INDEPENDENT RESEARCH AND DEVELOPMENT

HEARINGS

BEFORE THE

SUBCOMMITTEE ON RESEARCH AND DEVELOPMENT

OF THE

COMMITTEE ON ARMED SERVICES

AND THE

SUBCOMMITTEE ON PRIORITIES AND ECONOMY IN GOVERNMENT

OF THE

JOINT ECONOMIC COMMITTEE

UNITED STATES SENATE

NINETY-FOURTH CONGRESS

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INDEPENDENT RESEARCH AND DEVELOPMENT

WEDNESDAY, SEPTEMBER 17, 1975

U.S. SENATE, SUBCOMMITTEE ON RESEARCH AND DEVELOPMENT OF THE SENATE ARMED SERVICES COMMITTEE, AND SUBCOMMITTEE ON PRIORITIES AND ECONOMY IN GOVERNMENT OF THE JOINT ECONOMIC COMMITTEE,
Washington, D.C.

The subcommittees met, pursuant to notice, at 2 p.m., in room 1114, Everett M. Dirksen Office Building, Hon. Thomas J. McIntyre (chairman).

Present: Senators McIntyre (presiding), Proxmire, and Leahy.

Also present: Hyman Fine and Richard Kaufman.

Senator MCINTYRE. The committee will come to order.

Today we begin joint hearings on the important subject of Independent Research and Development, which I will refer to as I.R. & D. For the purposes of these hearings, the term I.R. & D. includes Bid and Proposal elements of cost.

Today marks the culmination of an agreement reached between myself and my good friend and cochairman, Senator Proxmire, 2 years ago when the Senate debated the military procurement bill for fiscal year 1974.

At that time, Senator Proxmire, who is with us today, introduced an amendment which, if adopted, would have reduced I.R. & D. funds by 50 percent. However, the amendment was withdrawn when we agreed to request the Comptroller General to conduct an in-depth investigation of the underlying assumptions and the overall justification of the I.R. & D. program, as well as into the implementation of the current provisions contained in section 203, Public Law 441, and Department of Defense applicable regulations.

The Comptroller General has completed this study and his report was made on June 5, 1975. Without objection, the full text of this report and the previous partial report dated August 16, 1974, will be placed at this point in the hearing record.

[Reports follow:]

[By the Comptroller General of the United States, August 16, 1974]

REPORT TO THE SUBCOMMITTEES ON RESEARCH AND DEVELOPMENT, COMMITTEE ON ARMED SERVICES, U.S. SENATE, AND PRIORITIES AND ECONOMY IN GOVERNMENT, JOINT ECONOMIC COMMITTEE, CONGRESS OF THE UNITED STATES

PARTIAL REPORT—IN-DEPTH INVESTIGATION INTO INDEPENDENT RESEARCH AND DEVELOPMENT AND BID AND PROPOSAL PROGRAMS, DEPARTMENT OF DEFENSE

COMPTROLLER GENERAL OF THE UNITED STATES,
Washington, D.C.

TO THE CHAIRMEN OF THE SUBCOMMITTEES ON RESEARCH AND DEVELOPMENT, SENATE COMMITTEE ON ARMED SERVICES, AND PRIORITIES AND ECONOMY IN GOVERNMENT JOINT ECONOMIC COMMITTEE:

Your letter of October 8, 1973, requested an in-depth investigation of the underlying assumptions and the overall justification of the independent research and development (IR&D) and bid and proposal (B&P) programs. Also, you asked us to consider the implementation of section 203 of Public Law 91-441 and Depart-

ment of Defense (DOD) regulations. In regard to the latter, we refer you to our recent report to the Chairman of the Senate Committee on Armed Services (B-164912, May 1, 1974).

You enclosed a list of 22 questions to be answered as part of our examination. We previously notified you that, because of the extensive effort required to adequately fulfill your request, we will not have a full report until the fiscal year 1976 authorization and appropriation cycle. For this partial report, we have

—analyzed and reconciled the costs of IR&D and B&P programs as reported by DOD for the years 1968 through 1973 (questions 1 to 5);

—explored the availability of information on the costs of administering the programs (question 6);

—considered whether certain types of costs (directed toward new business promotional and nontechnical services, etc.) are allowed and reimbursed IR&D and B&P under DOD's regulations (questions 8 and 9); and

—evaluated the procedures implemented by DOD for contractors not meeting the $2 million threshold prescribed by section 203 for advance agreements and technical reviews (question 10).

Each of these matters is covered in detail in the summaries which follow. These summaries are based on information obtained during previous and current GAO reviews at DOD, the Defense Contract Audit Agency; the Atomic Energy Commission, the National Aeronautics and Space Administration, and the Council of Defense and Space Industry Associations.

We have not obtained formal comments on this report from agency heads but have discussed it with DOD officials.

As your offices agreed, we are sending copies to the Chairman of the House and Senate Committees on Appropriations, Armed Services, and Government Operations and to Representative Gubser at his request. Also, as agreed, we are sending copies to the Director, Office of Management and Budget; the Secretary of Defense; the Director of Defense Research and Engineering; the Secretaries of the Army, Navy, and Air Force; the Director, Defense Contract Audit Agency; the Chairman, Atomic Energy Commission; the Administrator, National Aeronautics and Space Administration; and the Council of Defense and Space Industry Associations.

ELMER B. STAATS,
Comptroller General of the United States.

QUESTIONS 1 TO 5—DEFENSE CONTRACT AUDIT AGENCY REPORTS ON I.R. & D. AND B. & P. COSTS

Question 1. The DCAA audits of IR&D costs show that the ratio of IR&D costs to defense sales increased from 2.73 percent in 1968 to 3.83 percent in 1972. What accounts for this increase? What is the rationale to support a high level of contractor IR&D expenditures even in the face of declining defense sales?

Answer. DOD's share of IR&D, B&P, and other technical effort (OTE) costs of major defense contractors for contractor fiscal years 1968–73 is shown below. We include defense sales to show the percentage of such costs to DOD sales. Amounts were compiled by DCAA.

TABLE 1.—DOD'S SHARE OF I.R. & D., B. & P., AND OTE COSTS OF MAJOR DEFENSE CONTRACTORS AND SALES TO DOD FOR FISCAL YEARS 1968–73

[Dollar amounts in millions]

	I.R. & D. and B. & P.					Defense sales	Percent of costs to DOD sales	
	I.R. & D.	B. & P.	Total	OTE	Total		I.R. & D. and B. & P.	I.R. & D. B. & P., and OTE
1968	$338	$271	$609	$64	$673	$22,275	2.73	3.02
1969	410	289	699	79	778	22,692	3.08	3.43
1970	376	278	654	60	714	21,315	3.07	3.35
1971	354	265	619	49	668	19,568	3.16	3.41
1972	392	306	698	34	732	19,117	3.65	3.83
1972 [1]	392	306	698	37	735	19,117	3.65	3.85
1973	441	346	787	32	819	20,941	3.76	3.91

[1] DCAA recently updated its 1972 OTE figure and completed its compilation of 1973 figures.

The two percentages cited in question 1 are not comparable. The 2.73 percent was based on the costs of IR&D and B&P, and the 3.83 percent was based on IR&D, B&P, plus OTE. Many other factors affect any year-by-year comparison of IR&D and B&P costs.

Burdening

Burdening is the accounting practice of adding a proportionate share of overhead to the direct costs of a particular project. Some contractors have always allocated an appropriate share of indirect and administrative costs to IR&D, consistent with their accounting policies. Other contractors have began to burden IR&D at various times during the past years. Effective January 1, 1972, all contractors were required by Defense Procurement Circular 90 to burden B&P as well as IR&D with all applicable indirect costs except general and administrative expense.

As a result, IR&D and B&P costs from 1968 to 1973 increased by amounts representing burden added by contractors for the first time although contractor effort did not increase. The increases in IR&D and B&P costs solely for first-time burdening were $32 million in 1972 and $55 million in 1973. The amounts of burden included in prior years is not available.

OTE

Changes in OTE reporting requirements also affect the comparison of IR&D and B&P cost data. These changes are discussed in the answer to question 3.

Foreign military sales

The sales data in table 1 includes sales to foreign governments which were placed through DOD contracts. The foreign government reimbursed DOD for these sales, as well as the applicable IR&D and B&P costs allocable to the sales.

Foreign military sales for 1972 totaled about $435 million, including about $13.8 million of IR&D and B&P costs. Comparable figures for 1973 were $962 million and $36 million, respectively. Consequently, DOD's net share of IR&D and B&P costs reported for 1972 and 1973 is overstated by $13.8 million and $36 million, respectively. DOD sales data should also be reduced by the amount of the foreign sales.

All prior years would require similar adjustments. However, information on the amount of IR&D and B&P included in foreign sales for prior years is not available.

Inflationary trend

Following is a summary of total IR&D and B&P costs and DOD's share. The dollar amounts and the percent of sales to DOD were extracted from DCAA reports. This table differs from table 1 in showing costs incurred by the contractors and amounts accepted by the Government for allocation to all work performed by the contractor, a share of which is then absorbed by the Government.

TABLE 2.—I.R. & D. AND B. & P. COSTS

[Dollar amounts in millions]

	Contractor costs			Accepted by Government			DOD share		
	I.R. & D.	B. & P.	Total	I.R. & D.	B. & P.	Total	I.R. & D.	B. & P.	Total
1968	$776	$381	$1,157	$579	$367	$946	$338	$271	$609
1969	808	426	1,234	653	409	1,062	410	289	699
1970	753	413	1,166	597	398	995	376	278	654
1971	703	427	1,130	567	390	957	354	265	619
1972	936	469	1,405	725	432	1,157	392	306	698
1973	1,051	526	1,577	809	488	1,297	441	346	787

DOD'S SHARE OF I.R. & D. AND B. & P. COSTS

	Percentage of contractor costs			Percentage accepted by Government			Percentage of sales to DOD
	I.R. & D.	B. & P.	Total	I.R. & D.	B. & P.	Total	
1968	44	71	53	58	74	64	68
1969	51	68	57	63	71	66	62
1970	50	67	56	63	70	66	65
1971	50	62	55	62	68	65	61
1972	42	65	50	54	71	60	63
1973	42	66	50	55	71	61	61

The above table shows that contractors' costs declined from 1969 through 1971 by about 8.4 percent. DOD's share declined at an even greater rate, about 11.5 percent. DOD's share of contractor's costs increased about 12 percent in 1972 over 1971.

However, these costs have not been adjusted for the impact of inflation. We know of no research and development cost index. The National Science Foundation, in the absence of a reliable index, used the gross national product price deflator in its reports on funds supporting research and development for 1968 through 1973.

Year	Price index	Year-to-year increase
1968	104.01	4.01
1969	109.02	5.01
1970	115.01	5.99
1971	120.42	5.41
1972	124.25	3.83
1973	130.91	6.66

Using a base year of 1967, the table indicates the inflationary trend, i.e., products or services purchased for $100 in 1967 would cost $104.01 in 1968 and would cost $130.91 to purchase in 1973.

We have not attempted to convert current IR&D and B&P dollars to constant dollars. The gross national product deflator includes price changes of all goods and services in the economy and therefore can only indicate approximate changes in costs of inputs specifically related to research and development.

Based on discussion with the cognizant National Science Foundation official, we believe there is some merit to the contention that salaries of scientists and engineers and, especially, costs of complex equipment have increased at a rate higher than that of the overall economy.

Support during declining sales

DOD has found that, in times of declining sales, contractors' emphasis in IR&D will generally shift to efforts with shorter range payoff, as a means of survival. Greater B&P activity will also result. Initially, the amount of resources devoted to these endeavors may rise at the expense of other, less critical functions of the company. As sales continue to decline, however, IR&D and B&P actual dollar resources will start to decline even though IR&D and B&P as a percentage of company resources may increase even more at the expense of other company functions.

DOD finds that this same pattern will generally follow in negotiations of advance agreements with major defense contractors. In periods of declining defense sales and increasing commercial sales. establishing relatively constant IR&D and B&P ceilings will reduce DOD's actual dollar participation. Table 2 shows that DOD's percentage share of contractor costs declined from 1969 to 1972, as did sales to DOD by these contractors. (See table 1.)

DOD points out that it has the responsibility to maintain a base of competent contractors capable of competitive efforts in every critical defense technology area. This responsibility is often in direct conflict with any policy which would follow the forces of the marketplace relative to the level of IR&D and preclude a high level of support during declining defense sales.

Question 2. Reconcile the apparent inconsistencies in the figures for IR&D expenses from 1968 to 1972 between your April 16, 1973, report, reports by DCAA, and the figure given by DOD to the Senate Armed Services Committee as printed in the Committee report of September 6, 1973.

Answer. Much of the confusion regarding the varying IR&D and B&P cost figures stems from the fact that DCAA releases two sets of figures applicable to each year—one in the year immediately following the year in whihc the costs were incurred, based to some extent on estimated costs, and updated figures in the second following year. Table 3 identifies the source of figures referred to in question 2.

TABLE 3.—I.R. & D., B. & P., AND OTE COSTS REPORTED BY THE SENATE ARMED SERVICES COMMITTEE, GAO AND DCAA

[In millions of dollars]

	I.R. & D. and B. & P. costs	TOE costs	Total	Defense sales
1968:				
Senate report [1]				
GAO report [2]			673	22,275
DCAA report March 1970	609	64	673	22,275
1969:				
Senate report			[3] 754	
GAO report			778	22,692
DCAA report March 1971	699	79	778	22,692
1970:				
Senate report			714	
GAO report			714	21,315
DCAA report March 1972	654	60	714	21,315
1971:				
Senate report			[4] 668	
GAO report			673	[4] 19,655
DCAA report March 1973	619	49	668	19,568
1972:				
Senate report			[5] [6] 738	
GAO report			[6] 704	[6] 18,385
DCAA report March 1973	704	(7)	[6] 704	[6] 18,385
DCAA report March 1974	698	(7)	698	19,117

[1] Dated Sept. 6, 1973.
[2] Dated Apr. 16, 1973.
[3] Consists of I.R. & D/B. & P. costs of $675,000,000 reported by DCAA in its March 1970 report plus $79,000,000 of OTE costs. The $675,000,000 was subsequently corrected to $699,000,000. The $699,000,000 of I.R. & D. and B. & P. plus OTE of $79,000,000 equals the $778,000,000 reported by DCAA and GAO.
[4] Preliminary amounts reported by DCAA in March 1972.
[5] Includes $34,000,000 of OTE costs which are not considered of an I.R. & D. and B. & P. nature, as in prior years, because of the redefinition and reclassification of such costs effective in 1972. (See answer to question 3.)
[6] Preliminary figures. The final figures for 1972 appear in the DCAA March 1974 report.
[7] DCAA stopped reporting OTE after 1972.

Question 3. In its report to Congress, DOD includes an amount for "other technical effort (OTE)" in its IR&D figures. What are the audit substantiated amounts for OTE for the years 1968 to the present? Why are these amounts not included in the DCAA audit report? Do the same rules apply for OTE as for IR&D and B&P costs?

Answer. The miscellaneous technical costs of operating a contractor's facility, which were not classified as IR&D or B&P, came to be known collectively as OTE. Although not a clearly defined group, these costs were cumulatively reported by DCAA as OTE. They did not necessarily represent audited amounts and, for the most part, were extracted from contractor's records. OTE reports were prepared and submitted in conjunction with IR&D and B&P reports through 1971. (For OTE amounts, see table 3.)

In the late 1960s, DOD became concerned that costs for designing and developing new products or improving existing products, and accumulated under such account titles as feasibility studies, capability studies, proposal efforts, predesign studies, product development, and product improvement, should properly be considered as IR&D and B&P. Other accounts, such as technical equipment maintenance, sales engineering, and advanced marketing, even though technical efforts, were clearly not directed toward new or improved products.

Because of this concern, the definition of IR&D was revised to include "systems and other concept formulation studies [such as] analyses and study efforts either related to specific IR&D efforts or directed toward the identification of desirable new systems, equipments or components." The definition of basic and applied research remained substantially the same while the definition of development was revised to clarify the types of technical effort, such as design engineering, prototyping, and engineering testing, to be included.

B&P had been simply defined as the costs of preparing bids and proposals on potential Government and non-Government contracts or projects, including the necessary supporting engineering and cost data. Upon completion of the study, the definition was revised and expanded to include the costs incurred in preparing, submitting, and supporting bids and proposals, whether or not solicited, on potential Government or non-Government contracts which fall within the definitions of administrative costs and technical costs.

These changes were published in Defense Procurement Circular 90 September 1, 1971. Revisions in contractors' accounting practices, to provide cost data required by these changes, were to become effective for the contractors' first fiscal year starting on or after January 1, 1972. This substantially removed costs which were in the nature of IR&D and B&P from other overhead accounts. However, contractors continue to incur certain technical costs in overhead accounts which are not part of IR&D or B&P effort.

With the revised definitions of IR&D and B&P, DOD felt that it was unnecessary to continue to compile a summary of OTE costs because items remaining in that category should no longer be considered as similar to IR&D and B&P. DCAA auditors are still expected, however, to review OTE costs to insure that they are properly identified and classified.

DCAA said that about $14 million of costs incurred during 1972 for the types of projects previously classified as OTE had now been included as costs for projects in the IR&D and B&P category. DCAA auditors identified an additional $34 million in 1972 of OTE costs that were not in that category. This total of $48 million compares to the $49 million of OTE reported during 1971. DCAA identified $32 million of costs in 1973 which would have been reported as OTE prior to 1972 but are not IR&D and B&P type of costs.

The IR&D and B&P ceilings do not apply to OTE. OTE costs are recoverable through the normal overhead rate. Therefore, for the years 1968 through 1971, it can be assumed that some unknown portion of OTE, under current definitions, should have been classified as IR&D or B&P. The remainder should not have been considered in cost analyses relating to either IR&D or B&P.

Question 4. The DCAA audit report of IR&D covers only those defense contractors with "an annual auditable volume of costs incurred of $15 million or more and other contractors who, although not meeting the auditable volume criteria, required 4,000 or more man-hours of DCAA's direct audit effort per year".

What does the term "auditable volume" of costs incurred mean? What is the difference between auditable volume of costs and total defense sales (including both prime contracts and defense subcontracts)? What is your estimate of total IR&D, *including* contractors that do not meet the criteria of $15 million of annual auditable costs incurred or $4,000 man-hours of defense audit effort?

Answer. The term "auditable volume" of costs incurred means costs related to negotiated flexibly priced contracts, as opposed to firm fixed-price contracts, which DCAA audits to determine either the actual or projected total contract costs. Examples of such contracts are cost-plus-fixed-fee, fixed-price redeterminable, fixed-price incentive, and cost-plus-incentive-fee. A contractor who meets the DCAA criteria of having $15 million or more of auditable volume of costs or requiring more than 4,000 man-hours of direct audit effort a year is included in the DCAA annual report.

Total defense sales, as reported by DCAA, means total sales prices of all contracts where DOD is the ultimate customer, including total sales under firm fixed-price contracts and/or subcontracts.

Neither we nor DCAA have any data to determine how much additional IR&D and B&P costs are paid to contractors who do not meet the criteria for inclusion in their annual report. DCAA said that getting any further detailed data would necessitate an inordinate amount of work, requiring a survey of 350 field audit offices and involving data collection of approximately 3,300 contractors. Even then, such a survey would only account for some of the smaller DOD contractors. The IR&D data of major contractors not included in the DCAA annual reports is not available to DCAA. Contracts are either awarded to those contractors on a firm, fixed-price, competitive basis or are based upon rates or schedules set by law and thus are not susceptible to DCAA audit.

We recognize the absence of data pertaining to some unknown portion of the IR&D and B&P paid by DOD. This figure has in the past been roughly estimated to represent 10 to 15 percent of the total. We plan to explore further the feasibility of reasonably estimating this amount.

Question 5. The IR&D figures reported to Congress are based on a DCAA statistical report covering 77 defense contractors. The top 77 defense contractors account for only 69 percent of defense prime contracts. How much additional IR&D costs are reimbursed by the DOD to divisions, contractors, and subcontractors not covered in the DCAA report?

Answer. As explained under question number 4, neither GAO nor DCAA has any data to determine how much additional IR&D/B&P costs are paid by DOD. We plan to explore the matter.

QUESTION 6—COSTS OF ADMINISTERING I.R. & D. AND B. & P. PROGRAMS

Question 6. What is the total in-house cost of administering the IR&D program—include the cost of reviewing contractor proposals, DOD negotiation teams, technical review effort, administration of disputes, etc.? What are the comparable costs for AEC?

Answer. W asked DOD if such costs were maintained and, if not, could it estimate costs which could be verified by us.

DOD replied that no accounting or reporting system had been established which directly relates DOD administrative costs to IR&D an B&P. Further, there is documentation that would provide a basis for estimating, with any sense of traceability, costs of time spent in prenegotiation preparation, preparation of correspondence, position papers, reports, advance agreements, supervision policy material, or other administrative support. These costs would have to be estimated by participating personnel on the basis of their recollection and could not be verified by audit.

Supporting documentation, such as lists of participating personnel and travel records, could be used to estimate roughly the time spent and costs involved in onsite technical evaluations of contractors' proposed programs. Because of the roughness of any such estimates, we did not obtain this unauditable information.

AEC does not maintain a system that will produce the in-house cost of administering IR&D and B&P programs, which involve a relatively minor portion of its overall contract negotiation and administrative effort. Therefore, AEC does not believe that the results produced by such a system would be commensurate with the cost. AEC was also unable to provide an estimate of in-house costs on an auditable basis. An estimate by one of the AEC offices most involved in IR&D activities indicated it to be very minor.

NASA also does not separately account for the costs of administering its IR&D program. NASA acknowledged that one of the important advantages of its cooperation with DOD is the administrative economy of such an arrangement. NASA's in-house costs of administering its program are relatively small compared to what they would be if it had to assume the burden of an independent technical review and negotiation function.

Although not included in the scope of the question, a major factor in administering these programs is the contractors' costs. The seven contractors covered in our 1973 report to the Chairman of the Senate Committee on Armed Services said then that the increased emphasis on technical evaluations and relevancy reviews had increased administrative costs for them. Four contractors furnished estimates which showed, cumulatively, increased costs of between from $500,000 to more than $1 million. Three other contractors did not quantify the amount that their expenditures had risen. Some acknowledged improvements in management controls stemming from the expenditures.

One of these contractors recently affirmed that its visible costs for administering IR&D and B&P ran from $500,000 to $750,000 annually. The contractor attributes about two-thirds of these costs to the special handling required by Public Law 91-441. Another believed the administrative and management costs equaled about 50 percent of the total program costs. Still another contractor, whose administrative costs exceeded $1 million annually, believes these costs have not been greatly affected by requirements of the law.

In conclusion, Government in-house costs and contractor costs of administering IR&D and B&P are probably substantial in view of the number of people involved and the time spent. However, these costs are not quantified. We will look into the possibility of obtaining a rough estimate of them.

Questions 8 and 9—Contractor costs accepted by DOD in IR&D and B&P.

Question 8. Does DOD pay contractors' cost for: (*a*) research and development projects primarily of a promotional nature, such as projects directed toward the development of new business or projects connected with proposals for new business; (*b*) studies or projects which are undertaken, in whole or in part, for other customers; and (*c*) projects which represent unwarranted duplication of other research and development work sponsored by the DOD? Cite examples if any such costs are paid.

Question 9. Do Bid and Proposal costs paid by DOD include negotiating and promotional costs or the cost of salesmen, representatives or agents who do not provide technical services in connection with bids or proposals?

Answers 8 and 9. The request of October 8, 1973, states that, for the purposes of this study, the term IR&D is inclusive of B&P. In answering the above questions, however, we have assumed that question 8 pertains only to IR&D exclusive of B&P, since question 9 is specifically directed at B&P costs.

New business projects in IR &D.

The overall intent of DOD in supporting IR&D is to encourage the evolution and maintenance of a strong, up-to-date, and creative technology-based industry, from which DOD can draw both new concepts and rapid competitive responses to meet its requirements.

The Armed Services Procurement Regulation (ASPR), in defining IR&D, allows technical effort of projects directed at new business. Projects allowable as IR&D include (1) applied research to exploit the potential of scientific discoveries or improvements and attempts to advance the state of the art, (2) projects to design, develop, test, or evaluate a potential new product or service, or improve an existing product or service, and (3) analyses and studies directed toward indentifying desirable new systems, equipment, or components or desirable modifications and improvements to existing ones.

DOD's policy is to allow, as charges to overhead, costs of IR&D projects which are judged to be relevant to DOD's mission and responsibility and which, in the aggregate, are not unreasonable in total dollar value as measured by what a prudent business man would expend in operating his business.

Based on IR&D projects examined in our past work; reviews of contractors' procedural guidelines; and discussions with contractor officials and DOD personnel, including contract auditors; it is clear that contractors undertake IR&D projects to obtain new business. The projects we examined were largely technical in content rather than related to selling or marketing activities.

Projects for other customers

DOD is aware that IR&D accepted for allocation to Government and commercial contracts may result directly in products which both DOD and other customers desire. Some IR&D relevant to DOD may also be of interest to other customers of the contractor. On the other hand, IR&D primarily directed toward commercial customers may be of interest to DOD and the Government.

The percentage of IR&D relevant to DOD is generally much greater than the percentage of DOD's participative share. Therefore, DOD believes that it receives benefits considerably greater than its dollar share in those cost centers involving a mix of DOD and commercial business. Our previous studies have shown that military relevant projects in all cases exceeded the negotiated ceilings which DOD agreed to accept for allocation to all customers. For example, in 1973 DOD absorbed $441 million as its share of the $809 million of IR&D accepted by the Government, the better part of which had in the past been relevant to DOD. Also, contractors incurred an additional $242 million for IR&D projects, some of which were relevant to DOD. (See table 2.)

Duplication of research

DOD acknowledges that creating and maintaining multiple bidding sources in the various technologies necessarily results in some duplicative effort among contractors in any particular area. DOD believes that this duplication provides alternate approaches to a problem and is thus beneficial to some degree.

In 1970 we reported to the Congress (B–164912, February 16, 1970) our belief that a data bank on contractors' IR&D programs would be of benefit to Government personnel in selecting research projects. A DOD official agreed that a systematic method of diseminating information on IR&D projects would be useful in avoiding unnecessary duplication in Government-sponsored research. DOD subsequently established a data bank, which is still in a trial period to end July 1, 1975. In view of the proprietary nature of the contractors' IR&D programs, such information is confined to Government personnel.

Although some of the duplication might be eliminated by exchange of information between contractors, this is not feasible because of the proprietary nature of IR&D. DOD states that it has no authority to single out and support a limited number of competitors in any specific product area.

AEC policy on allowance of contractor IR&D costs

The costs described in question 8 are excluded from acceptance by AEC's procurement regulations, which allow IR&D costs only to the extent to which they provide a direct or indirect benefit to the particular contract work. AEC's rationale for restricting its support of these costs is due to a large extent to its type of operation.

AEC's procurement has been concentrated in relatively narrow technical fields where the Government has developed and continues to develop most of the technology. AEC does not rely primarily upon private industry using contractor-owned facilities and is not concerned with contractors maintaining a nuclear

research and development capability, since most of AEC's activities are conducted and financed in a Government-owned, contractor-operated environment.

On the other hand, a part of DOD's rationale for supporting IR&D is the development and maintenance of competition. DOD concludes that the complexities of the technological areas, the many avenues and alternatives requiring exploration within any one technology, and the need for two or more competent and competitive contractors in each technology, all combine to justify the current approach to IR&D as not being unwarranted duplication of other research and development work sponsored by DOD.

Negotiating, promotional, nontechnical costs in B&P

ASPR distinguishes between B&P costs and selling costs, defining the latter as sales promotion, negotiation, liaison between Government representatives and contractor personnel, and other related activities. DOD, therefore, stated that selling and promotional costs of the type usually associated with these words are not allowed as part of B&P.

ASPR defines B&P to include two types of costs incurred in preparing, submitting, and supporting bids and proposals on potential contracts—(1) administrative costs incurred for nontechnical effort in the physical preparation of the technical proposal documents and for technical and nontechnical effort in the preparation and publication of supporting cost and other administrative data and (2) technical costs incurred to specifically support a bid or proposal, including systems and concept formulation studies and the development of engineering data.

An allocable share of B&P is recoverable on Government contracts as an indirect cost, subject to any limiting agreement negotiated in advance.

The contractor's negotiation team that meets with Government personnel will include nontechnical people concerned with the negotiation of price and other nonengineering aspects of the contract. DOD said that these people may charge their time to the B&P project established by the contractor for the solicitation under consideration. Other nonengineering personnel at the contractor's facility who assist in preparing cost and pricing data and proposed contract provisions may also charge their time to B&P. However, this practice is not followed by all contractors; frequently such personnel charge their time to the overhead organization in which they work, such as the Controller's or General Counsel's offices. Either practice is permitted under ASPR.

According to resident auditors at two contractors' plants, B&P costs generally do not include nontechnical services as direct charges. Direct charges to B&P are almost exclusively technical support. However, B&P costs are burdened with a proportionate share of allowable nontechnical effort other than general and administrative overhead.

A defense audit agency official located at another defense contractor's plant said that the ASPR definition of B&P does not include marketing functions of sales promotions, negotiations, and related activities. ASPR allows contractors to recover, as indirect costs not considered B&P costs, the full amount of selling costs for marketing their products, subject only to tests for allocability and reasonableness.

The defense contract audit manual specifies that selling costs should be appraised for a recognizable benefit to the Government in consonance with the amount included in the contractor's claims or cost representations. If it can be established that useful and desirable information on technical matters concerning existing contracts were discussed during visits by contractor personnel to Government procurement offices, the resulting costs may be considered to result in benefit to the Government.

Our limited inquiry of contractors' practices indicated that most B&P activity involves preparation of proposals or quotations in response to known needs of customers. Contractors' accounting manuals generally correspond to the ASPR provisions. We did not find in any B&P projects examples of personnel engaged in accelerated advertising or promotional activities. For each contractor in our sample, the resident auditor had similar negative findings from his more in-depth reviews over the past several years.

We conclude that, since contractors can recover reasonable amounts of selling expenses in their entirety, they have no incentive to charge them to B&P. B&P expenses, recovery of which may be limited, are primarily used for technical activities responding to stated, or in some instances anticipated, needs of customers.

QUESTION 10—DOD PROCEDURES FOR CONTRACTORS BELOW $2 MILLION THRESHOLD

Question 10. Public Law 91-441, Section 203, provides that appropriated funds may not be spent for IR&D unless the Secretary of Defense determines that the IR&D has potential military value. However, it appears that DOD does not technically review IR&D proposals in cases where it is charged less than $2 million a year. What is your evaluation of the adequacy of DOD's technical review of such program? Of the $700 million in IR&D expenses in 1972, how much goes to contractors under the $2 million ceiling? What is the Comptroller General's opinion of the legality of IR&D payments made in the absence of any technical review as to potential military value? Would it be feasible to lower the

Answer. Section 203 precludes payment by DOD of IR&D or B&P unless the work has, in the opinion of the Secretary of Defense, a potential military relationship and other requirements are met, one of which is the negotiation of advance agreements with all companies which, during the last preceding year, received more than $2 million of IR&D or B&P from DOD.

DOD interpreted the statute to require a relevancy test only for projects of major companies, those which received payment of more than $2 million from DOD for IR&D and B&P DOD believed that the following factors supported this conclusion.

1. DOD deals with thousands of contractors, an unknown number of which may incur IR&D expense and all of which incur B&P expense.

2. DOD does not have the personnel resources to perform technical and relevancy reviews for hundreds or thousands of contractors.

3. Many contractors with limited amounts of Government sales would probably not assume the burden of submitting IR&D and B&P data.

DOD told us that, before section 203 was implemented, DOD furnished and discussed drafts of its implementation policy with staff personnel of the Senate and House Committees on Armed Services. Although no official concurrence was requested or received, no opposition was expressed.

In our April 1972 report to the Chairman of the Senate Committee on Armed Services, we agreed that DOD's interpretation was administratively sound but suggested that the Congress might want to clarify the intent of the law. In the absence of further guidance, DOD does not make a technical review or relevancy determination for IR&D and B&P projects of contractors under the $2 million threshold.

It is our opinion that section 203(a)(2) does not expressly call for a technical review of the projects of a contractor with which an advance agreement is not required. For such cases, the act merely states that the opinion of the Secretary of Defense that the contractor's work has a potential military relationship is required. Since the word "opinion" implies an element of discretion and the act does not specifically require that such "opinion" be based on a technical review of the contractor's projects, we are unable to conclude that DOD payments of IR&D in the circumstances described are contrary to law.

Amount paid by DOD to contractors under the $2 million ceiling

Of the $698 million reported to the Congress by DCAA as paid by DOD in 1972 for IR&D and B&P, about $20 million was paid to contractors who received less than $2 million from DOD for IR&D costs during 1971. These contractors were included in the report because they met other criteria (auditable volume of costs, etc.). In addition, an unknown amount of IR&D and B&P was paid to other contractors under the $2 million threshold and not included in the report. DCAA has no practicable means of estimating the amount paid to contractors not meeting the criteria for inclusion in its report. We plan to explore the matter. (See question 4.)

Lowering of the $2 million threshold

DOD does not recommend any change in the $2 million threshold. It feels the present language covers all major contractors and the number should not be increased because of the additional workload involved. Neither does it want to lessen its surveillance, so it does not advocate any change that would reduce the number of contractors with which advance agreements are negotiated.

One contractor told us that it had observed the volume of effort involved with evaluating programs and the limited number of projects that had been determined not to be relevant. Therefore, in its judgment it would not be practicable or cost effective to attempt to lower significantly the threshold above which a relevancy determination would be required of DOD.

WEMA, an industry association representing many smaller companies, expressed the opinion that Congress recognized the administrative burden and expense involved in the negotiation of advance agreements and therefore, in drafting the statute, limited its application by establishing a threshold of $2 million of IR&D or $2 million of B&P expense. WEMA believes that DOD, by establishing the threshold at $2 million of IR&D and B&P combined, extended these controls beyond the congressional interest and added to contractors' indirect expenses.

A formula for determining the allowability of IR&D and B&P is used by DOD for contractors below the $2 million threshold. WEMA believes the formula is highly practical and economical for these numerous cases that represent a small fraction of the dollars. Because the formula does not provide for a precise determination of potential military relationship and the lack of such a determination has been questioned, WEMA hopes that any inquiry will not lead to stricter interpretation and enforcement where administrative expense would exceed any possible return.

We believe that the pros and cons of changing the threshold should be evaluated thoroughly before any change is made in the $2 million standard. Lowering the threshold significantly might not justify the additional administrative costs to DOD and the contractors. On the contrary, assuming that relevancy determinations will be a continuing requirement and that inflation will continue, additional companies could exceed the $2 million threshold and advance agreements and the accompanying reviews and evaluations could become necessary.

REPORT TO THE SUBCOMMITTEES ON
RESEARCH AND DEVELOPMENT
SENATE COMMITTEE ON
ARMED SERVICES
AND
PRIORITIES AND ECONOMY
IN GOVERNMENT
JOINT ECONOMIC COMMITTEE

Contractors' Independent Research And Development Program--Issues And Alternatives

Department of Defense

BY THE COMPTROLLER GENERAL
OF THE UNITED STATES

PSAD-75-82

JUNE 5, 1975

COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-164912

The Honorable Thomas J. McIntyre, Chairman
Subcommittee on Research and Development
Committee on Armed Services
United States Senate
and
The Honorable William Proxmire, Chairman
Subcommittee on Priorities and Economy
in Government
Joint Economic Committee
Congress of the United States

As requested in your letter of October 8, 1973, we are reporting on the issues relating to the Government's support of the contractors' independent research and development program.

We are recommending that, if financial support for independent research and development is to be continued, the Congress clarify the policy for such support.

We have not obtained formal comments on this report from agency heads but have considered the views of Department of Defense and other agency officials.

As your office agreed, we are sending copies to the Chairmen of the House and Senate Committees on Appropriations, Armed Services, and Government Operations. Also, as agreed, we are sending copies to the Director, Office of Management and Budget; the Secretary of Defense; the Director of Defense Research and Engineering; the Assistant Secretary of Defense (Installations and Logistics); the Secretaries of the Army, Navy, and Air Force; the Director, Defense Contract Audit Agency; the Administrator, Energy Research and Development Administration; the Administrator, National Aeronautics and Space Administration; and the Council of Defense and Space Industry Associations.

Comptroller General
of the United States

C O N T E N T S

ABBREVIATIONS

AEC	Atomic Energy Commission
ASPR	Armed Services Procurement Regulation
B&P	bid and proposal
CWAS	contractor's weighted-average share
DCAA	Defense Contract Audit Agency
DOD	Department of Defense
DPC	Defense Procurement Circular
G&A	general and administrative
GAO	General Accounting Office
IR&D	independent research and development
NASA	National Aeronautics and Space Administration
PMR	potential military relationship
R&D	research and development
RDT&E	research, development, test, and evaluation

COMPTROLLER GENERAL'S
REPORT TO THE SUBCOMMITTEES ON
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JOINT ECONOMIC COMMITTEE

CONTRACTORS' INDEPENDENT RESEARCH AND DEVELOPMENT PROGRAM--ISSUES AND ALTERNATIVES
Department of Defense

D I G E S T

Independent research and development (IR&D) is that part of a contractor's total research and development program not required to be performed by a contract or grant. The contractor decides on the independent research and development areas undertaken to maintain and improve its ability to compete for future products and services. (See p. 4.)

GAO recommends that, if financial support for IR&D is to be continued, the Congress clarify the policy for such support by establishing guidelines which set forth:

--The purposes for which the Government supports IR&D costs.

--The appropriate amount of this financial support.

--The degree of control to be exercised by the Government over contractors' supported programs. (See p. 88.)

The Commission on Government Procurement examined this subject in detail. (See p. 79.) The report of the Commission, as well as this report, should assist the Congress by providing information on which judgments can be reached.

The Chairman of the Research and Development Subcommittee and the Chairman of the Subcommittee on Priorities and Economy in Government asked GAO to present alternatives for consideration.

PSAD-75-82

In testimony before the Armed Services Committees in 1970, GAO suggested that the Congress may wish to consider, as an alternative policy, how greater use could be made of direct contracting to obtain contractors' research and development efforts. Also, GAO suggested that the Congress may wish to explore the extent to which agencies could identify development projects of the type now included in IR&D for review and authorization in the same manner as those that are funded from research and development appropriations.

In its current study, GAO obtained a wide range of Government and industry views on alternatives to the present method including:

--Establishing a line item in the agency budget for research and development now funded by IR&D and contracting direct with companies.

--Recovering IR&D through overhead by formula-type approaches.

--Allowing recovery through overhead only if there is benefit to the particular contract.

--Including IR&D as an element of profit.

--Removing most of the present controls. (See ch. 7.)

After studying the comments received on the various alternatives, GAO continues to support the views expressed in dissenting position 1 of the Commission on Government Procurement. Dissenting position 1 agreed with the majority position in recommending:

--Recognizing IR&D expenditures as being in the Nation's best interest to promote competition, advance technology, and foster economic growth.

--Establishing a policy recognizing IR&D efforts as necessary cost of doing business.

--Uniform treatment for IR&D, Government-wide, with exceptions treated by the Office of Federal Procurement Policy.

Dissenting position 1 also recommended, in part, a policy providing:

--That DOD procedures for negotiating advance agreements be retained when applicable and that, in all other cases, use of the DOD formula for reasonableness be continued.

--That Government have access to contractors' commercial records when needed to determine that costs are allowable.

--That nothing in this policy precludes a direct contract arrangement for specific research and development contracts proposed by a contractor.

--That allowable projects have a potential relationship to an agency function or operation in the opinion of the agency head. (See p. 89.)

An interagency committee of the executive branch considered the Procurement Commission's recommendation and dissenting positions and proposed adoption of the Armed Services Procurement Regulation policies and procedures for IR&D as a standard for the executive branch, with the relevancy requirement broadened to encompass relevancy to the Government's interest. (See p. 81.) If the Congress establishes a uniform, Government-wide policy of reimbursing IR&D expenditures similar to that provided for by the Armed Services Procurement Regulation, the Congress will have to consider the desirability of a test of Government-wide relevancy.

If a Government-wide policy is adopted, GAO recommends that the legislation also provide for:

--Having the Government present one face to industry; i.e., one advance agreement, a joint technical review, a single overhead rate, etc.

--Including in advance agreements patent and technical data provisions granting the Government royalty-free licenses and data rights, based on a scale of the agencies' cost participation.

If the Congress proceeds as above, the Federal agencies should consider:

--Having contractors continue to propose annual programs to the Government so that the technical data would be added to Government data banks.

--Making technical reviews less structured and not as administratively burdensome and encouraging intensive reviews and exchanges of views between Government and contractor personnel on defined areas of common concern. (See p. 90.)

CHAPTER 1

INTRODUCTION

During debate in the U.S. Senate on the bill to authorize appropriations for the Department of Defense (DOD) for fiscal year 1974, Senator William Proxmire introduced an amendment to reduce funds available to DOD for contractors' independent research and development (IR&D) and bid and proposal (B&P) costs by 50 percent. The amendment was later withdrawn after an understanding was reached with Senator Thomas J. McIntyre, Chairman, Subcommittee on Research and Development, Senate Committee on Armed Services, that a study would be requested of GAO.

By letter dated October 8, 1973 (see app. 1), the Senators requested an in-depth investigation into the underlying assumptions and overall justification of the IR&D (and B&P) program, as well as into the current provisions of law. Attached were 22 questions. We replied to some questions in our August 1974 report.[1] Appendix II shows where in that report or this one we have answered the 22 questions.

PREVIOUS STUDIES BY GAO

An earlier study of IR&D resulted in our 1970 report to the Congress on the policies and practices of DOD, the National Aeronautics and Space Administration (NASA), and the Atomic Energy Commission (AEC).[2] The study followed a report to the Congress in March 1967 on the need for improved control by DOD and NASA over the costs of bidding and related technical efforts charged to Government contracts.

In March 1971, in response to an inquiry by Senator Proxmire, we reported[3] that a line-item control of IR&D

[1] "Partial Report--In-Depth Investigation into Independent Research and Development and Bid and Proposal Programs" (B-164912, Aug. 16, 1974).

[2] "Allowances for Independent Research and Development Costs in Negotiated Contracts--Issues and Alternatives" (B-164912, Feb 16, 1970).

[3] "Feasibility of Treating Contractors' Independent Research and Development Costs as a Budget Line Item" (B-164912, Mar. 8, 1971).

payments to major defense contractors could be developed. But we felt that no further legislative controls should be imposed pending evaluation of the legislative restrictions that had become effective January 1, 1971 (Public Law 91-441).

At the request of the Senate Committee on Armed Services, we reported on DOD's implementation of section 203 of Public Law 91-441, which restricted DOD's payments for IR&D and B&P, for each of the first 3 years that the law was in effect.[1] These reports were concerned with the effectiveness of DOD's policies and regulations in implementing the restrictions imposed by section 203, recommending improvements in DOD's implementation, and ascertaining the effect of the law and DOD's regulations on defense contractors.

SCOPE OF REVIEW

In this study we have considered (1) the basic justifications given by Government and industry for maintaining Government support of IR&D programs, (2) how industry manages Government-supported IR&D programs as contrasted with other R&D programs, (3) whether IR&D program benefits can be tangibly measured, (4) whether the effectiveness of various tests and procedures instituted to limit IR&D and B&P costs justify their costs, and (5) alternatives to the present method of supporting IR&D.

We analysed the IR&D programs of four defense contractors for a 2-year period, identifying purposes or objectives of IR&D programs and examining DOD and contractor management of IR&D and B&P programs. We also used information obtained from (1) previous reviews at 11 contractor sites over a 2-year period, (2) DOD, NASA, AEC, and other Government agencies, (3) the Council of Defense and Space Industry

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[1] "Implementation of Section 203, Public Law 91-441, on Payments for Independent Research and Development and Bid and Proposal Costs" (B-167034, Apr. 17, 1972).
"Payments for Independent Research and Development and Bid and Proposal Costs" (B-167034, Apr. 16, 1973).
"Department of Defense's Implementation of Section 203, Public Law 91-441, Involving Contractors' Independent Research and Development" (B-164912, May 1, 1974).

Associations, its members, and individual contractors, and (4) individuals in Government, industry, educational, and other associations or institutions who contributed their views on various aspects of this report.

DOD and NASA generally follow the same policies with respect to IR&D and B&P. Although our study concentrated on DOD procedures, we included NASA's operation or position to the extent known. It is likely that most descriptions of DOD procedures also pertain to NASA even when not so indicated.

CHAPTER 2

BACKGROUND OF IR&D AND B&P ISSUE

WHAT IS IR&D?

The Armed Services Procurement Regulation (ASPR) defines "IR&D" as a contractor's technical effort not sponsored by, or required in performance of, a contract or grant. It consists of projects in the areas of (1) basic and applied research, (2) development, and (3) systems and other concept formulation studies. NASA's procurement regulation contains the identical language.

The term "IR&D" is used by Government agencies to distinguish the independent work of the contractor from research and development (R&D) performed for the agency under contract or grant arrangement. IR&D performed by a Government contractor is the same as the R&D performed by a commercially oriented contractor to come up with new products or services. In the commercial marketplace, R&D costs are normally recovered in the selling price of products. This is also true for products sold to the Government on a fixed-price, price-competitive basis. But for other contracts awarded by DOD and NASA, contractor-initiated IR&D is considered an indirect or overhead item and allocated proportionately.

Generally, IR&D is related more to future business than to current sales and is recognized as a normal cost of doing business.

WHAT IS B&P?

DOD and NASA regulations define costs incurred in preparing, submitting, and supporting bids and proposals on potential Government or non-Government contracts as B&P costs. The proposals may be solicited or unsolicited, successful or unsuccessful.

B&P costs include direct technical effort, including the costs of system and concept formulation studies and the development of engineering data. B&P costs can also include administrative or nontechnical effort for the physical preparation of the technical proposal documents and technical

and nontechnical effort for the preparation and publication of the necessary supporting cost and other administrative data.

Administrative costs incurred in proposal preparation are not required to be separately identified and classified as B&P costs. If, in accordance with the contractor's normal accounting practice, these costs are charged to an appropriate overhead account, they are considered by ASPR to be allowable costs subject to the general principles of reasonableness.

B&P effort is generally shorter range than IR&D effort. A contractor uses the techniques and know-how acquired under IR&D to prepare a technical package designed to convince the customer of the merit of the proposal. The B&P activity helps the customer to make an award on the basis of the demonstrated capabilities of competing suppliers.

HOW THE GOVERNMENT PAYS FOR IR&D AND B&P

DOD and NASA recognize IR&D and B&P costs as indirect costs to be allocated to a contractor's Government and commercial business. IR&D or B&P is not directly reimbursed. Costs generally are recovered by allocating a portion to each contract awarded to the contractor on the same basis as general and administrative expenses are allocated to each contract. If this basis does not provide an equitable cost allocation, the contracting officer may approve a different base to allocate the costs.

WHY IR&D AND B&P COSTS ARE CONTROVERSIAL AND RECEIVE SPECIAL TREATMENT

DOD recognizes contractors' IR&D and B&P expenditures as legitimate costs of doing business on the rationale that it is essential that contractors perform technical work, independently conceived and directed, to insure that DOD is provided with the most advanced technology needed in a prompt and technically competitive manner.

Generally, a direct relationship does not exist between current-period IR&D and B&P costs and current work in process. IR&D and B&P costs are generally accumulated and

distributed through overhead allocations to company activities. Thus current-year contracts bear the costs of future-year benefits. In a competitive environment, where awards are based primarily on price, IR&D reimbursement would present no problem, since competition for available contracts would restrict expenditures to those determined to be essential to economic survival.

Lack of price competition

In the defense and/or space industry, when price competition is lacking or the product is distinctive, there is widespread use of cost-plus or other flexibly priced contracts and the final prices are based on actual costs incurred. DOD has evidenced its concern that the Government pays a fair and reasonable price by substituting other controls for price competition.

The first ASPR cost principles were published in 1949. R&D costs specifically applicable to contract work were established as allowable, but general research costs were unallowable unless the contract terms specifically provided for them. Many defense contractors had such specific contract provisions and recovered all of their costs of the type now known as IR&D. B&P costs were not specifically mentioned, since they were considered allowable without question.

The existing IR&D and B&P cost principles were published in 1959. The term "independent research and development" was used for the first time, replacing general research. Independent research costs were generally allowable if allocated to all the contractor's business. Independent development costs were allowable if directly related to those product lines for which the Government had contracts. The principles stated that IR&D costs should be scrutinized and limited by advance agreements when appropriate.

In the 1959 principles, B&P costs were identified for the first time and made allowable, subject to the general test of reasonableness.

During the 1960s many problems arose regarding the 1959 cost principles. There was concern over the separation of research and development, differentiation between IR&D and B&P, the technical evaluations associated with advance agreement negotiations, and the application of overhead to IR&D and B&P.

Years of study culminated in 1969 in revisions to ASPR which placed tighter controls over the separation of IR&D and B&P, used the contractor's weighted-average share in cost risk (CWAS) concept, and provided a formula technique for contractors not using the CWAS concept.[1]

Difficulty in differentiating between IR&D and B&P

IR&D and B&P are often referred to as a single entity or as one program. Sometimes the total dollars spent for IR&D and B&P are inappropriately referred to as IR&D expenditures; i.e., the $700 million IR&D program.

There are many similarities between IR&D and B&P. Both consist of technical effort. At times the same individuals are involved. Both are mostly related to future income rather than current sales. However, the objectives of each are different.

A company undertakes IR&D to put itself in a position from which it can technically compete for future business. Once the company has obtained the capability to respond to a specific need of a customer or to anticipate and propose a solution for a need which the customer has not clearly defined, the effort becomes B&P.

A company fixes a point in time for accounting purposes when IR&D ceases and B&P begins; e.g., when a request for proposal is received or a management decision is made to launch an all-out effort to convince the customer of the worthiness of the company's proposed effort. There are no accounting standards or principles that clearly define which charges are IR&D and which are B&P. The point of separation between IR&D and B&P differs among companies.

[1]CWAS and the formula are discussed on p. 46.

Before 1971 the acceptance of IR&D for Government reimbursement was subject to limitation through negotiation of advance agreements, whereas the cost of technical effort for preparing bids and proposals generally was not limited. DOD and NASA had problems in distinguishing between the technical effort involved in IR&D and that related to B&P. Inasmuch as the amount of IR&D acceptable to the Government was limited, there was an incentive for the contractor to classify IR&D as B&P and increase the probability of full reimbursement.

Beginning January 1, 1971, companies required to negotiate advance agreements with the Government have had ceilings established on the allowability of both IR&D and B&P costs.

Increased costs

In 1963 DOD reported that major defense contractors incurred costs for IR&D and B&P in the amount of $625 million. DOD's share of these costs amounted to $325 million. By 1968 DOD's share (of $1,157 million) had risen to $609 million. In 1973, contractors incurred costs of $1,578 million and DOD's share amounted to $787 million.

Congressional concern over the escalation of IR&D and B&P costs surfaced in 1969 during consideration of the military procurement authorization bill for 1970. A statutory limitation of "93 per centum of the total amount contemplated for use for such purposes" was placed on the funds available to DOD for payment during fiscal year 1970 for IR&D, B&P, and other technical effort costs (Public Law 91-121).

PUBLIC LAW 91-441

Hearings on IR&D and B&P were held during the first half of 1970 by the Armed Services Committees. Section 203 of Public Law 91-441, enacted October 7, 1970, repealed the 93-percent limitation but placed other restrictions on DOD's payments for IR&D and B&P costs after 1970. Among other things, the law requires that:

--Funds authorized for appropriation to DOD not be available for payment of IR&D and B&P costs unless the Secretary of Defense determines that the work has

a potential relationship to a military function or operation.

--DOD negotiate advance agreements to establish dollar ceilings on such costs with all companies which, during their preceding fiscal year, received more than $2 million of IR&D and B&P payments from DOD.

--IR&D portions of the negotiated advance agreements be based on company-submitted plans that are technically evaluated by DOD before or during the fiscal year covered by the agreement.

DOD'S IMPLEMENTING REGULATIONS

On September 1, 1971, on the basis of the requirements of section 203 and its own continuing studies, DOD issued revisions to ASPR cost principles in Defense Procurement Circular (DPC) 90, effective January 1, 1972. DPC 90 requires that IR&D and B&P costs include all direct and allocable indirect costs, except that general and administrative costs are not considered allocable to IR&D and B&P. The provisions of DPC 90 were incorporated into ASPR on April 28, 1972.

For major contractors--those receiving annual payments of more than $2 million from DOD for IR&D and B&P--advance agreements are negotiated. Separate dollar ceilings are required--one for IR&D and one for B&P. However, a contractor is permitted to recover one cost above the negotiated ceiling, provided that the ceiling on the recovery of the other is decreased by a like amount. Thus, in effect, they are considered jointly.

In negotiating a ceiling, particular attention is to be paid to the technical evaluation and the potential military relationship of IR&D projects, comparisons with previous years' programs, and changes in the company's business activities. For companies not required to negotiate advance agreements, allowable IR&D and B&P costs are determined using a formula based on previous years' costs and sales.

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CHAPTER 3

BENEFITS TO THE GOVERNMENT FROM DOD'S IR&D EXPENDITURES

The Senators' letter and accompanying questions were directed at two main points: (1) whether DOD's expenditures for IR&D and B&P result in benefits to the Government and (2) if so, whether there is a better way to handle the IR&D and B&P programs.

One of the major issues of IR&D is whether the benefits are worth the cost. It was not possible for us to make such a determination. Alternatively, we looked at the relationship of IR&D projects to customer requirements. We also considered contractor planning and management of IR&D programs.

IR&D OBJECTIVES

DOD considers that its support of IR&D encourages the evolution and maintenance of a strong, creative, and competitive technology-based industry, capable of providing new concepts and rapid responses to defense needs. Specific objectives are (1) the continued availability of technically qualified contractors who are willing and able to meet DOD needs by competing for contracts, (2) reduced costs through technically competitive proposals based on IR&D efforts, and (3) superior military capabilities through a choice of competitive technical options originating in IR&D.

Contractors see IR&D as essential if they are to remain competitive in existing business areas and obtain entry into new business areas through technical and cost competitions. Specific objectives of a contractor's IR&D program are to be a position to (1) respond quickly to the needs of the customer, (2) submit cost-competitive bids that are based on complete identification of technical risks and accurate cost and schedule estimates, and (3) provide greater technical excellence in proposals.

IR&D BENEFITS

We were asked (question 12) to "identify what specific developments have been made by each of the top 25 defense contractors with respect to the amount of IR&D received" for each of the years 1968-72. In addition, for the same 25 defense contractors, each IR&D project in excess of $25,000 a year was to be identified, indicating "the potential military benefit rationale used by the DOD in accepting the project."

IR&D benefits have been expressed by DOD and industry as satisfaction of the objectives enumerated above; i.e., developing an industrial technology base as a complement to the DOD in-house technology base, providing alternative solutions to technical problems, stimulating competitive capabilities and creativity, etc.

IR&D has at times been identified as contributing to the development of a specific military system or component or to the solution of a particular problem. For example, DOD officials testified in congressional hearings in 1970 that IR&D projects had led to the phased-array radar antenna and Huey Cobra helicopter and had contributed to gas-laser technology. But we know of no presentation that related all the IR&D dollars received by a contractor in any given year to specific developments.

GAO's pilot study

The time interval between conception of an idea and completion of a specific development generally involves many years. DOD, in its attempt to identify reasons for successful developments, traced specific systems over a 20-year period. The study showed that the time between predecessor and successor in defense equipment was typically 10 to 20 years.

The National Science Foundation sponsored a study which documented significant events during the innovative process for 10 innovations that first came to realization during 1933-66. The average time from conception to realization for the 10 innovations studied was about 19 years. One innovation was in process for 32 years. The difference between the longest and the shortest time was caused mainly

by a difference in the availability of technology. The shortest time required only existing technology and so proceeded from first conception to first realization in 6 years.

Thus it did not seem likely that many specific developments directly attributed to projects funded in the years 1968-72 could be identified.

Our field staffs attempted to see if IR&D benefits could be quantified on a project-by-project basis by making pilot tests at four contractors' locations. The contractors were selected taking into consideration the locations where we had particularly capable staff interested in the issue.

Pilot study results

Preliminary tests confirmed that it would not be feasible to attribute developments to IR&D projects over a 5-year period. Projects were too numerous, and most projects did not, in themselves, become specific developments. Projects are often aimed at advancing technology without a known product application.

We initially looked into the feasibility of identifying IR&D benefits by tracing individual projects funded in 1968 to their ultimate use; this approach was difficult and time consuming. It proved to be impracticable because of the numerous projects involved, the lack of continuity of projects, changes in project titles, the merging or splitting of projects as work progress brought about changes in scope or emphasis, company reorganizations, and personnel changes.

We also tried to trace recent proposals and/or contract activity back to IR&D. Many relationships could be established, although in some cases the contribution of IR&D was indirect.

For example, at one company we examined the events leading to three high-technology proposals submitted to DOD. Two resulted in contracts. The company claimed that considerable IR&D technology had been used for two of the proposals and that it would not have been technically competitive without IR&D experience on the third. For two of the proposals, we identified a strong IR&D relationship. For

the other, IR&D and prior contract experience had similarly affected the company's competitive position. Although the examination was time consuming, we established that company-generated IR&D projects had been used in development of DOD systems, that technical alternatives had been offered, and that the company had relied on IR&D to develop products for DOD.

Although some examples of specific products or developments could be identified through these approaches, neither approach could practicably produce an evaluation of a total IR&D program for a specified period. We therefore decided to evaluate the IR&D programs of the four contractors for a 2-year period on the soundness of the companies' bases for undertaking projects. Since the objective of an IR&D program is to put a company in a position to meet customers' needs, we examined the business reasons for undertaking projects in the test period.

More than 400 of the contractors' 1972 and 1973 projects--valued in excess of $60 million--were classified into three business objective categories: (1) improvements to existing products, (2) development of new products, or (3) basic research and other general engineering and technical efforts. We reviewed agency and/or customer planning documents or other bases for undertaking projects. When B&P or contract activity had resulted, this relationship was noted.

Evidence showed that contractors' IR&D programs generally were related to customers' needs, were undertaken to serve a Government purpose, or were directed toward meeting agency program goals.

Generally, a direct relationship existed between the IR&D project and an objective stated in an agency planning document. For example, an Air Force Required Operational Capability document stated the need for a modern off-the-shelf vehicle. The selected vehicle was to provide improvements in speed, range, productivity, and maintainability over those vehicles currently in use. The contractor responded to this need by planning IR&D to perform system analysis and configuration studies which, together with user inputs, would be used to develop preliminary requirements.

In other cases the planning documents stated needs for which the requirements were not as specific. For example, a directive stated DOD's policy to encourage innovation, inventiveness, and exercise of technical and managerial judgement in designing and producing systems and their logistics support to meet operation requirements. Contractor performance in carrying out the logistics-support approach was to be a major factor in evaluating overall contract performance.

To meet this need, the contractor planned an IR&D project on product-support research to consolidate research accomplished in previous years into an integrated program aimed at increasing the effectiveness of present systems and decreasing the cost of ownership of new systems. The 1972 program included a technical plan for reliability, maintainability, and system safety research to investigate and develop solutions to problem areas identified from field experience data.

The IR&D programs of the four contractors were each directed toward advancing the individual contractor's competitive position. Therefore, there was a difference in the number of projects that each devoted to existing product improvement; meeting new, customer needs; or looking toward future business. A tabulation of the four contractors' projects showed that about 80 percent of the projects could be directly related to an existing or new product or to a known need. The remaining 20 percent were projects for basic research, development of new concepts, or other work which could lead to new business at some future time. The analysis proved that it was feasible for contractors to categorize projects by objectives should such an analysis be useful to program managers.

Project Hindsight

To compare the effectiveness of IR&D efforts with other R&D efforts funded either in-house or by contract, we looked into Project Hindsight. Project Hindsight was a DOD effort to assess the importance and the benefit of science and technology to defense. The study took a retrospective look at 20 weapon systems developed between the end of World War II and 1963.

Project Hindsight involved analysis of successful R&D events to identify those management factors that led to their success. Teams of experienced technical specialists examined development of the 20 systems for evidence of science or technology that was not available or used in previous systems. Each instance (known as an event) was then traced historically to identify the people, place, and time associated with the generation of the knowledge which led to the advanced level of technology.

We asked the project director whether, during the study, IR&D had been identified as a source of funds used in support of the successful technological events. He told us that information as to IR&D as a source of funds had been obtained but had not been the subject of detailed analysis. At our request, a special analysis was made.

This analysis showed that in 40, or 5.7 percent, of the 698 events the original funding sources for the exploration of new technical concepts were considered IR&D. Expenditures identified as IR&D involved slightly over $2 million, whereas the total funding for the 698 events in the Project Hindsight data bank approximated $100 million. Thus the IR&D expenditure of just over 2 percent of the total funding accounted for 5.7 percent of the initial tests of concept feasibility.

Industry views

After the request to GAO appeared in the Congressional Record of October 11, 1973, industry associations prepared position papers, including responses to the 22 questions.[1] We reviewed the technical papers for their reaction to question 12. (See p. 11.) We found that industry identified technical outputs of IR&D as follows:

--Technology advancement--attaining or maintaining competitive capability in key technologies not

[1]Technical Papers on Independent Research and Development and Bid and Proposal Efforts, March 1974. Aerospace Industries Association of America, Inc., Electronic Industries Association, National Security Industrial Association.

oriented toward specific new hardware and end-items but toward technology improvements.

--System and other concept formulation studies.

--Successful failures--beneficial to demonstrate that a given approach to resolution of a problem or meeting a need is inadequate or uneconomic.

--Evolution of superior systems or hardware--improved performance, lower cost, or both.

--Brilliant discoveries and great innovations.

The industry associations did not believe that specific developments during any 5-year period would prove the worth of IR&D because no standard had been devised to meaningfully measure R&D cost against the value of work done.

One company said that it was the exception rather than the rule that attaining a dramatically increased operational capability or cost reduction was directly traceable to a specific piece of research or development work. The company noted that the Project Hindsight director had said that it was the cumulative synergistic effect of many innovations which made the radical improvement and that each innovation, taken by itself, would produce little or no improvement. The company believed this finding to be equally as valid for IR&D work as for R&D in general.

Industry's technical papers documented, in some detail, 48 examples of benefits to DOD and the Nation from the IR&D efforts of about 20 contractors. Benefits were put in four categories--major systems, subsystems, new components, and technology advancement. The papers did not identify costs of IR&D applicable to each example.

PATENT AND DATA RIGHTS

Government contracts for R&D contain a patent rights clause requiring contractors to convey certain property rights, consistent with the subject item of the contract and its ultimate use, in whatever new or improved concepts result from the contract effort. DOD contracts use the

patent rights clauses contained in ASPR. However, it is DOD's and NASA's policy to not require contractors to furnish property rights in inventions or data resulting from IR&D. At issue is the equity of this policy when contractors recover from the Government a major part of the costs of their IR&D programs.

DOD policies

According to DOD, its IR&D patent practices are compatible with Government policy. This policy is to promote, insofar as feasible, the commercial exploitation of patents derived from Government-sponsored work, even to the extent of granting exclusive licenses to private companies which will undertake productive exploitation.

DOD believes the actual value of these patents is questionable since most of them relate primarily to technology that is largely or solely of interest to the Government. DOD states that its experience has been that the Government's use of such patents nearly always is granted royalty free. Data rights are usually available to the Government on a for-official-use-only basis.

A study in 1972 by a DOD working group showed that most companies seldom applied for patents. Fewer than 10 percent of IR&D projects resulted in patent applications. A small number of companies, however, made patent applications on the results of most of their IR&D projects.

Pilot contractor studies

We were asked to identify patent applications made by, and patents issued to, the 25 major contractors as a result of IR&D programs from 1968-72. Also we were asked to identify the income each contractor received from these patents or prior patents developed under IR&D and to determine whether this income was credited to DOD in proportion to its financial support of the project. (Question 12.) As noted previously, our study was confined to four contractors.

One contractor told us that it applied for patent rights on company developments because of their proprietary nature or to protect company interests. Company contract negotiators said that no effort was made to charge either Government or commercial customers for patent rights. Defense Contract Audit Agency (DCAA) auditors told us that the contractor paid all the engineering costs, legal fees, consultant fees for patent searches, and filing fees required to develop and obtain patents. We were told that patent income was small, about enough to cover the costs of marketing the patents. The contractor considers the exact amount of patent and royalty income to be proprietary.

DCAA auditors did not know the amount of income collected from patent rights but confirmed that the contractor did not charge the Government for patent rights on work done under Government contracts.

We examined a contractor document listing 135 patent applications over a 7-year period. About one-third of the total applications were noted by the contractor as having been developed under IR&D funds. Of the applications arising from IR&D, 31 applications were still pending, 9 patents had been issued, and the remaining applications had been abandoned.

Another contractor identified five patents on which it had royalty income during a 6-year period, but the contractor said that none of them had resulted from work done under IR&D programs.

A third contractor said that, until an invention proceded beyond the conceptual stage, it was worthless. The contractor reported that 14 patents and patent applications had resulted from IR&D over a 5-year period. Royalty income was modest; the contractor considered the figure proprietary.

The fourth contractor reported its patent income for 1973 to be less than $15,000.

Exploitation of inventions

DOD does not have a prohibition against contractors "exploiting" inventions in the commercial market developed

primarily under IR&D. (Question 15.) DOD believes that commercial customers should have the benefits of inventions growing out of defense work.

Industry representatives said that, before an invention conceived primarily for military benefit could be used commercially, a great amount of additional product development and marketing was usually needed. Industry believes that, as a matter of basic policy, the Government should not enter into commercial fields or restrain companies from engaging in their own lines of business.

DOD's concern is that defense contractors not develop items in defense plants and then spin them off to other commercial divisions, depriving the defense plant of the additional sales that would tend to reduce indirect costs allocated to Government contracts.

AEC's position on patents arising in IR&D is discussed on page 75.

INDUSTRY MANAGEMENT OF IR&D

The four contractors in our pilot study had developed management control systems for planning, initiating, reviewing, and revising their IR&D projects.

One contractor said that IR&D planning was an integral part of its business plan. A long-range business plan is updated annually, with primary attention being devoted to new business opportunities and their potential effects. Assumptions concerning DOD, NASA, and other Government agencies are included. Long-range technology trends and requirements are addressed and assessed.

An operating plan is the primary vehicle used for planning near-term business, controlling operations, and forecasting near-term results. Project and program IR&D and B&P plans for the following year are included as part of the detail of actions to be taken to insure ultimate accomplishment of long-range objectives. An integrated technology plan is used to define the contractor's total technology effort and relate it to the product goals in the business plan. After the plan for the following calendar year is

approved, IR&D project writeups are modified as necessary for final guidance and budget constraints, leading to document submittal to DOD and advance-agreement negotiations.

Most IR&D projects are defined and initiated on a basis of technology effort directed to a product or product line. The contractor said that performance was evaluated against cost and commitments at regular intervals by management echelons and that operating organizations were required to make changes in IR&D programs as soon as a need was recognized.

The other contractors also consider planning and developing IR&D and B&P programs to be an integral part of the short- and long-range business-planning function. Plans are formulated after evaluation of external planning documents from the military services, Government agencies, and civilian sources, as well as contracter-obtained market and state-of-the-art intelligence. These inputs are matched against company resources, product or system objectives, and technology requirements. IR&D and B&P projects compete for resources with all other proposed endeavors. Program size is determined by such factors as the anticipated level of Government funding, the level of contractor funding, and the need to maintain IR&D and B&P overhead rates at a competitive level.

We found that management procedures established by the four contractors provided for IR&D and B&P programs to receive the same financial and technical attention as that given to contract R&D.

CHAPTER 4

DOD'S EVALUATION OF IR&D

We were asked if DOD received detailed technical reports or other technical data regarding technology developed under IR&D programs and considered the information in developing weapons programs (question 13) and if DOD evaluated the results of contractors' IR&D efforts. (Question 14.)

DOD has said that it uses a number of ways to consider the quality of IR&D and to make the data known to its personnel. DOD finds no single mechanism to be totally self-sufficient. Information on data developed under IR&D is made available through the contractor's technical plan and the technical review process, direct professional-to-professional communication, and the IR&D data bank.

TECHNICAL PLANS AND REVIEWS

Every contractor required to negotiate an advance agreement submits a technical brochure describing proposed IR&D projects. The brochure, or IR&D technical plan, provides a basis for technically evaluating the program. A contractor can delete or add projects throughout the year without DOD approval. Each new project is then evaluated the following year.

The contractor's annual IR&D technical plan includes writeups on individual projects, generally 5 to 10 pages. Each writeup includes a statement of the problem being worked on, the technical objective and approach for the current year, and the progress and accomplishments of the preceding year.

Copies of the contractor's technical plan are sent to many Government organizations to obtain evaluations from the most expert persons available. In addition, an onsite evaluation of a portion of the IR&D program is made at the contractor's plant at least every 3 years. For example, in 1973 onsite and brochure reviews made by the Air Force involved more than 11,000 project evaluations. The Air Force estimated that the evaluation process required about 24.5 staff years.

PROFESSIONAL COMMUNICATION

The onsite review provides technical communication between various DOD specialists and their counterparts at contractors' plants. DOD believes that the physical inspections enable Government representatives to obtain a better understanding of the projects and to assure themselves that the technical plan accurately describes the efforts. Through discussions, Government personnel learn what contractors are doing that is directly related to DOD interests and what other work is going on.

DOD laboratory personnel, using the brochure information, can obtain by letter, telephone, or visit detailed technical data on results and progress of individual IR&D projects by direct communication with the investigators conducting the work. Upon request of the Government, this data can be supplemented by the contractor's project report.

One Army command has instituted policies and procedures to increase its knowledge of contractor IR&D programs. Laboratory personnel when planning travel must consider visits to nearby IR&D contractors. Also personnel are instructed to call principal investigators regarding projects of interest.

IR&D DATA BANK

At our suggestion, DOD established an IR&D data bank at the Defense Documentation Center in 1971. The data bank's objective is to provide a centralized source of information through which DOD scientists, engineers, and R&D managers can become familiar with IR&D projects.

The IR&D data bank was set up as a trial operation to end about July 1, 1975. Not all contractors preparing technical brochures for DOD were required to submit IR&D project record data to the Defense Documentation Center.

In August 1973 we reported to the Secretary of Defense that much of the data in the bank duplicated data in an Army's IR&D data bank, that use of the banks was limited, and that contractors were reluctant to participate because of the administrative burden of preparing both IR&D brochures and data in the data-bank format.

We suggested that DOD determine whether a data bank could be justified by projected usage; if so, which one; and how contractors could economically provide the data needed by its users.

In May 1974 DOD announced the results of a special review of the IR&D data bank made before completion of the trial period. The study group found that DOD should have one IR&D bank as a useful and needed supplement to the bank of in-house and contracted R&D effort. The bank, located at the Defense Documentation Center, is expected to be fully operational after July 1, 1975. The bank is to be expanded to include all contractors with whom DOD negotiates advance agreements. Contractors' data bank inputs are to be identical to the technical plan synopsis. Service R&D activities are to query the bank before starting new in-house or contracted efforts, to preclude unnecessary duplication of effort.

The bank provides data organized in a variety of ways and can be useful in searches to identify work in selected areas. Screening of IR&D projects can lead to the technical descriptions for more detailed information or provide the names and telephone numbers of the contractors' principal investigators for direct contact.

CHAPTER 5

IR&D AND B&P COSTS

Questions 1 through 5 relate to DOD's IR&D and B&P costs reported to the Congress by DCAA. They were answered in detail in our report of August 16, 1974.[1]

Two points should be kept in mind when reviewing the figures in the DCAA reports. IR&D and B&P costs are incurred for different purposes, and, although it is sometimes difficult to distinguish one from the other, their total costs should not be considered as representing either of them. Secondly, DOD shares with other customers in the total costs incurred by the contractors; in fact, DOD's share is less than the percentage its sales represent to total contractor sales.

This latter point was illustrated by the IR&D and B&P costs for 1968-73 of the four contractors we looked at in some detail. The ratio of the Government's share of IR&D and B&P costs to total costs was consistently lower than the ratio of Government sales to total sales for three contractors. The ratios of the fourth contractor were the same for each year.

DOD'S COSTS REPORTED BY DCAA

A summary of sales and costs of IR&D and B&P as reported by DCAA follows (dollar figures represent millions).

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[1]"Partial Report--In-Depth Investigation into Independent Research and Development and Bid and Proposal Programs" (B-164912, Aug. 16, 1974).

	1968	1969	1970	1971	1972	1973 preliminary figures
	(000,000 omitted)					
Sales to DOD	$22,275	$22,692	$21,315	$19,568	$19,117	$20,941
Number of contractors	92	96	98	84	77	83
Contractor costs:						
IR&D	$ 776	$ 808	$ 753	$ 703	$ 936	$1,052
B&P	381	426	413	427	469	526
Total	$1,157	$1,234	$1,166	$1,130	$1,405	$1,578
Accepted by the Government:						
IR&D	$ 579	$ 653	$ 597	$ 567	$ 725	$ 809
B&P	367	409	398	390	432	488
Total	$ 946	$1,062	$ 995	$ 957	$1,157	$1,297
DOD's share:						
IR&D	$ 338	$ 410	$ 376	$ 354	$ 392	$ 441
B&P	271	289	278	265	306	346
Total	$ 609	$ 699	$ 654	$ 619	$ 698	$ 787
DOD's share of contractor costs (%)						
IR&D	44	51	50	50	42	42
B&P	71	68	67	62	65	66
IR&D and B&P	53	57	56	55	50	50
Sales to DOD (%)	68	62	65	61	63	61
IR&D and B&P costs to DOD sales (%)	2.73	3.08	3.07	3.16	3.65	3.76

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The above figures are indicators of annual activity but should not be used for making absolute comparisons of one year to another for the following reasons:

--Technical effort not classified by contractors as IR&D or B&P was reported separately by DCAA through 1971. In 1972, after definitions were revised, $14 million of these costs were classified as IR&D and B&P. DCAA did not determine how much was included in IR&D and B&P in 1973 because of reclassification. For 1968-71 it can be assumed that under current definitions some part of contractors' other technical effort would have been classified as IR&D or B&P.

--Effective in 1972 all contractors were required to allocate (burden) to IR&D and B&P an appropriate share of indirect or overhead costs except general and administrative (G&A) costs. Previously some contractors had burdened IR&D consistent with their accounting practices. Increases in IR&D and B&P costs solely for first-time burdening were $32 million in 1972 and $55 million in 1973. The amounts for previous years are not available. Although burdening increased the reported IR&D and B&P costs, it did not necessarily increase total DOD contract costs. Overhead costs were merely reclassified from other overhead accounts to IR&D and B&P accounts.

--Military sales to foreign governments through DOD contracts are included in the reported figures as are the IR&D and B&P costs allocable to these sales and reimbursed by the foreign governments. DOD's share of IR&D and B&P costs reported for 1972 and 1973 is, therefore, overstated by $13.8 million and $36 million, respectively. DOD sales data for these years should be similarly reduced by $425 million and $962 million, respectively. Previous years would require similar adjustment, but the amounts are not available.

Also, if the annual cost figures are to be used as indicators of changes in contractors' actual level of effort, consideration should be given to the impact of inflation.

Amounts of IR&D and B&P
not reported by DCAA

We reported on August 16, 1974, that neither we nor DCAA had any data to determine the amount of IR&D and B&P paid to contractors which did not meet the $2 million threshold for advance agreements. Therefore, this amount is not included in DCAA reports, (Questions 4, 5, and 10.) DCAA stated that an inordinate amount of effort would be required to obtain detailed data, since thousands of small companies were involved. Even this data would still not be complete because it would not include data on some major contractors. For example, contracts awarded on a firm fixed-price competitive basis or on the basis of rates or schedules set by law are not susceptible to DCAA audit and therefore are not available to DCAA for inclusion in its reports.

DOD has estimated in the past that it has reported 80 to 85 percent of the costs over which it has control (access to records for the purpose of audit). We asked DOD whether a calculation could be made to currently estimate the amount of additional IR&D and B&P it pays. DOD worked on a means of estimating the unknown portion but could not develop any reasonable basis for estimating more accurately the size of this IR&D and B&P effort.

How DCAA reviews and monitors
incurred costs and ceiling adherence

DCAA is responsible for reviewing IR&D and B&P costs recovered through DOD contracts, to verify that such costs are properly classified in a contractor's accounting system and that recovery does not exceed the negotiated advance agreement or formula limitation. For cost-type contracts, IR&D and B&P costs are recovered as a part of the indirect costs allocated to all contracts through the application of an estimated overhead rate, which is adjusted to the actual rate at the end of the year.

For a contractor under negotiated ceiling, the estimated rate is based on the lesser of the contractor's estimated IR&D and B&P costs or the negotiated ceiling and the contractor's estimated allocation base; e.g., cost of sales, direct labor hours, etc.

Within 90 days after the close of a contractor's fiscal year, the contractor will submit its overhead costs to DCAA for final overhead rate determination. If a contractor is subject to use of the formula for determining the amount of IR&D and B&P to be allowed, DCAA audits the records to make certain the computations are accurate. According to the auditors, for a contractor under advance agreement they, with the assistance of Government technical personnel, review the data for accuracy and to determine whether the classification of IR&D and B&P is proper and in compliance with ASPR. This effort includes (1) verifying that the IR&D and B&P expenditures listed were actually incurred, (2) verifying that nonrelevant projects had no effect on the ceiling negotiated, and (3) determining that the contractor has not been reimbursed for more than it has spent or is entitled to under the ceiling.

According to the auditors, the final contract payments for the fiscal year will reflect any adjustments needed to bring the amount of IR&D and B&P recovered in line with the contractor's actual expenditures, subject to negotiated ceiling or formula limitation.

B&P costs

The law requires that the maximum number of qualified sources be solicited for proposals consistent with the nature and requirements of the procurement. The Commission on Government Procurement reported that translating this statutory requirement to practice posed a problem in R&D procurements.

R&D procurements embody two characteristics which give rise to the problem: (1) a large number of firms seeking Government contracts and (2) relatively complex proposals which are costly to prepare and evaluate. Most R&D procurements seek innovative ideas and frequently cannot be considered as essentially cost or price competitive. Therefore the Commission believed that participation of a maximum number of firms did not necessarily insure minimum costs to the Government.

The Commission recommended[1] that the statute provide for soliciting a competitive rather than a maximum number of sources, retaining the requirement for public announcement of procurements.

A study group of the Commission had sampled 396 competitive R&D contract awards and found examples of more than 100 contenders for a single solicitation, with an overall average of nearly 10 proposals for each award. The Commission reported that, because in many instances the Government ultimately paid the bidding costs through overhead and the evaluation costs as part of its in-house effort, the total costs might exceed the value of the resulting contract.

The Commission noted that these steps were performed in duplicate for each contender under the principle that the savings resulting from competitive pressures more than offset the bidding costs. The principle operates generally with respect to solicited R&D. When more than a few proposals are received, there is comparatively little added benefit and much added expense on the part of the bidders and the Government.

The Commission's report[2] stated that, when possible, the competitive announcement for proposals should identify not less than three nor probably more than five "best qualified potential sources" in the particular program being purchased.

Contractors claim that the Government has a powerful and direct influence on B&P costs through its procurement policies and that they are not in control of the amount of B&P effort required to be responsive to the Government's competitive procurement objectives. We therefore decided to see whether there was an opportunity for savings in DOD's solicitation process.

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[1]Report of the Commission on Government Procurement, vol. 1, p. 22, recommendation 4.

[2]Report of the Commission on Government Procurement, vol. 2, p. 44.

From a selection of about 125 R&D contract awards made by the 3 services, we determined that the procurement centers were not receiving an inordinate number of reponses to requests for proposals or quotations. At five Army, Navy, and Air Force procurement centers, the average number of bidders ranged from 3.4 to 5.6 for each solicitation. The highest number responding to a solicitation was 13 bidders. About 65 percent of the solicitations resulted in from two to five bids.

Should G&A be included in IR&D?

The Cost Accounting Standards Board asked us to consider whether IR&D and B&P costs were understated because they did not include G&A costs.

ASPR provides that IR&D and B&P include all allocable indirect costs except G&A. G&A are those costs which are necessary for the maintenance of the company as a whole. They are not directly allocable to a particular cost center, cost element, or function. We made a brief inquiry into whether the ASPR concept is sound and whether the results are equitable to the Government.

We found that there was a difference of opinion among accountants, educators, and others on the issue. The Financial Accounting Standard Board recently issued a standard for industry and the public accounting profession to follow in accounting for research and development costs. It provides that R&D costs include a reasonable allocation of indirect costs but that G&A costs which are not clearly related to R&D activities not be included as R&D costs. The Board stated that its conclusion conformed to present accounting practice.

We visited several contractors on this matter. They believed it inappropriate to allocate G&A to IR&D and B&P. They furnished us with estimates to show that there was a minimal relationship between the bulk of G&A activities and IR&D and B&P. In view of the subjective nature of these estimates, however, we did not attempt to verify them.

The limited number of contractors included in our study did not provide an adequate basis for a firm conclusion. However, we believe that, if it should become a requirement

that G&A be included in IR&D and B&P, certain G&A activities, such as contract administration, customer support, and regional sales offices, should be excluded because these activities do not contribute to the IR&D and B&P effort. These costs should be related to activities to which they do contribute.

Also we believe that the benefits of having full disclosure of IR&D and B&P costs should be weighed against the costs involved in the change in accounting procedures. Any actual effect on DOD contract costs would depend, in part, on the extent to which ceilings would be adjusted to recognize the accounting change.

NASA'S COSTS

NASA is second to DOD in supporting IR&D and B&P. Its reported sales and costs follow.

	1968	1969	1970	1971	1972	1973
	(000,000 omitted)					
Sales to NASA	$3,192	$2,602	$2,129	$1,990	$1,991	$1,801
Contractor costs:						
IR&D	$ 377	$ 544	$ 645	$ 703	$ 936	$1,052
B&P	256	330	365	428	469	526
Total	$ 633	$ 874	$1,010	$1,131	$1,405	$1,578
Accepted by Government:						
IR&D	$ 350	$ 444	$ 514	$ 568	$ 725	$ 809
B&P	250	316	352	390	433	488
Total	$ 600	$ 760	$ 866	$ 958	$1,158	$1,297
NASA's share:						
IR&D	$ 61	$ 43	$ 44	$ 41	$ 40	$ 38
B&P	46	49	48	51	50	47
Total	$ 107	$ 92	$ 92	$ 92	$ 90	$ 85
NASA's share of contractor costs (%)						
IR&D	16	8	7	6	4	4
B&P	18	15	13	12	11	9
IR&D and B&P	17	11	9	8	6	5
Sales to NASA (%)	18	12	7	6	7	5
IR&D and B&P costs to NASA sales (%)	3.35	3.54	4.32	4.62	4.52	4.72

CHAPTER 6

DOD'S IMPLEMENTATION OF PUBLIC LAW 91-441

The Senators requested that, in addition to the overall study of IR&D and B&P, we look into the implementation of the current provisions of law and DOD regulations.

IR&D POLICY COUNCIL

The DOD IR&D Policy Council consists of its Chairman, the Director of Defense Research and Engineering; the Assistant Secretaries of Defense (Installations and Logistics) and (Comptroller); and the Assistant Secretaries of the Army, the Navy, and the Air Force (Research and Development) and (Installations and Logistics). Representatives of NASA and AEC participate as observers.

The Policy Council's mission is to develop policy and guidelines for administering DOD's IR&D and B&P programs, including such facets as the proper level of DOD support, the goals of IR&D and B&P, the overall level of effort, the validity of potential relevancy determinations, and the appropriateness of negotiation policies.

In September 1971 the IR&D Policy Council organized a working group to provide the Council with a concise definition of IR&D--what it was, what its objectives were (as seen by DOD, other Government agencies, and industry), its accomplishments, its deficiencies, and any impediments to the realization of its defined objectives. In December 1972 the working group produced a report, based on extensive interviews with Government and industrial executives directly involved with managing, evaluating, and using IR&D work. The report was presented to the Council and interested Government and industrial activities. An updated version was presented to the Council in June 1974.

The Council's review of the study report and its consideration of the results of previous guidance resulted in approval of revised guidance.

DOD'S LATEST GUIDANCE

On October 21, 1974, DOD issued the following guidelines to the services to clarify and/or emphasize previous IR&D and B&P policies.

--Departmental negotiators are to take steps to achieve equitable treatment of contractors, regardless of which service conducts the negotiations. Issues are to be identified for resolution by the IR&D Technical Evaluation Group or Policy Council.

--Negotiators shall maintain sufficient documentation in the files to provide the rationale for the dollar levels established and other provisions of the advance agreements.

--Results of the technical evaluations of the contractors' IR&D programs shall have meaningful and traceable effects on the negotiated ceilings. A technical representative shall participate in establishing DOD's prenegotiation objectives.

--Three-year advance agreements, with provisions for appropriate adjustments as necessary in the second and third years, should be used to the extent practicable.

--Inflationary or deflationary economic factors shall be considered in negotiating IR&D ceilings.

--Negotiators shall have responsibility for determining the potential military relationship (PMR) of B&P projects. DOD-solicited proposals and unsolicited proposals resulting in DOD contracts are potentially related. Other B&P projects should be considered for the relationship of the efforts to the military functions or operations rather than to the customers to which the proposals are submitted. B&P determinations generally cannot be made until the end of the contractor's fiscal year but should be completed as soon thereafter as possible.

--Nonrelated IR&D and B&P projects may be included in negotiated ceilings, provided the costs allocated to DOD contracts do not exceed the total cost of all PMR projects.

NEGOTIATION OF ADVANCE AGREEMENTS

Section 203 of Public Law 91-441 made mandatory DOD's practice of establishing dollar ceilings on the IR&D costs of major contractors and extended the requirement to B&P costs as well. Advance agreements are to be negotiated with all contractors which, during their last preceding fiscal year, received more than $2 million of IR&D or B&P payments from DOD

DOD interpreted the statute to apply to payments of $2 million for IR&D and B&P. The desirability of negotiating agreements either before cost incurrence or early in the contractors' fiscal years was recognized in DOD's guidance to the services.

Advance agreements establish separate ceilings within which the Government will share. Costs incurred within the ceilings are allocated to DOD, other Government, and commercial contracts or sales. The contractors absorb costs incurred above the ceilings.

We learned from negotiators that each service uses basically the same factors to arrive at a contractor's IR&D and B&P ceiling. These factors include (1) the contractor's prior year's IR&D and B&P ceiling, (2) the contractor's historical and projected sales to DOD, and (3) DOD's historical and projected share of the ceiling.

We were informed that, in addition to the previously mentioned factors, there were other elements which the negotiators considered. Two of these factors were the potential relationship of the contractors' programs to DOD needs and the technical quality of IR&D projects. We could not determine from our review of negotiation files or from our inquiries the dollar effect on negotiated ceilings of PMR or technical reviews. Considering these factors in establishing ceilings is basically subjective.

TECHNICAL EVALUATIONS

Section 203 requires that the IR&D part of the advance agreement be based on a plan, submitted by the contractor, which DOD has technically evaluated. DOD policy states that the basic purpose of the plan and its evaluation is to assist in determining the PMR of IR&D projects and in evaluating the reasonableness and technical quality of the contractor's IR&D program. DOD's guidance states that the results of the technical evaluation should have a meaningful and traceable effect on the negotiated ceiling.

Government personnel technically evaluate contractors' IR&D programs by two separate means--the onsite and the brochure reviews. Onsite reviews at the contractors' facilities are required at least once every 3 years. The brochure reviews are required yearly on the contractors' written descriptions of IR&D projects.

Within each of the services, organizations are assigned the responsibility for overseeing technical evaluations of contractors' IR&D programs. The number of companies or divisions of companies for which an organization has primary evaluation responsibility is dependent upon such factors as (1) the technical expertise available within the organization, (2) the organization's proximity to the contractors, and (3) the function of the organization within the service.

An organization which has primary responsibility for a technical evaluation must:

1. Schedule onsite reviews--This entails selecting projects for discussion by the Government and the contractor. It involves soliciting sufficient Government representation for the onsite review to adequately evaluate the contractor's programs.

2. Oversee onsite reviews--An individual within the organization is selected to oversee the onsite review, including briefing Government representatives, collecting project evaluation forms the representatives completed, and orally advising the contractor of the results of the onsite reviews.

3. Coordinate brochure reviews--DOD requires that a reasonable part of the dollar amount of a contractor's IR&D program be technically evaluated by a brochure review. Also DOD desires that the overall evaluation be sufficiently comprehensive to permit a reasonable conclusion concerning the technical quality of a contractor's program. The technical managers are responsible for compiling the individual project ratings into an overall contractor technical rating.

PMR TESTS

Section 203 does not permit DOD to pay for IR&D and B&P costs, unless the Secretary of Defense has determined that the work has a potential relationship to a military function or operation.

Our reports of April 1972 and April 1973 to the Senate Armed Services Committee noted that the statutory requirement was vague and that DOD had established its own criteria to test the relevancy of each project.

Under DOD's procedures, the determination is made as part of the technical evaluation. The technical managers make the final determinations of PMR for IR&D projects. The managers receive assistance from project evaluators who provide their written opinions as to whether projects have PMR. Also, a manager of one service will solicit the opinions of other service managers if projects are not relevant to his service.

The negotiators, with assistance from DCAA auditors, or the administrative contracting officers determine PMR for B&P projects. The Navy and Air Force make before-the-fact determinations; all three services make after-the-fact determinations.

Our studies have found that the PMR requirement has had no effect on DOD's reimbursement of contractors' costs. DOD's mission is so broad that almost all efforts of defense contractors can be shown to have PMR. Even though some attempts have been made to screen out projects in

areas where DOD does not have primary responsibility, the cost to DOD for sharing in IR&D programs was not reduced.

PMR has had no impact on DOD's payments, because the costs of non-military-related projects have been minor. DOD does not accept contractors' programs in full. DOD shares with other customers in the costs up to the ceiling amounts, and the contractors absorb incurred costs in excess of the ceilings. The costs of projects having PMR exceed the amounts allocated to DOD contracts.

NASA, which has no statutory relevancy requirement, believes contractors are slanting their IR&D efforts in favor of DOD, to insure reimbursement through compliance with DOD's relevancy requirement. Both agencies believe the requirement should be broadened to relevancy to the Government's interest.

Contractors without advance agreements

Question 10 asked about the legality of payments to a contractor receiving less than $2 million of IR&D and B&P annually in the absence of a technical review for PMR. It is our opinion that section 203 does not require such a review if an advance agreement is not required; therefore we are unable to conclude that DOD payments in the circumstances are contrary to law. (See our report of Aug. 16, 1974.)

PROBLEMS OF TECHNICAL EVALUATORS AND NEGOTIATORS

Question 7 asked, "What problems are encountered by DOD and AEC contracting officers and technical or project personnel in evaluating and negotiating IR&D proposals?"

AEC told us that its field offices had not encountered any major problems in evaluating IR&D and B&P proposals. Problems generally were limited to such things as explaining the AEC reimbursement policy to contractors, obtaining sufficient information from contractors to evaluate the relationship of the project-to-contract work, late submissions by contractors of costs incurred, and questions on the percentage limitation on B&P.

We obtained information on problems within DOD by interviewing negotiators, individuals serving as IR&D focal points, and technical evaluators.

Negotiation of advance agreements

We talked with five of the negotiators from the three services. They mentioned no particular problems in arriving at ceilings or negotiating agreements with contractors.

Technical evaluations

We interviewed individuals assigned as focal points and technical evaluators to determine what problems they had had with technical evaluations. Although the problems they mentioned varied from organization to organization and individual to individual, they basically fell into four main categories.

1. Continuity in evaluations--Evaluators felt they could not make meaningful evaluations of contractors' projects because they did not have the opportunity to (1) review projects from all contractors within their area of technical expertise and (2) attend onsite reviews after being required to make brochure reviews. Evaluators believed that, without this continuity, they could not compare the quality of a contractor's research effort to other contractors in the technical field nor could they effectively determine whether a contractor had improved its program from year to year.

2. Quality of project descriptions--According to evaluators, the quality of project descriptions in brochures varied considerably from company to company. Although it is difficult to effectively explain a technical effort in writing, this shortcoming can best be overcome at an onsite review because evaluators can question the company's principal investigator working on the project and thus get a better understanding of the technical effort.

3. Caliber of evaluators--Several individuals serving as IR&D focal points stated that they had had a difficult time in getting personnel to evaluate projects. As a result, individuals within their own organizations had to evaluate projects of which they had minimal knowledge or interest. Some of the evaluators we spoke to felt they were doing the contractors and the services an injustice by not being able to effectively evaluate the projects.

   The evaluation form required the evaluator to judge his qualifications for technically evaluating the project. We examined a Navy office's 1,526 evaluations of 445 projects proposed by 4 company divisions for 1973 and 1974. Of these 1,526 evaluations:

   --15 percent showed that the evaluators rated themselves as having minimal qualifications to evaluate the projects.

   --46 percent showed that the evaluators had general knowledge or past experience in the technical area.

   --26 percent showed that the evaluators had specific knowledge of current work in the technical area.

   --12 percent showed that the evaluators had specific knowledge of current work on similar projects.

   Only 31 percent of the 1973 evaluations showed that the evaluators had specific knowledge of work in the area or on similar projects; in 1974 this figure increased to 45 percent

4. Allowable IR&D projects--Several evaluators thought that more restrictions should be placed on the types of projects funded by DOD through IR&D. These evaluators believed that industry would fund certain IR&D projects without

Government assistance simply because they appear profitable; IR&D funds should be used to stimulate research in areas in which the Government has an interest but which would probably not be funded by contractors with their own resources.

PMR determinations

Some evaluators felt that determining PMR did not present a problem because DOD's interests were so varied that almost any project could have PMR.

COST OF ADMINISTRATION

DOD's accounting or reporting system does not segregate the costs of administering IR&D and B&P. (Question 6.) The technical administration of IR&D within each service has been coupled, as much as possible, with the administration of ongoing research, technology, and conceptual systems programs the services directly support.

In response to our request, DOD furnished cost estimates which represent the best guesses of key personnel involved. Although these gross estimates are not susceptible to audit or verification, DOD believes that they are fairly representative of the annual costs of IR&D and B&P administration.

Service	Cost of negotiation	Cost of technical evaluation	Total
Army	$ 30,000	$ 350,000	$ 380,000
Navy	85,000	564,500	649,500
Air Force	108,500	984,000	1,092,500
	$223,500	$1,898,500	$2,122,000

NASA acknowledges that one of the important advantages of its cooperation with DOD is the administrative economy of such an arrangement. NASA's in-house costs of administering its programs are relatively small compared with what they would be if NASA had to assume the burden of independent technical review and negotiation functions.

AEC does not maintain a system which produces the in-house cost of administering IR&D and B&P programs. (Question 6.) One of the AEC offices most involved in IR&D activities estimated its costs to be minor.

Contractors told us that the increased emphasis on technical evaluations and relevancy reviews had increased their administrative costs. Although these costs are not generally quantified, some of the larger contractors have estimated their increased annual costs to have been between $500,000 and $1 million. Some of these costs eventually will be borne by the Government through indirect charges to contracts.

OTHER MATTERS

Should B&P be under ceiling?

Section 203 requires a ceiling on the allowability of both IR&D and B&P costs. Industry representatives contend that B&P should not be treated like IR&D because of the degree of control that a company can exercise over B&P expenditures. IR&D lends itself to advance planning, and each project is undertaken after evaluation against a business objective. On the other hand companies say that, although each B&P project is reviewed for its market potential, it is difficult to plan a year's B&P effort in advance.

Depending upon the nature of their operations, some companies spend more for B&P than they do for IR&D. Some companies spend heavily on unsolicited proposals rather than on responding to formally solicited proposals. However, any proposition to treat unsolicited-proposal costs differently from solicited-proposal costs (e.g., lumping unsolicited B&P costs with IR&D under one ceiling and exempting solicited-B&P costs) would be difficult to control because unsolicited proposals are often solicited by the Government informally.

When sales opportunities, unforeseen or forecasted for later periods, develop, a contractor can choose between (1) foregoing the opportunity, (2) funding the opportunity out

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of profits, (3) reducing other B&P activities, or (4) curtailing IR&D projects to fund the B&P activity.

Although advance agreements permit shifting between IR&D and B&P costs as long as the total ceiling is not exceeded, industry feels that a ceiling prevents the Government from maximizing the quality and vigor of competition and limits the Government's options. Further, industry states that the Government has a direct influence on B&P costs through its procurement policies and that the contractor is not in sole control of the amount of B&P effort required to be responsive.

We recognize that there could be occasions when a contractor could become aware of upcoming Government procurements and not be in a position to respond because of expenditure limitations.

Since it appears that the Government could have a greater effect on the amount a contractor spent for B&P than IR&D, we considered the feasibility of clearly identifying B&P expenditures so that these costs could be separated from IR&D and controlled by normal competitive restraints, leaving it necessary to maintain controls over IR&D expenditures only.

We concluded that such a separation could not be enforced. The nature of the technical work and the records kept by the performers are such that the auditor cannot responsibly determine whether a particular effort is IR&D or B&P. The same performers are involved in both. We believe that, if restraints other than the forces of the marketplace are to be imposed on IR&D, similar restraints must be imposed on B&P.

Separate ceilings for IR&D and B&P

We were asked about the practicability and desirability of establishing separate ceilings for IR&D and B&P if a decision is made to establish a total ceiling in law. (Question 21.)

DOD has followed a policy of negotiating separate ceilings, while permitting some contractor flexibility to adapt to changing circumstances and to recognize the difficulty of precise classification of the two costs. The contractor can vary the division of effort between IR&D and B&P as long as the sum of the efforts does not exceed the sum of the individual ceilings. DOD believes that such a provision for latitude must be built into any funding arrangement.

NASA believes that the concept of separate ceilings in law is not realistic or desirable because of the interrelationship between IR&D and B&P. Both types of costs should be allowed in reasonable amounts, without artificial, arbitrary controls that would be difficult to administer and more costly to operate.

Industry believes that the establishment in law of separate ceilings or a total ceiling for both would be incongruous with pricing practices of the present Government procurement process. It would create impracticalities and inequities. Industry sees enforcement as a practical impossibility, considering that DOD alone contracts with approximately 18,000 firms.

As previously explained, we believe that the nature of the two costs is such that, if it is considered necessary to institute a ceiling for one, the other must also be controlled by a ceiling. However, we recognize the administrative burden of enforcing a ceiling in law unless the statutory language clearly and narrowly identifies those companies whose costs the law is intended to control.

Contractors' submissions in support of cost estimates

We were asked to evaluate the adequacy of contractors' supporting data with respect to cost estimates, specifically as to whether contractors comply with the Truth-in-Negotiations Act by providing detailed cost or pricing data in support of project cost estimates and certifying as to their accuracy, currentness, and completeness. (Question 11.)

The advance agreements for IR&D and B&P do not in themselves provide for payments by DOD; rather, they are understandings with the contractors as to the amounts of these costs which are allowable as overhead on subsequent contracts. Ultimately, under the Truth-in-Negotiations Act, contractors will submit certified cost or pricing estimates in support of the negotiated contracts on which payments are to be made.

The Air Force and Army require that certified cost or pricing data be submitted with IR&D proposals. DOD is considering an ASPR change which would establish the requirement as a policy.

We found service personnel had some reservations about the value of obtaining certified data for a project which might never be undertaken or completed. Contractors can terminate or modify projects as they see fit. Some projects included in brochures as a basis for advance agreements never get started. Both Government and industry personnel believe that one advantage of IR&D is not having the contractor locked into a particular project, as it is with a contract. They prefer that the contractor have the flexibility to stop an unpromising project or increase the work on a promising project without the administrative formalities of negotiating a contract change.

The value of a requirement for submission of certified data with IR&D proposals in our opinion seems to instill some discipline in program preparation.

Nondefense contractors

Since DOD pays the most IR&D to the large, established defense contractors, the Senators asked what safeguards were in effect to offset this competitive advantage over new firms trying to enter defense business--particularly small firms. (Question 15.)

It is DOD's position that any company to which DOD has awarded a contract can recover a proportionate share of reasonable IR&D and B&P costs. This applies to small companies as well as large ones. Therefore DOD does not

consider that the large, established companies have a competitive advantage.

Industry representatives note that all companies engaged in advance technology, large and small, conduct self-initiated R&D to improve their product lines, regardless of who their customers are. These costs historically have been considered as current operating expenses by all industries. They point out that any company seeking to enter into a new market must compete its technology or product against the existing expertise of the market, which likewise has been customer funded. Consequently, every company is on an equal footing, whether it is a defense contractor seeking entry into commercial markets or a commercial contractor seeking entry into the military market.

DOD uses thousands of contractors each year in its R&D work. We believe that there is opportunity for any size company which has established a competency in a defense-related area to receive DOD support for its IR&D. Small companies are subject to a formula which tends to permit them to recover all expenditures except when their sales or expenditures vary widely from those of prior years. On the other hand, large contractors are required to negotiate advance agreements and the ceilings have historically been negotiated below actual expenditures. Large companies also have the burden of costs incurred in negotiations and technical evaluations; however, this disadvantage may be somewhat offset by the value of the technical evaluations received, which small companies do not get.

Small companies

DOD contracts with many companies which incur IR&D and B&P costs but which are not required to negotiate advance agreements. These companies recover their costs through overhead on contracts subject either to CWAS principles or to a formula computation.

CWAS technique

CWAS is a technique set forth in ASPR for determining and expressing numerically, on the basis of an analysis of its contracts, the degree of financial risk a contractor has assumed. CWAS is available to all DOD contractors on a voluntary basis. To determine an annual CWAS rating, the contractor develops cost-incurred data on its Government business, broken down by types of contracts, and on its commercial business.

The CWAS rating given to a contractor depends upon the riskiness of its contracts. Under competitive firm-fixed-price-type contracts when the contractor has full-cost risk, the contractor is assigned a cost-risk percentage factor of 100. A zero-cost risk is assigned under cost-type contracts when the Government assumes the full-cost risk. The risk factors of other contracts range somewhere in between. If the computed CWAS rating of a profit center incurring costs is 65 points or higher--35 points having been derived from competitive firm-fixed-price contracts or commercial sales--the reasonableness of the costs will not be questioned. A contractor with a rating between 50 and 65 points can become CWAS-qualified at the discretion of the contracting officer. The contractor with a rating below 50 points is subject to audit.

ASPR designates which cost principles are subject to CWAS determination for reasonableness. The sections of the IR&D and B&P cost principles which pertain to companies required to negotiate advance agreements indicate that CWAS is not applicable. For other companies, whose allowable costs are subject to formula, CWAS provisions are applicable.

Formula approach

The large number of small companies (under $2 million of IR&D and/or B&P paid by DOD) have the allowability of their IR&D and B&P costs determined by a formula. A combination of previously incurred contractor costs and sales is used to determine a ceiling; i.e., the amount of IR&D and B&P costs to be accepted by the Government. The formula limits allowable costs for the current year to 120

percent of the average annual costs for the two highest of the preceding 3 years. Costs up to 80 percent are allowable as a minimum.

However, at the discretion of the contracting officer, an advance agreement may be negotiated when the contractor can demonstrate that the formula would produce a clearly inequitable cost recovery.

In September 1973 we reported to DOD that young, fast-growing companies were concerned about inequities under the formula approach and that their recourse to advance agreements was unsatisfactory. DOD told us that these situations had not surfaced to the extent that they represented a widespread problem. DOD plans to work out solutions on a case-by-case basis.

CHAPTER 7

ALTERNATIVES TO PRESENT METHOD OF FUNDING AND PAYING FOR IR&D AND B&P

We were asked for "alternative recommendations" to give the Senate Armed Services Committee a choice of actions which might be adopted. The Senators also included four questions related to eliminating or modifying the present method by which DOD supports contractors' IR&D and B&P programs.

ELIMINATION OF IR&D AND B&P AS ALLOWABLE COSTS

In commenting on "the practicability of completely eliminating Department of Defense payments to contractors for IR&D and B&P as allowable costs" (question 17), DOD stated its opinion that IR&D was not wasted or redundant effort. DOD felt that, if IR&D were replaced dollar for dollar by direct contract R&D, the added cost of contract administration would reduce the R&D effort. The Director of Defense Research and Engineering stated that:

> "* * * this might be offset by more discriminatory direction of R&D work to eliminate redundancy, but this presupposes that the Government is so perceptive as to be capable of not only discerning every salient and essential requirement but also has the wisdom to direct the technology down the path leading to the optimum solutions."

DOD believes that much of the capability of scientists in industry, educational institutions, and other non-Government organizations would be lost to DOD if they were not permitted the freedom to pursue concepts they have evolved.

DOD pointed out that B&P effort relates to work the contractor is proposing to perform, mostly on new contracts. Any contractor, unless it is the sole source, cannot hope to win every proposal, yet the cost of unsuccessful proposals must be recovered if the contractor is to continue in business. DOD believes that the savings realized by encouraging competition through contractors' recovery of IR&D

and B&P costs can be expected to more than offset the costs of IR&D and B&P.

Competition stimulated by IR&D and B&P can also be expected to yield higher quality results for the Government's outlay. DOD believes that competition to maintain and increase the quality of the Nation's technological base is every bit as important in the long run as is competition to develop and produce major weapon systems in the short run.

NASA took the position that, if IR&D and B&P costs were disallowed:

> "* * * contractors would have no choice but to attempt to finance the cost of this work through profits. Since profits are uncertain, the resources available for IR&D and B&P support would lack stability and continuity. Periods of high profits would be likely to result in higher allocations and periods of low profits in lower allocations. This is just the reverse of what is desirable."

NASA's experience has been that, without stability, R&D is inefficient because personnel and facilities cannot be programed beyond the short term.

An industry representative responded that, if IR&D and B&P were eliminated entirely, defense contractors would have to provide these essential activities from already inadequate profits until they were no longer able to survive. DOD and NASA would lose the basis for competitive negotiation of major weapons and space systems contracts. It would diminish national technological leadership and would destroy the viable industrial defense capability.

Industry spokesmen also made the point that the question referred to "payments" to contractors for IR&D and B&P. They emphasized that DOD did not pay for IR&D and B&P. It buys products and services which are generally priced in accordance with cost or pricing data following strict formats as to allowable costs. At present, due to statutory, regulatory, and administrative restrictions, only part of the IR&D and B&P costs become eligible for consideration in

defense contract pricing. This share has always been lower than the ratio of defense sales to commercial sales.

Industry contends that the general level of defense contract profits is low and that many fixed-price contracts are loss contracts. If a contractor is not permitted to include IR&D and B&P costs in DOD contracts, questions are raised as to what it should do and what the Government policy is to be on using private companies.

DIRECT FUNDING OF IR&D AND B&P

Three of the Senators' questions related to the practicability of eliminating or reducing IR&D and B&P reimbursement as allowable costs while providing some measure of direct funding. One supposition eliminated allowability completely while:

> "* * * establishing a separate program in each of the RDT&E appropriations for IR&D and B&P with an amount of funds to be distributed directly, by contract or grant, to industry. This distribution could be based upon such factors as the experience of negotiating teams, including technical review panels, and the same criteria presently used under the existing procedures." (Question 18.)

Another hypothesis combined "the present system, with an established dollar ceiling substantially lower than the $700 million level and a separate, directly financed program" of contracts or grants. (Question 19.) The third question asked "the practicability of the continuation of the present system but based upon a dollar ceiling which is reduced 10 percent each year with an equal increase in the directly financed program." (Question 20.)

We asked DOD for its views on these questions. DOD responded that direct distribution of IR&D and B&P dollars to contractors by contracts or grants was not considered practicable for several reasons. DOD deals with 18,000 to 20,000 contractors, all of which incur B&P expense and many of which incur IR&D. Direct distribution to so many contractors would increase the negotiation, technical review, and administrative workload far beyond DOD's current IR&D and B&P management capabilities.

Also, direct IR&D support would reduce or eliminate the ingredient of independence which DOD considers essential. Any contractual instrument would have to be sufficiently definitive that it would eliminate contractor independence and freedom to adopt a needed change.

NASA does not favor line-item appropriation and direct funding by contract or grant to industry because "the work would tend to become directed research and development with the consequent loss of independence and flexibility inherent under the present system." Administration "would be inefficient and uneconomical with great difficulty to be experienced in allocating funds among the contractors in an acceptable manner." NASA believes that the present balance between R&D and the independent effort conducted under IR&D and B&P is adequate.

Industry groups reported that these questions:

> "* * * assume a gradual transition to the Federal Government of control over the defense-related R&D activity of the private companies by gradually removing the benefits of company-initiated technology development, discouraging private finance sources, and making these companies in effect dependent on contracts and grants rigorously controlled * * *.
>
> "Whether intended or not, they seek an evaluation of methods for achieving such control over private companies * * *."

Industry believes the issue, rather than being a question of accounting or administrative detail, is the soundness of a policy which has consistently encouraged an incentivized, competitive, and privately owned enterprise.

SAMPLING OF OPINION ON ALTERNATIVES

Over the years many ideas have been proposed to modify or replace the DOD-NASA method of supporting a contractor's IR&D program. To be able to respond to the Senators' request for alternatives, we selected 14 of these approaches, described each briefly, and listed the known advantages and

disadvantages of each. The resulting package of alternatives was sent for comment to a number of knowledgeable persons with widely divergent views on the need for supporting IR&D.

We received responses from 18 individuals and 1 industry association. The individual respondents represented Government, industry, and academia. All had direct working experience with IR&D programs from one or more of these vantage points.

The responses varied considerably in the amount of detail presented. However, the respondents generally agreed on the following points.

--Before considering the alternatives, it was necessary to establish personal criteria for the objectives or goals of the IR&D program.

--Measured by the individual's criteria, a characteristic, such as "increased Government control," could be seen as an advantage or a disadvantage.

--None of the alternatives represented an important enough improvement over the present system to warrant a change.

We have synopsized most of the alternatives, combining them when they reflected somewhat similar approaches to the problem. We have not included all the presupposed advantages and disadvantages but rather let the experts' comments reflect the pros and cons. We selected comments on each alternative or group of alternatives to indicate their strengths or weaknesses. In most instances, in the interest of conserving space, we have taken the liberty of paraphrasing the actual comments submitted.

No constraints on recovery, except reasonableness and allocability

One alternative approach removed most of the restrictions of the present DOD-NASA method.

Remove present controls and limitations on the recovery by industry of normal IR&D costs. As defined in ASPR, IR&D would be allowable as overhead to the extent determined to be reasonable and allocable. Administrative costs would be reduced and contractors would have maximum flexibility in conducting their programs. IR&D costs could increase.

Favorable comments

1. Since this alternative retains the controls of reasonableness and allocability, in reality only the relevancy and technical quality controls would be removed, but this should considerably reduce administrative costs. The reasonableness control with its negotiation and advance agreements would be retained, so costs of IR&D should not increase. Retention of the IR&D data bank should minimize the reduction in visibility to the Government of contractor programs. This alternative essentially represents DOD's position and procedure during the 1960s until the release of DPC 90 and the enactment of section 203 of Public Law 91-441. Reinstitution of this alternative would require a major change to section 203.

2. This method is the most likely to foster the kinds and amounts of IR&D necessary to achieve national economic and social objectives while insuring that the work is efficiently managed and performed.

3. On the basis of the fundamental principles of IR&D, recognized in both Government and industry, this could be considered a completely acceptable alternative to the present system. Constraints of the marketplace do exist and would hold IR&D expenditures to a constrained level.

4. Cost competition would limit expenditures; only high-value programs would survive internal company reviews.

Unfavorable comments

1. This approach is not practicable because it does not eliminate the key issues which are responsible for the present controversy; i.e., how do we determine the reasonableness and allocability of IR&D overhead costs?

2. The removal of all controls would greatly increase IR&D costs for two reasons. First, there would be a step increase because DOD contracts would get a full allocation of contractors' expenditures which are greater than ceilings presently being negotiated. Second, the competitive advantage to be gained by contractors through increased technological capabilities would drive IR&D costs higher than they are today.

3. Congress would never accept this method.

4. Philosophically, to rely on an after-the-fact evaluation of reasonableness is to abandon any idea of effective control, direction, or screening. This alternative would surrender on all the points thought important enough to bring about the present attempts at control.

Recovery based on formula-type approaches

Each of several proposed alternatives would simplify the administration of IR&D, and thereby reduce administrative costs, and would provide more uniform procedures for all contractors. Technical and relevancy tests could be eliminated. IR&D costs would likely increase, and Government visibility of programs would decrease. The principal alternatives in this group are:

All contractors would be subject to DOD's CWAS formula. Those qualifying under a CWAS rating (65 or higher based on fixed-price and commercial sales) would have no limitations on IR&D recovery through overhead. Other contractors would be subject to the DOD formula or advance agreements.

Contractor cost centers with 50 percent or more fixed-price Government contracts and commercial sales would be accepted as overhead, subject to a reasonableness determination. (Commission on Government Procurement recommendation.)

DOD's formula based on prior years' experience (now applicable to contractors not meeting requirements for advance agreements) would be applicable to all contractors.

Favorable comments

1. Applying CWAS at a 50-percent threshold to screen out those contractors whose contract mix is considered such as to force a cost consciousness that eliminates the need for technical evaluation, reasonableness checks, and relevancy determinations is an excellent possibility if (1) the CWAS qualification procedures can be simplified, (2) CWAS is limited to major contractors (incurring over $2 million in IR&D), and (3) the philosophy of the commercial marketplace, that an adequate cost-consciousness environment will cause any industrial organization to act in a prudent manner both technically and financially, is acceptable.

There is no way of determining how many of the more than 200 profit centers which now receive technical evaluations and which negotiate advance agreements would qualify at a 50-percent CWAS threshold. However, there is potential for reducing the administrative burden.

As for visibility of IR&D programs, it has always been the practice of most major defense contractors to maintain close contact with those defense organizations which may have interest in specific IR&D programs. In addition, the newly expanded IR&D data bank could be continued, regardless of CWAS qualification.

There would be a need to considerably change section 203 of Public Law 91-441.

2. The combination of the CWAS approach and the formula ceiling approach is feasible, subject to a few refinements. When applicable, the CWAS concept would rely on the natural competitive forces and would eliminate unnecessary redtape. Only the threshold needs to be decided. For those not meeting the CWAS threshold, the formula approach could be applied uniformly for all agencies, not just for DOD.

3. The DOD formula could also apply to all contractors with $2 million or more in IR&D payments with the following modifications.

--A longer period to equalize any unusual fluctuations.

--IR&D costs predicated on allowable (ceiling) IR&D costs.

--Evaluation of the contractor's technical quality and effective management of its IR&D program.

--Relief for either party when it can be demonstrated that the method is clearly inequitable.

Brochures, as currently prepared, would no longer be necessary and relevancy would be considered by the modification which considers allowable costs as one of the bases.

4. The present formula approach could be successful if appropriate guidance were distributed to Government IR&D decisionmakers to make it suited to small business.

5. If the DOD study now underway to revise CWAS were to result in a practicable administrative procedure and if the formula approach were modified to consider radical changes in the business environment and to provide for the treatment of new companies with no track record, they would be viable alternatives and would reduce administrative costs.

Unfavorable comments

1. It is not clear how such procedures, although acceptable from a concept standpoint, would be achieved, since those companies which would not qualify would be subject to the same procedures (evaluations, advance agreements, relevancy, etc.) that are in effect now. The formula does not recognize the real-time problem (i.e., as sales go down, the need for increased expenditures in IR&D goes up) in the reimbursement of IR&D.

2. These are, in fact, simply approaches which eliminate advance agreements. DOD and NASA have determined that it is cost beneficial from their points of view to negotiate these agreements, and these agreements provide at least some certainty to industry. Focusing on cost-type versus fixed-price-type contracts misses the fact that the IR&D issue arises because of the lack of real competition involved

in letting many DOD-NASA contracts. It is the uncertainty about the degree to which the Government can count on the restraints of the marketplace to hold down prices and hence count on its suppliers to control their IR&D and B&P expenditures which causes the issue.

3. Available information indicates that few major contractors' cost centers have more than 50 percent of cost-type contracts. At the same time, some very small research-type firms do. Applying CWAS would eliminate many major contractors from the requirement to negotiate advance agreements and would require negotiation with some small contractors who are not now subject to this procedure. There would be inadequate control of large IR&D dollars and overcontrol of small amounts. Applying DOD's formula would result in a quantum increase in costs to the Government because current negotiation ceilings are less than those computed under the formula.

4. The alternatives don't give the assurance that a company is using its resources, in technical areas, in a way that promises to produce results, or that the company is doing an intelligent job of managing these resources so that the Government will benefit from its partial sponsorship (through acceptance of its share of the cost of the effort).

The value of CWAS and its theoretical base never has been tested. Like any mechanical approach, the formula gives an appearance of control but is applied using numbers that have little to say about the quality and effectiveness of past IR&D efforts.

5. Certainly there may be a point where commercial and firm, fixed-price sales are so predominant that administrative controls of any kind would be nonproductive. However, it is highly questionable whether that point can be fixed in advance to apply to all contractors. Another factor that ought to be considered, and one which is applicable to all automatic schemes for recovery, such as CWAS, is the loss of technical visibility and interchange which is inherent under the present system.

The formula approach would perpetuate a sort of status quo. Large companies or companies whose ratios of IR&D and

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B&P to sales have been historically high would seem to prosper, or at least be assured of maintaining a comparable position in relation to ceilings established for other contractors. Small companies or new firms entering the Government market might find it extremely difficult to compete effectively for Government business.

Line-item funding; contracts and grants for IR&D

A series of alternatives centered around budget line item funding, contracts, and grants. Features of these alternatives included assured relevancy; more Government control than the present method; assured Government rights to patents and data; increased administration procedures and costs; a need for increased funds for IR&D unless effort is reduced; and a lessening of contractor independence, Government visibility of contractors' programs, and technical innovation. The principal alternatives in this group are:

Contractors' IR&D would be treated as a budget line item. Awards would be made in whole or in part through contract- or grant-type arrangements.

A contractor required to submit a program for technical review would have projects selected for direct R&D funding from the research, development, test, and evaluation (RDT&E) appropriation. The amounts would be deducted from the ceiling. Remaining projects would be funded through overhead up to the reduced ceiling.

Independent research projects would be funded through overhead. Independent development projects would be submitted for evaluation and those selected would be directly contracted for.

A contractor now required to enter into an advance agreement would be awarded a level-of-effort contract. The contract would have considerable latitude, and results would be reported at the year's end.

Favorable comments

1. Under line-item funding the Government could buy what it needs; it could adopt successful R&D procurement contract practices. While making the transition, selected projects could be contracted for and the remaining projects could be funded through overhead, which would provide a bridge for improving present systems.

2. If a line item for IR&D could be established in the RDT&E budget, the Government could contract directly with contractors for the IR&D it has decided it needs. The proposals for this contracted effort could be as simple as the IR&D brochures that are currently the basis of the IR&D advance-agreement negotiations. Companies that are not now in the advance-agreement category could likewise prepare IR&D proposals seeking a contract for IR&D effort. The method of contracting should be a level-of-effort-type contract with flexibility on the part of the contracting officer to start, stop, revise, and reprogram projects when necessary. Any R&D that a contractor wishes to undertake on its own would be financed from the contractor's profit.

3. A combination of (1) direct funding of selected projects and overhead recovery of others and (2) direct funding of independent development and recovery of independent research costs through overhead could become an acceptable alternative if certain changes were made. Research should be independent, and some downstream development work now being done on IR&D could be more effective if done under a contract. In so doing, it is absolutely essential that such work is done in a competitive environment. Further, this sort of activity should be initiated by a Government-need statement with industry responding by proposals rather than by industry submitting a listing of proposed projects in areas of its own interest.

4. If the alternative (the deduction feature when contracting for part of a contractor's program) were modified to deduct from the ceiling only the amount of funds required to conduct the project as an IR&D project, it would be a viable option to add to the current recovery approach.

Unfavorable comments

1. Assuming that IR&D as a separate budgec line item were adopted, "how to cut the pie" (the appropriated dollars) presents a serious problem. The first budget line item could be developed from the records of dealings with "major" contractors, and justification could rest on the experiences and results of earlier transactions. How do companies not on that initial list get their share? In addition, wouldn't it be necessary, in justifying budgets for subsequent years, to point to concrete results? Wouldn't this cause pressures to direct efforts into areas of high potential for short-term payoff? Won't the use of a contract or grant to funnel the money to a company mean the end of "independent" R&D?

2. Proposals for the Government to obtain a pot of money for disbursing to IR&D performers through contracts or grants would lead to the wrong priorities, delays of the best programs, and a gradual decrease in the Government's procurement options.

Although direct contracting might assure the Government that work is relevant to an agency's mission, it may not be an advantage because it would require applying a potential relationship test for every agency a contractor does business with and with which it might negotiate a contract.

The problems of a contractor's planning an organized continuing program under the budget problems involved in a level-of-effort contracting for IR&D would be impossible to solve. No contractor would know what would be appropriated by the Congress or allocated by agencies.

3. The Government's rights to patents is considered "an unequivocal advantage" for direct contracting, although a genuine question exists as to whether the Government's acquisition is clearly in the Nation's best interests. Independent of this broader question, the acquisition of patent rights clearly represents an extremely debatable advantage when it involves loss of innovation.

4. Contracts, in any form, or grants are not viable alternatives. No one has the wisdom or ability to judge or determine all the technical projects and approaches which

may produce beneficial results. The thrust of these proposed approaches ignores the innovative ability and productivity of the thousands of "brains" within companies across the country.

5. Line-item budgeting would cost the Government considerably more, even when maintaining present spending levels, since the Government does not now foot the entire bill. In addition, long-range IR&D programs would suffer and thus the technical base of the country would be weakened.

6. IR&D as a separate line item will entail establishing elaborate machinery within each R&D contracting agency to estimate, budget, coordinate, select, justify, parcel out, and award thousands of contracts to hundreds of contractors. If applied to B&P, line item budgeting would completely disrupt the acquisition process and would create massive disputes.

The difficulty with direct funding of IR&D projects is that, in the context of a typical R&D life cycle, it is usually much too early to incite the interest of the contracting agency to the point of a direct-funding commitment. It appears that many good IR&D ideas might not be pursued, either as directed R&D or as IR&D.

The obvious disadvantage of the level-of-effort-contracts approach is the huge resources that would be required to administer the program, both by the Government and by the contractors involved. There is a danger in any contractual approach, even level-of-effort transactions, becoming more and more restrictive so that, in time, IR&D would be transformed into something more akin to directed research and development.

7. The budget line item approach would substantially reduce the number of contractors with technical capability in any field because those which were not granted funds would fall too far behind to catch up.

Contracting for selected IR&D suggests that all worthy projects would be funded, but the number of projects could not exceed the amount established many months earlier in the budget, authorization, and appropriation cycles. Unless

the RDT&E budget were actually increased, the result would be a reduction in R&D effort. It is questionable that the Government would obtain any appreciable number of new royalty-free licenses. It receives many now from projects started in IR&D.

Separation of independent research and independent development implies a simplistic view that development relates only to development of a product for sale. For most defense contractors, development is more likely to be directed toward taking research to the point where the feasibility of new and better or less expensive solutions are demonstrated. There is no practicable way to draw the line between research and development.

Level-of-effort contracts would free contractors with nondefense business to conduct any program they wished for that part of the program to be supported by commercial or even firm, fixed-price defense work. The Government would lose visibility of all such projects and would lose the capability to influence the work being done.

Recovery only if there is benefit to contract

IR&D would be allowable only to the extent specifically set forth in the contract, and then only to the extent the costs provide a direct or indirect benefit to the contract work. (AEC method.)

Favorable comment

There is a need to recognize the Government's interests and abolish the practice of subsidizing contractor IR&D. A system similar to that employed by AEC should be adopted.

--Treat IR&D costs on a contract-by-contract basis. IR&D costs would be unallowable except when the contracting agency has made an affirmative determination that an IR&D project provided enough benefits to the contract to warrant the cost.

--Allow contractors to submit to DOD any military-related research projects which they want the Government to finance completely. DOD would then

contract directly for whichever of these projects it desired to pursue. The funds would be provided as a separate line item in the RDT&E appropriation.

--Allow B&P costs if the subject matter of the bids and proposals were applicable to defense work. B&P costs for nondefense work would be unallowable. Place a ceiling, such as 1 percent of the total direct material and direct labor costs of the contract work, on the allowable B&P expenses.

--Reserve and protect Government rights to technical data and patents commensurate with the percentage of the research costs borne by the Government, regardless of whether funding of those costs is direct or indirect.

This system would greatly reduce the Government's funding of contractors' projects. However, DOD's money would be spent on specific defense projects when responsible officials have to review, approve, justify, and defend the expenditures. This system would also permit the Congress to review and oversee these expenditures.

Unfavorable comments

1. The AEC system is hard to administer. The disadvantages (disallowance would vary on every contract because of contracting officers' judgments; program continuity would be difficult because project support would be known only after a contract had been negotiated; technological effort might slacken; unsuccessful bidders would have their chances reduced for the next competition; and direct R&D costs might have to be increased to provide innovative approaches) are overwhelming.

2. Disadvantages include the complications of negotiating and justifying IR&D on each contract. However, the major disadvantage is the stagnation of industry into precise, present lines of business. Many, if not most, great ideas are byproducts of effort totally unrelated to the initial application area.

3. Allowing IR&D costs only to the extent they relate to specific contracts raises the questions: Isn't such work actually required in the performance of the individual contracts? and shouldn't it be a direct charge? The United States is not so far advanced over the technology of other nations that it can afford to reduce its total R&D effort. If this approach were adopted, using the savings for other R&D effort should be considered.

4. The advantages (only those costs determined to provide benefit to existing contract work would be accepted; IR&D costs would be reduced because much IR&D is directed toward the future) are, in fact, disadvantages when the welfare of the country is considered. Moreover, planning for IR&D would be virtually impossible, since a firm contract base could not be forecasted and allowability would always be in question, retroactively.

5. The requirement for contract relevancy would mean that long-range research and development, if it is to be done at all, would have to be directed and covered by contract. The contract-by-contract relevancy requirement would pose some difficult, if not insurmountable, cost allocation problems.

6. Using the AEC approach for DOD, the Energy Research and Development Administration, or any agency in need of research and development, would turn off the technological strength essential for coping with the Nation's social, economic, energy, and defense needs. It is important that there be an awareness that AEC's operational orientation was unique for Government agencies.

IR&D recovery as a profit factor

IR&D would be included as an element of the contractor's profit instead of an acceptable contract cost. This method would recognize that the amount of IR&D incurred by a contractor is influenced by the contractor's long-term objectives and is subject to adjustment.

Favorable comments

1. In presenting this alternative, no provisions were made to establish the mechanics for computing a percentage to be added to profit. To give due weight to factors that should be considered, such as technical quality and management efficiency, it would be appropriate to provide the rationale and mechanical means of computing the profit percentage for IR&D, such as the percentage of IR&D to DOD sales.

The modified approach would eliminate advance agreements and would give contractors incentive to eliminate unproductive engineering efforts. However, incorporating a profit factor into the weighted guidelines could, in time, defeat the concept of IR&D as an additional element of profit because some negotiators would be inclined to standardize the profit rate on the basis of previous negotiations. Therefore it is suggested that this percentage be added "below the line" as a special profit item.

Allowing IR&D as a profit element would not deprive the Government of assurance that the contractor actually would continue to perform IR&D. Over a long period, contractors would have to keep up with competition or fail.

Increasing the statutory limits on profit is a mechanical problem which can be done within the framework of any future legislation. The objection that IR&D might be subject to adjustment by the Renegotiation Board can be overcome.

The objection that there may be a tendency to apply the same profit factor for IR&D to all contractors represents a serious problem. One possible solution would be to include the item below the line in computing the profit factor and not include it in the weighted guidelines. Another possibility is using a different factor for different industries. Below-the-line treatment would also take care of the assertion that profits would be the first to be reduced in periods of economic tightening. Many unallowable but necessary and allocable cost items, such as donations and interest, are considered to be covered by the profit factor, and therefore IR&D could also be considered in this context.

2. The factors of originality and motivation, together with many criticisms of the present system, are overcome with this proposal. A major problem, from the Government's viewpoint, with this approach is arriving at an equitable percentage for the wide diversity of industries. One approach might be to collect averages for various kinds of industry (including commercial companies) and use those averages in the weighted guidelines. Another approach might be to let the Renegotiation Board evaluate IR&D expenses when evaluating profit.

Unfavorable comments

1. The additional profit to compensate for IR&D costs would undoubtedly be gradually reduced over a few years, which would eliminate IR&D.

2. IR&D as a profit factor would be implemented only on noncompetitive, negotiated procurements when negotiations are predicated on a contractor's proposal that includes cost or pricing data that, in turn, is subjected to analysis and used and relied on to negotiate the pricing agreement. There is a real chance that this would mean a cutback in total money companies spend to support IR&D. It also would mean that IR&D would be allowable, subject to tests of allocability and reasonableness, with no other control. It would put a premium on shortrun objectives with quick and reasonably sure payback.

3. A disadvantage is that a number of Government contractors having large IR&D programs recover a major part of the cost of those programs under Government subcontracts. Even if the Government, in negotiating prime contracts, were able to establish a consistent and equitable increment in profit in lieu of reimbursing IR&D as a cost, it seems an impossible task for the Government to insure that prime contractors or higher tier subcontractors also would do so. Industry has grave doubts that the profit method could be uniformly implemented by the numerous services and agencies of the Government.

4. There would be a loss of technical visibility and interchange--an awareness of what is being done, by whom, and how it relates to our in-house and contracted R&D

programs. How much IR&D and B&P costs are recovered as a part of profit may have more to do with bargaining position on individual contracts than with the quality and need for IR&D and B&P. IR&D would lack a steady and reliable source of capital. Finally, there would be no consistency or continuity in an approach that entailed a multitude of contract-by-contract negotiations involving a host of different contracting officers, each with varying capabilities and points of view.

5. The suggestion is too mechanistic for application to the wide spectrum of industry and too often inappropriate for rapidly changing situations, and therefore many exceptions would be required. Also it fails to recognize the different accounting practices or management emphasis among contractors. Adjusting the weighted guidelines to allow more profit to reimburse for IR&D and B&P would, in effect, be a fixed charge which would not vary with the IR&D effort.

Long-term solution to IR&D problem

Adopt new definitions for R&D and other technical effort conceived for commercial businesses. Establish new cost accounting standards and appropriate procurement regulations. Consider new treatments of cost allocations, such as special cost-sharing arrangements.

Favorable comments

1. This approach would establish three categories for all technical effort: (1) shortrun product improvement, (2) long-range research leading to new business and new products in the same line of products and in the same market, and (3) development of a product, process, or market in which a company has no direct manufacturing, marketing, or management experience or technology.

Although revised definitions and new cost allocation criteria might simplify matters somewhat by making costs in categories (1) and (2) more clearly relevant, there still would be a need to be concerned with how much the contractor was spending and for what. To use ceilings with some assurance in those instances where the contractor isn't excused by reason of a CWAS-type calculation seems to require

review of projects underway and planned. The alternative is intriguing but needs development and evaluation in depth.

2. This approach warrants further study. Contractors would be reluctant to entertain this proposal unless liberal definitions of "new ventures" and "new business project research" were given.

3. This may well be a useful endeavor, provided the redefinition effort recognizes the objectives of IR&D stated in terms of benefit both to the contractor and to DOD, whereas the proposed categories reflect only the contractor's business objectives.

Unfavorable comments

1. Much more work has to be done before changes and definitions can be developed that would relate to both the commercial and the Government marketplace. An initial approach might be evaluating the activities of the Cost Accounting Standards Board. Even if such new definitions could be developed, this approach still would not resolve the major problem; that is, how to treat those cost centers that do the majority of their work for the Government under cost-type contracts.

2. The concept of defining IR&D into classifications relating to business objectives rather than technical objectives might simplify the IR&D problem, but the three categories proposed are not the answer. Requiring costs related to product lines to be allocated to those product lines was included in the original DOD cost principle on IR&D and was found to be unworkable. Among other problems, there is no definition of a product line. A category for exploratory research would be difficult, if not impracticable, to police, because there is no clear definition of what exploratory research is. The third category, new ventures, would suffer from the same malady.

3. In addition to the fact that the proposed definitions were conceived for purely business reasons and without regard to the Government's treatment of IR&D and B&P allowances, the definitions are based on the existence of proprietary product lines and are singularly inappropriate to IR&D by DOD or NASA contractors.

4. The probability of industry's investing capital with no guarantee of control over future business potential (monopsonistic customer) is remote.

5. It is not certain what the suggested definitions will buy in terms of more equitable, efficient, or effective controls. Some projects and work defy exact categorization; also, interpretative judgments will have to be made which will lead inevitably to arguments and disputes. Futhermore, the current allocation practices are not too unlike those proposed for the first two categories. Many companies do have corporate research programs and allocate costs related thereto across all corporate sales.

Eliminating technical reviews is not an advantage. There are valuable benefits to be derived from the technical interchange itself. The approach contemplated for new ventures would deny the application of our best technological talent to solving technological problems and challenges, whatever they are and wherever they may be.

6. This proposal shifts the basis of cost accountability from a known and useful set of definitions to an unfamiliar, less objective base. It eliminates or reduces only some administrative actions without providing for either reducing IR&D costs or improving program quality.

Present DOD-NASA method
versus proposed alternatives

Ten of the respondents explicitly stated that the present method DOD and NASA used was preferable to any of the proposed methods. Three others either implied a preference by rejecting all the proposed alternatives or said that only a method which would ease some of the constraints of the present method would be as acceptable as the present method.

Only four respondents preferred an alternative method: one preferred using a combination of CWAS and formula; one preferred using the AEC method; and two preferred using combinations of budget line item funding and contracting.

One of these four also proposed a cost-sharing arrangement. Another respondent submitted an original alternative which proposed that contractor IR&D supported by the Government be set at a level which best approximates what a similar contractor would have allocated for its own R&D purposes were it competing in a free market for the sale of commercial products similar in technology to those being supplied by the Government contractor.

CHAPTER 8

NEED FOR A UNIFORM GOVERNMENT-WIDE IR&D POLICY

The Senators asked us to specifically consider the recommendations in the report of the Commission on Government Procurement. The Commission considered, among other IR&D and B&P issues, the need for and desirability of uniformity among agencies' policies and procedures to assure equitable treatment of all contractors. The Commission recommended that IR&D and B&P receive uniform treatment Government-wide. The policies of Federal agencies other than DOD show varying degrees of acceptance of IR&D and B&P costs.

NASA POLICY AND PROCEDURES

NASA's IR&D and B&P policy is similar to DOD's. NASA allows, as an indirect charge to its contracts, reasonable costs of IR&D and B&P undertaken by NASA contractors. This policy is based on the conviction that these expenditures are necessary costs of doing business, which have proven to be beneficial to NASA.

Companies, at their discretion, undertake a level of IR&D and B&P activity which enables them to compete effectively for new business. NASA believes that, to keep abreast of the rapidly advancing technology in aerospace and related industrial sciences, contractors have no practicable alternative but to join the search for technology, a search undertaken mostly under IR&D and B&P. This basic fact of economic life in a competitive system cannot, in NASA's opinion, be altered or ignored without radically changing the system itself.

NASA believes the R&D done under IR&D and B&P has been a major contributing factor to maintaining a strong and creative technological and industrial capability, a condition of utmost importance to the success of NASA's mission. NASA's policy is to preserve the independent character of this activity as a prime motivator of new ideas and new technology which has supported NASA's mission. The constraint is on dollars, not on the directions taken in R&D.

NASA believes that any controls should be compatible with the independent nature of the activity.

NASA cooperates with DOD in controlling the level of IR&D and B&P expenditures. NASA sees advantages in common controls, including economies in administration. The common approach allows many NASA regulations to be identical to those of DOD, which eases the administrative burden on NASA's contractors. NASA's policy is to accept all DOD-executed advance agreements. The only difference in procedures results from DOD's relevancy requirement which does not apply to NASA.

NASA states that the impact of DOD's relevancy requirement is a problem of unknown proportions. DOD has declared and is declaring certain IR&D work of interest and value to NASA to be nonrelevant to a military function or operation. NASA finds that contractors are inclined to slant their IR&D in favor of DOD interests, to the detriment of NASA.

Although available evidence is that DOD's relevancy requirement has not yet had a financial impact on NASA-oriented IR&D, NASA does not know to what extent contractors are being motivated by this rule to structure their IR&D programs to avoid being caught in the financial crunch of DOD's relevancy requirement. NASA feels that new technology of value to NASA may be neglected.

NASA believes that the benefits of IR&D are reflected in the quality of contractors' proposals received and the contracted work.

AEC IR&D POLICY

The Energy Research and Development Administration recently assumed AEC's responsibilities; its IR&D policy is not known. AEC's policy differed from the DOD-NASA policy. The differences were highlighted in the congressional hearings of 1970 when the Congress was considering a bill to control the expenditures of funds by DOD and NASA through the application of controls similar to AEC's procurement regulations.

AEC did not accept a general allocation of IR&D costs. Such costs were unallowed except to the extent specifically set forth in the contract. Then they were allowed only to the extent that they provided a direct or indirect benefit to the contract work.

About 80 percent of AEC's procurement activity was represented by AEC's operating contracts; i.e., contracts for the management of Government-owned plants and laboratories under no-risk, cost-type contracts. AEC owned the facilities, provided the materials, and advanced the funds. The generation of new ideas through R&D was an integral part of the program which was completely financed by AEC. There was, therefore, no IR&D, as such, by the contractor under an AEC operating contract. However, the equivalent thereto was performed and fully funded as a part of the AEC program.

The remaining 20 percent of AEC's business generally was with contractors which performed the contract work in their own facilities without advances of Government funds. In addition, the contractors which operated the AEC-owned plants and laboratories subcontracted some work to industrial firms. These subcontractors, as well as the prime contractors which performed work in their own facilities, frequently engaged in contract work also with DOD or NASA. AEC accepted a limited amount of IR&D costs incurred by those contractors and subcontractors.

AEC's study of 1972 showed that there were 36 contracts totaling about $127 million on which AEC allowed about $1.9 million for IR&D, or 1.5 percent of the contract costs. AEC estimated that, under DOD procedures, its IR&D costs would have increased by a factor of at least 2.

Rationale for differences in DOD and AEC policies

Since DOD accepted IR&D as a general overhead cost and AEC reimbursed as overhead only those costs shown to be of direct or indirect benefit to specific contracts and since both agencies were involved extensively in R&D work, we looked into the reasons for the differences. (Question 16.)

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DOD generally accepts contractors' IR&D costs because it relies on private industry to maintain capabilities and competitively explore alternatives in a broad spectrum of technological fields. Because of the broad involvement of DOD in practically all aspects of the economy, it seems likely that most independent effort by defense contractors would be of potential value to the Government.

AEC stated that this was not true in its case. Unlike DOD, AEC concentrated much of its procurement in a highly technical field where the Government had developed most of the technology. AEC contracted directly for the R&D it considered necessary, because initially there was little or no commercial R&D work.

AEC did not rely primarily upon private industry using contractor-owned facilities for nuclear R&D efforts and was not concerned with maintaining this capability since most of AEC's activities were conducted and financed in Government-owned, contractor-operated laboratories and plants. AEC said that, although it was attractive to say that undirected R&D led to more imaginative and advanced work and should be supported by the Government through IR&D, it was not a desirable mechanism for AEC work.

Part of DOD's rationale for reimbursing IR&D rests upon developing and maintaining competition. IR&D was a relatively small part of AEC's total activity and was not used to develop and maintain competitive capability.

One of AEC's missions was to develop a competitive, private, nuclear industry. AEC said that it had used policies other than IR&D to encourage competition and bring about a nuclear power industry and that, to a real extent, it helped with needed industrial R&D through the device of Government R&D contracts which had helped to build and maintain the industry's capability for further Government and private work. AEC said that it also actively disseminated the technology and patents developed in AEC laboratories and by other contractors to insure that industry had use of all unclassified information.

Patent and technical data rights

AEC acquired rights to technical data and inventions or discoveries made or conceived under an IR&D project based upon its percentage share of the total project cost. AEC regulations provided that:

--When AEC's cost participation in the IR&D project was less than 20 percent, the contractor was required, if so requested, to submit a summary report and the agency did not seek patent rights.

--When AEC's cost participation was between 20 and 75 percent, the contractor had to submit a project summary report specifying any invention or discovery made or conceived and giving a nonexclusive, irrevocable, paid-up license to AEC for AEC purposes. The contractor could also be required to submit a complete and detailed technical report.

--If the cost participation exceeded 75 percent, the contractor was required to furnish scientific and technical information and data and to give the Government a nonexclusive, irrevocable, paid-up license for all purposes and the right to grant sublicenses for all purposes.

In the past, AEC sought to avoid substantial participation in contractors' IR&D efforts and its participation level was consistently below 20 percent. In some cases its policy served to hold down or avoid transferring rights to the Government. AEC said that recently there had been a few times when AEC had received licenses, licenses had been tendered to AEC, or AEC's entitlement to rights had been identified through contractors' applications for patents.

Unallowable IR&D projects

AEC regulations provided that, in addition to any project which did not provide a direct or an indirect benefit to AEC contract work, the following projects should be excluded.

--Any R&D project primarily of a promotional nature, such as a project directed toward developing new business or a project connected with proposals for new business.

--Any study or project which was undertaken in whole or in part for other sources.

--Any otherwise acceptable project which duplicated AEC-sponsored R&D work.

We were asked whether DOD paid for similar IR&D projects. (Question 8.)

DOD's policy is to allow, as charges to overhead, reasonable costs of IR&D projects directed toward new concepts, products, or services judged to be relevant to DOD's mission and responsibility. Our examinations have shown IR&D projects to be largely technical in content rather than related to selling or marketing activities.

DOD recognizes that some of the projects undertaken by its contractors may be of interest to commercial customers. However, IR&D accepted by the Government is allocated to both Government and commercial contracts. DOD absorbs a little over half of the IR&D accepted by the Government and a much greater amount is determined to be relevant to DOD.

DOD acknowledges that creating and maintaining multiple-bidding sources in the various technologies necessarily results in some duplicative effort among contractors in any particular area. DOD believes that this duplication provides alternative approaches to a problem and is thus beneficial to some degree. DOD states that, because of the proprietary nature of IR&D, it has no authority to single out competitors to support. (For a more detailed discussion of question 8, see our report of Aug. 16, 1974.)

Bid and proposal costs

AEC followed a policy of requiring B&P costs to be applicable to the AEC program to be allowed as a contract cost. The bid or proposal could be made to AEC or to a

contractor for work under an AEC contract or to others for work determined to benefit the AEC program.

The contractors' costs of preparing bids or proposals were allocated to the contract as indirect costs and were limited to 1 percent of the direct material (exclusive of capital equipment) and the direct labor costs of the contract work.

Under AEC regulations, B&P expense pools excluded negotiation and promotional expense and the expense of salesmen, representatives, or agents who did not provide technical services for B&P. We were asked whether the B&P costs DOD paid included these costs. (Question 9.)

ASPR distinguishes between B&P costs and selling costs, defining the latter as being the costs for sales promotion, negotiation, liaison between Government representatives and contractor personnel, and related activities. DOD therefore said that selling and promotional costs of the type usually associated with those words were not allowed as part of B&P. The costs of marketing products are fully recoverable as indirect costs, subject only to tests for allocability and reasonableness.

ASPR permits nontechnical personnel engaged in proposal preparation to charge their time direct to B&P or to an overhead account. DCAA auditors found, as we did, that B&P costs generally did not include nontechnical services as direct costs. B&P is ultimately burdened with a proportionate share of allowable indirect nontechnical effort, except G&A. Since contractors can recover reasonable amounts of selling expenses in their entirety, they have no incentive to charge them to B&P. B&P expenses, recovery of which may be limited, are primarily used for technical activities responding to stated, or sometimes anticipated, customer needs. (Question 9 was discussed in greater detail in our report of Aug. 16, 1974.)

POLICIES OF OTHER AGENCIES

IR&D and B&P costs are minor in the procurements of agencies other than DOD and NASA. The Federal Procurement Regulations allow IR&D and B&P as indirect costs on

cost-reimbursable-type contracts similar to the DOD-NASA approach. However, Federal agencies have the option of using these principles or alternative principles, and they are not uniform in their treatment of IR&D and B&P costs.

Some agencies, as a policy, do not allow IR&D or B&P. If IR&D and B&P costs are allowed, it is generally to the extent that the contractor has demonstrated to the agency that the costs are reasonably related to the agency's program. In some cases, when exceptions are made, the rates established by DOD are accepted to avoid the cost of additional negotiations and to facilitate contract closeouts.

NEED FOR AN INDEPENDENT IR&D AGENCY

We were asked to consider the practicability and desirability of establishing an independent Government agency to be responsible for the IR&D program on a Government-wide basis as opposed to the present separate-agency basis. (Question 22.)

DOD strongly opposed the concept of a single executive branch agency's exercising control of all Government-supported IR&D. DOD's primary concern was the loss of responsiveness in IR&D to defense needs and priorities. IR&D is one of the prime means DOD uses to advance the technological base on which its acquisition depends. This advancement is fostered along DOD's lines of interest through close interaction between the contractor and DOD.

DOD's second concern involved the independence of the IR&D effort. To exercise control, the single agency would have to put the IR&D effort under a contract or grant. DOD believes this would have a detrimental effect on independence and innovativeness.

NASA assumed that an independent agency meant one receiving its own appropriation and solely responsible for funding all Government IR&D by contract or grant. NASA believes such an approach is neither practicable nor desirable. The loss of independence and flexibility that NASA sees inherent in line item funding would be compounded by the centralization of all Government decisionmaking authority in a single agency. The complementary

relationship of mission agency-funded R&D and its contractors' IR&D would be lost or seriously eroded. NASA believes the single agency approach is bound to result in IR&D's being less responsive to the actual needs and priorities of the individual agencies.

Other agencies' comments included: (1) the relative magnitude of the problem was not such as to justify creating an agency devoted to its solution, (2) there was no need for an independent agency unless the intent of the Government was to change IR&D to directed R&D, and (3) the agency would not oppose such an action if it could be shown to result in overall cost savings.

Industry associations reported that it was hard to conceive of an agency's having the wisdom and dependability needed to decide the degree of participation of all Government agencies in a national IR&D program that would be suitable to the Congress, acceptable to the public and industry, economically efficient, and technically sound. Industry favors Government agencies' having a common policy and practice for IR&D and B&P, but believes it is neither practicable nor desirable to establish a new Government agency responsible for operational aspects of IR&D.

RECOMMENDATIONS OF THE COMMISSION ON GOVERNMENT PROCUREMENT

The Commission on Government Procurement took note of the emotion and controversy over IR&D and B&P, attributing it to the many Government procurements which could not be satisfied by the sealed-bid, fixed-price-contract technique. The Commission found that this situation, which had led to applying controls rarely applied to indirect costs which averaged less than 4 percent of sales, had resulted largely from poor communication and misunderstanding.

The Commission's recommendation was (1) that cost allowability principles recognize IR&D and B&P as being in the Nation's best interests to promote competition, advance technology, and foster economic growth, (2) that a policy recognizing IR&D and B&P as necessary costs of doing

business and providing for uniform treatment, Government-wide, be established, (3) that IR&D and B&P be accepted without question as an overhead item for contractor cost centers with 50 percent or more fixed-price Government contracts and commercial sales and that other contractors be subject to the present DOD formula, and (4) that there be a relevancy requirement of a potential relationship to the agency function or operation for contractor cost centers with more than 50 percent cost-type contracts. Six Commissioners supported this recommendation.

Five other Commissioners, including the Comptroller General, agreed that IR&D and B&P were in the Nation's best interests, were necessary costs of doing business, and should receive uniform treatment.

However, they believe that DOD's method should be retained. The recommendation of dissenting position 1 was, in part, a policy which provided (1) that allowable projects have a potential relationship to an agency function or operation in the opinion of the agency head, (2) that the Government be given enough access to the contractor's records of its commercial business for determining that IR&D and B&P costs were allowable,[1] (3) that advance agreements be negotiated with major contractors; in other cases the DOD formula be continued, and (4) that nothing in the policy preclude a direct contract arrangement for specific R&D projects proposed by a contractor.

Another Commissioner, joined by one of the Commissioners supporting the majority recommendation, suggested a number of mechanisms to be explored for a long-range solution to the IR&D and B&P dilemma.

GAO believes that the majority recommendation of the 50-percent rule would increase DOD's annual IR&D and B&P costs by making many large contractors' costs acceptable without question. At the same time, many small contractors would become subject to the relevancy requirement, which would complicate DOD's administration.

1/This position was predicated on the situation described in our report, "Independent Research and Development Allocations Should Not Absorb Costs of Commercial Development Work, Department of Defense" (B-164912, Dec. 10, 1974).

DOD found that adoption of the majority position would increase DOD's costs by over $100 million annually. DOD was concerned that this method would increase administrative costs.

As for the recommendation contained in dissenting position 1 (that the Government be given enough access to the contractor's record for determining that IR&D and B&P costs were allowable), DOD expressed concern about the size of the workload if non-Government contracts were subject to review by DOD technical personnel. DOD is considering the feasibility of requiring contractors with whom advance agreements are negotiated to certify that costs incurred for IR&D projects sponsored by or required in the performance of a contract or other arrangement will not be allocated to DOD contracts.

PROPOSED EXECUTIVE BRANCH POSITION

An interagency committee, with DOD as lead agency, considered, at length, the Procurement Commission's recommendation and the dissenting positions. In November 1974 the task group proposed that the executive branch:

--Adopt ASPR policies and procedures for IR&D and B&P costs as the standard for the executive branch.

--Broaden the relevancy requirement to encompass Government-wide relevancy and amend ASPR and section 203 of Public Law 91-441 accordingly.

--Consider ASPR, as amended for relevancy, a satisfactory standard for Government-wide use when dealing with a competitive industrial base.

--Consider the Procurement Commission's recommendation and dissenting position 1 unacceptable as proposed.

--Recognize the Office of Federal Procurement Policy as the authority for review and authorization of exceptions to the uniform Government-wide IR&D and B&P policy and procedures.

--Recommend that the Office of Federal Procurement policy initiate, at the appropriate time, studies of those concepts of dissenting position 2 that appear sufficiently viable to be considered in depth.

--Consider applying CWAS to the IR&D and B&P cost principles of ASPR and the executive branch document which would implement, Government-wide, similar policies and procedures.

The committee noted that (1) the Procurement Commission's report accepted the current practices and concepts of IR&D and primarily concerned itself with examining the degree of control exercised by the Government, (2) the majority recommendation and dissenting position 1 accepted the premise that IR&D and B&P efforts were in the Nation's best interests to promote competition, advance technology, and foster economic growth, and (3) both the majority recommendation and the dissenting position 1 recognized these costs as necessary to do business in a high-technology environment.

The committee included the following issues in its findings and conclusions.

Relevancy requirement

The committee concluded that DOD had implemented the relevancy requirement but said that it had been difficult to find anything not potentially relevant to a military function or operation. Relevancy put added weight on a close tie-in to projects of current interest and undoubtedly caused DOD to classify as nonrelevant some IR&D projects which would lead to products used at a later date for military functions or operations.

The majority of the interagency committee concluded that the relevancy requirement placed on DOD was vague in concept, difficult to administer, and appeared to work against the best interests of the Nation by prohibiting defense contractors from making substantial contributions to resolving such national problems as public transportation, energy shortages, and pollution.

Allowances by AEC

Over 80 percent of AEC's expenditures for procurement were in its Government-owned, contractor-operated laboratories and plants. In these facilities R&D programs were totally directed and reimbursed by AEC. The contractors' costs of preparing annual budget proposals were reimbursable contract costs borne by AEC. Therefore the committee found that IR&D and B&P costs, as defined by DOD, were nonexistent in that environment.

The committee majority agreed with AEC that IR&D and B&P were inappropriate for AEC's contractors using Government-owned, contractor-operated laboratories and plants. However, the majority felt that AEC, when it contracted for the 20 percent of its work to be done by competitive industry in those contractor-owned facilities, should have followed the same cost allowance practices as other Federal agencies followed.

AEC's member of the interagency committee attached a dissenting-position paper to the report. The paper supported AEC's policy of requiring a direct or indirect benefit to the contract or AEC program as valid and reasonable since AEC's procurements did not extend across almost the entire national economy but were concentrated in a highly technical field.

AEC said that it had supported basic and advanced work by direct contract in response to presentations of ideas through contractors' unsolicited proposals. Also, it had an active program of disseminating technology and patents to the nuclear energy industry. AEC concluded that the device of Government R&D contracts had helped to build and maintain industry's capability for further Government and private work.

CWAS

The committee found that applying a 50-percent CWAS computation would either eliminate control over most major defense contractors and not provide an acceptable level of control over the amounts expended for IR&D or have an unknown impact on the number of IR&D evaluations and negotiations, depending on how the Commission intended CWAS to be

applied. For major contractors with a CWAS rating under 50 percent, the committee concluded the present ASPR provision for negotiation of major contractors' levels offered a more equitable approach than did automatic application of a formula.

Small companies

The Commission recommended negotiated ceilings for IR&D and B&P with all contractors whose sales under cost-type Government contracts exceeded 50 percent. The committee found that a number of small contractors would be included and that the administrative cost to them and to the Government would exceed the benefit of negotiated ceilings. The committee concluded that reasonable levels of IR&D and B&P for small contractors should be determined by the formula provisions of ASPR.

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Upon receipt and analysis of agency and private sector views on the task group's report, an executive branch position will be established on the IR&D and B&P recommendation. This action is currently targeted for June 1975.

CHAPTER 9

CONCLUSIONS AND RECOMMENDATIONS

IR&D

DOD's statement of principles for R&D, signed by the Director of Defense Research and Engineering and the three services' Assistant Secretaries (Research and Development), includes the position that a strongly supported IR&D program is essential. The program must be well directed, mostly by industry, and the benefits must be clearly visible.

DOD and NASA, the principal users of contractors' IR&D efforts, find IR&D necessary for maintaining a competitive, technically qualified industry which can respond rapidly to defense and space needs with new, alternative concepts.

According to the Council of Defense and Space Industry Associations, IR&D is essential if companies are to remain competitive and to obtain new business by meeting current and future needs of customers; the Government, as one of these customers, should pay its fair share of IR&D costs.

For several years we have examined contractors' IR&D programs. We looked at the procedures DOD established to control costs and evaluate the technical content of contractors' programs. In our reviews we found but one instance of DOD's allowing questionable projects as IR&D. Acceptance of these projects resulted from the lack of clarity in the ASPR definition of IR&D and from the DOD auditors' lack of access to the contractor's commercial records.[1]

For this study we attempted to determine whether the benefits of IR&D are worth the cost. We found that we could not.

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[1]See GAO report, "Independent Research and Development Allocations Should Not Absorb Costs of Commercial Development Work, Department of Defense" (B-164912, Dec. 10, 1974).

Alternatively, we evaluated four contractors' programs on the soundness of the basis for initiating projects. Nearly all projects could be related to documentation forecasting customer needs or outlining agency program goals. We found that the four contractors' managements provided for IR&D projects to receive the same financial and technical attention as contract R&D received.

B&P

Contractors incur, and DOD and NASA allow, B&P expenditures as the means of translating new ideas and concepts from IR&D to competing proposals to give the agencies technical options. DOD has instituted management procedures to control B&P costs similar to those for IR&D.

Contractors have said that they have an incentive to control B&P costs to keep overhead rates competitive. However, they feel that their ability to do so is somewhat limited because the timing and amount of their expenditures are dependent upon the requests for proposals issuing from the Government. Advance planning cannot be precise when the volume of effort, to a high degree, will be out of their control.

PROVISIONS OF SECTION 203

DOD has established elaborate procedures to make the technical evaluation of a contractor's program required by section 203. One of the evaluation's purposes is to fix a rating to influence the advance agreement. Yet the result of the evaluation is a negligible factor in the final agreement.

The evaluation's second purpose is to familiarize the evaluator with the contractor's work. Yet, many evaluators are only marginally familiar with the technical area of the projects reviewed. Once the evaluator has read the project description and fixed the rating, he often makes no further use of the knowledge nor does he follow up on the project.

We suggest that DOD consider changing the technical evaluation procedures to enable Government personnel to see a broader spectrum of industry technology confined to a

narrower area of their expertise. This knowledge, plus increased use of the IR&D data bank, should be useful in planning in-house and contract R&D work.

We suggest that, until the capabilities of evaluators are better correlated to the projects being evaluated, the evaluations not be precisely scored for use by negotiators in arriving at contractor ceilings.

Industry and some agency officials have suggested that, if there is to be a relevancy requirement, it be to the Government's interest. It will become particularly important if the provisions of ASPR are applied Government-wide, as the committee considering the recommendation of the Commission on Government Procurement has recommended.

Relevancy to the Government's interest could be interpreted as broadly as relevancy to a military function and determinations would be just as subjective. We have been told, however, that a requirement for relevancy to the Government's interest would forego each agency's having to review every project of virtually every contractor doing any appreciable business with the Government, as would be the case if each agency had its own relevancy requirement. Also relevancy to the Government's interest would ease the burden of contractors that otherwise would have to keep accounting records which would provide an allocation of the costs, or a share of the costs, of each IR&D and B&P project to each agency with which they contract, based on the degree of relevancy of the project to the mission of the particular agency.

ALTERNATIVES TO THE DOD-NASA METHOD FOR SUPPORTING IR&D

The Research and Development Subcommittee asked that we present alternatives for its consideration. A body of expert opinion was solicited from Government, industry, and academia on alternatives which would have the Congress determine the amount of funds available to agencies for IR&D and/or change the method by which agencies allocate IR&D funds to contractors.

Respondents could not agree on any alternative or combination of alternatives as representing a considerable improvement over the present method. Several pointed out that the DOD-NASA procedure for recognizing such costs in overhead represented the culmination of many years of deliberation and compromise, including rejection of many of the proposed alternatives.

Most respondents found it difficult to assess the alternatives because of the lack of criteria for measuring them. One respondent characterized the exercise as being solutions in search of the problem. Many responses were prefaced by statements of the criteria used in the evaluation. These criteria generally mirrored the individual's views on the purposes and worthiness of a Government-supported, contractor-initiated IR&D program.

We believe that this lack of agreement is indicative of the basic problem which perpetuates the IR&D controversy. IR&D and B&P have many strong supporters in Government and industry. On the other hand critics, although fewer in number, are adamant in their views that the program is a giveaway and should be cut back or terminated. We suggest that the issue may be resolved only by a statement of congressional policy on the Government's support or nonsupport of IR&D and B&P.

RECOMMENDATIONS TO THE CONGRESS

We recommend that, if financial support for IR&D and B&P is to be continued, the Congress clarify for Federal agencies and industry the policy for such support by establishing guidelines which set forth:

--The purposes for which the Government supports IR&D and B&P costs.

--The appropriate amount of this financial support.

--The degree of control to be exercised by the Government over contractors' supported programs.

The Congress could use the studies and recommendations of the Commission on Government Procurement, as well as this report, to assist it in reaching its judgments.

In this report we have presented alternatives to the DOD-NASA method. In testimony before the Armed Services Committees in 1970, we suggested that the Congress may wish to consider, as an alternative policy, how greater use could be made of direct contracting to obtain contractors' R&D efforts. Also, we suggested that the Congress may wish to explore the extent to which agencies could identify development projects of the type now included in IR&D for review and authorization in the same manner as those that are funded from research and development appropriations.

After studying the comments received on the various alternatives, we continue to support the views of dissenting position 1 of the Commission on Government Procurement. Dissenting position 1 agreed with the majority position in recommending:

--Recognizing IR&D and B&P expenditures as being in the Nation's best interest to promote competition, advance technology, and foster economic growth.

--Establishing a policy recognizing IR&D and B&P efforts as necessary costs of doing business.

--Uniform treatment of IR&D and B&P, Government-wide, with exceptions treated by the Office of Federal Procurement Policy.

Dissenting position 1 departed from the majority position and recommended, in part, a policy providing:

--That DOD procedures for negotiating advance agreements be retained when applicable and that, in all other cases, use of the DOD formula for reasonableness be continued.

--That the Government have access to contractors' commercial records when needed to determine that costs are allowable.

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--That nothing in this policy precludes a direct contract arrangement for specific research and development contracts proposed by a contractor.

--That allowable projects have a potential relationship to an agency function or operation in the opinion of the agency head.

The interagency committee, which considered the Procurement Commission's recommendation and dissenting positions, proposed adoption of the ASPR policies and procedures as a standard for the executive branch. The committee also proposed that ASPR and section 203 of Public Law 91-441 be amended to broaden the relevancy requirement to encompass Government-wide relevancy. If the Congress establishes a uniform, Government-wide policy similar to that of ASPR, it will have to consider the desirability of a test of relevancy to the Government's interest.

If a Government-wide policy is adopted, we recommend that the legislation also provide for:

--Having the Government present one face to industry; i.e., one advance agreement, a joint technical review, a single overhead rate, etc.

--Including in advance agreements patent and technical data provisions granting the Government royalty-free licenses and data rights, based on a scale of the agencies' cost participation.

If the Congress proceeds as above, the Federal agencies should consider:

--Having contractors continue to propose annual programs to the Government so that the technical data would be added to Government data banks.

--Making technical reviews less structured and not as administratively burdensome and encouraging intensive reviews and exchanges of views between Government and contractor personnel on defined areas of common concern.

APPENDIX I

COMMITTEES:
ARMED SERVICES
CHAIRMAN: SUBCOMMITTEE ON RESEARCH AND DEVELOPMENT
BANKING, HOUSING AND URBAN AFFAIRS
CHAIRMAN: SUBCOMMITTEE ON FINANCIAL INSTITUTIONS
SELECT COMMITTEE ON SMALL BUSINESS
CHAIRMAN: SUBCOMMITTEE ON GOVERNMENT REGULATION

APPENDIX I

THOMAS J. McINTYRE
NEW HAMPSHIRE

OFFICES:
SENATE OFFICE BUILDING
202-225-2841
WASHINGTON, D.C.
FEDERAL BUILDING
603-669-1232
MANCHESTER, NEW HAMPSHIRE 03105
FEDERAL BUILDING
603-436-7720
PORTSMOUTH, NEW HAMPSHIRE 03801

United States Senate
WASHINGTON, D.C. 20510

October 8, 1973

B-164912

The Honorable Elmer B. Staats
Comptroller General of the United States
General Accounting Office
441 G Street, N.W.
Washington, D.C. 20548

Dear Mr. Staats:

During the Senate debate on the Fiscal Year 1974 Military Procurement bill, Senator William Proxmire introduced an amendment which, if adopted, would have reduced Independent Research and Development (IR&D) and Bid and Proposal (B&P) funds by 50 percent. The amendment was withdrawn by Senator Proxmire pursuant to his agreement with me, as Chairman of the Research and Development Subcommittee, to request GAO to conduct an in-depth investigation of the underlying assumptions and the overall justification of the IR&D program, as well as into the implementation of the current provisions of law and Department of Defense regulations. The discussion of this subject appears on pages S17517-S17519 of the September 24, 1973 Congressional Record.

The subject of IR&D has been one of continuing interest, and the sustained high level of expenditures is not consistent with the recent trend of Department of Defense purchases from the Procurement and Research, Development, Test and Evaluation appropriations. A primary objective is to establish a better balance between these elements, and to insure that due consideration is given to sound business and accounting practices but consistent with the best interests of the government.

The attached questions reflect the results of a joint review and discussion conducted by Senator Proxmire's staff, Armed Services Committee staff, and representatives of your office. These questions should be answered in conjunction with the review of the IR&D program requested by the Committee letter of October 4, 1973. For the purposes of this study, the term IR&D will be inclusive of B&P.

APPENDIX I

The Hon. Elmer B. Staats

October 8, 1973

The review should be comprehensive and result in a report which should provide comments and recommendations for appropriate changes to the language of Section 203, P.L. 91-441. The report should consider the experience gained both before and after enactment of Section 203, and reflect the viewpoint of industry, the Department of Defense, other governmental agencies, and the General Accounting Office. Specific consideration should be given to the recommendations contained in the report of the Commission on Government Procurement and to the comments of the Department of Defense on that report. The report also should include alternative recommendations so that the Committee will have a choice of actions which may be adopted. The report should be submitted by April 1, 1974, so that the Subcommittee may consider it during the review of the Fiscal Year 1975 budget.

Sincerely,

William Proxmire, U.S.S.
Chairman, Subcommittee on
Priorities and Economy in
Government

Thomas J. Mcintyre, U.S.S.
Chairman, Research and
Development Subcommittee

TJM:Fa
Attachment (6 pages)

1. The DCAA audits of IR&D costs show that the ratio of IR&D costs to defense sales increased from 2.73% in 1946 to 3.83% in 1972. What accounts for this increase? What is the rationale to support a high level of contractor IR&D expenditures even in the face of declining defense sales?

2. Reconcile the apparent inconsistencies in the figures for IR&D expenses from 1968 to 1972 between your April 16, 1973, report, reports by the DCAA, and the figures given by DOD to the Senate Armed Services Committee as printed in the committee report of September 6, 1973.

3. In its report to Congress, the DOD includes an amount for "other technical effort (OTE)" in its IR&D figures. What are the audit substantiated amounts for OTE for the years 1968 to the present? Why are these amounts not included in the DCAA audit report? Do the same rules apply for OTE as for IR&D and Bid and Proposal Costs?

4. The DCAA audit report of IR&D covers only those defense contractors with "an annual auditable volume of costs incurred of $15 million or more and other contractors who, although not meeting the auditable volume criteria, required 4,000 or more manhours of DCAA's direct audit effort per year." What does the term "auditable volume" of costs incurred mean? What is the difference between auditable volume of costs and total defense sales (including both prime contracts and defense subcontracts)? What is your estimate of total IR&D <u>including</u> contractors that do not meet

the criteria of $15 million of annual auditable costs incurred and 4,000 manhours of defense audit effort?

5. The IR&D figures reported to Congress are based on a DCAA statistical report covering 77 defense contractors. The top 77 defense contractors account for only 69% of defense prime contracts. How much additional IR&D costs are reimbursed by the DOD to divisions, contractors, and subcontractors not covered in the DCAA report?

6. What is the total in-house cost of administering the IR&D program -- include the cost of reviewing contractor proposals, DOD negotiation teams, technical review effort, administration of disputes, etc.? What are the comparable costs for AEC?

7. What problems are encountered by DOD and AEC contracting officers and technical or project personnel in evaluating and negotiating IR&D proposals?

8. Does DOD pay contractors' costs for:

a. research and development projects primarily of a promotional nature, such as projects directed toward the development of new business or projects connected with proposals for new business;

b. studies or projects which are undertaken, in whole or in part, for other customers; and

c. projects which represent unwarranted duplication of other research and development work sponsored by the DOD.

Cite examples if any such costs are paid.

9. Do Bid and Proposal costs paid by the DOD include negotiating and promotional costs or the cost of salesmen, representatives or agents who do not provide technical services in connection with bids or proposals?

10. Public Law 91-441, section 203, provides that appropriated funds may not be spent for IR&D unless the Secretary of Defense determines that the IR&D has potential military value. However, it appears that the DOD does not technically review IR&D proposals in cases where it is charged less than $2 million a year. What is your evaluation of the adequacy of the DOD's technical review of such programs? Of the $700 million in IR&D expenses in 1972, how much goes to contractors under the $2 million ceiling? What is the Comptroller General's opinion of the legality of IR&D payments made in the absence of any technical review as to potential military value? Would it be feasible to lower the technical review threshold below $2 million?

11. With respect to IR&D proposals where the DOD is expected to pay in excess of $2 million per year, evaluate the adequacy of the contractors supporting data both with respect to estimated cost and technical justification? Since negotiated advance agreements on IR&D are of necessity sole source negotiations, do contractor submissions comply with the requirements of the Truth-in-Negotiations Act--that is does the contractor have to provide detailed cost or pricing data in support of his estimates and certify as to their accuracy, currentness and completeness? If not, why not?

12. For each of the years 1968 through 1972, identify what specific developments have been made by each of the top 25 defense contractors with respect to amount of IR&D received. For these same top 25 defense contractors identify each IR&D project in excess of $25,000 per year and indicate the potential military benefit rationale used by the DOD in accepting the project. Identify what patent applications have been made and what patents issued during this period to these top 25 contractors as a result of IR&D programs that have been subsidized by the DOD. Identify what income each company received from these patents or from prior patents developed under IR&D and determine whether or not this income has been credited to the DOD in proportion to its financial support of the project.

13. Does the DOD receive detailed technical reports or other technical data regarding technology developed under IR&D programs so that this information is considered in the development of weapons programs?

14. Does the DOD conduct reviews to evaluate the results of IR&D efforts by its contractors? What do such reviews, if any, show?

15. Apparently IR&D amounts are accepted (if under $2 million a year) or negotiated (if over $2 million a year) based primarily on historical rates of expenditures. Moreover, the DOD pays the most IR&D to the largest defense contractors. What safeguards are in effect to offset the competitive advantage this gives large, established firms in

relation to new firms trying to enter defense business -- and particularly small firms? What safeguards are in effect to prevent defense contractors from exploiting inventions developed primarily at public expense under IR&D in competition with other firms for non-defense business? Should safeguards be established in each of the aforementioned instances if they are not now in effect?

16. Since the DOD accepts IR&D as a general overhead cost and the AEC instead reimburses only IR&D costs, which are shown to be of direct or indirect benefit to specific contracts, and since both agencies are involved extensively in research and development work, what, if any, differences exist in the nature of the work or the circumstances under which it is performed that would justify the continued acceptance of IR&D costs by the DOD?

17. What is the practicability of completely eliminating Department of Defense payments to contractors for IR&D and B&P as allowable costs under Department of Defense contracts?

18. Same as previous question, except establishing a separate program in each of the RDT&E appropriations for IR&D and B&P with an amount of funds to be distributed directly, by contract or grant, to industry. This distribution could be based upon such factors as the experience of negotiating teams, including technical review panels, and the same criteria presently used under the existing procedures.

19. What is the practicability of a combination of the present system, with an established dollar ceiling substantially lower than the $700 million level, and a separate, directly financed program as described under the previous question?

20. What is the practicability of the continuation of the present system but based upon a dollar ceiling which is reduced 10 percent each year with an equal increase in the directly financed program described under question 2 above?

21. What is the practicability as well as the desirability of establishing a separate ceiling for IR&D as distinguished from B&P if the decision is made to establish a total ceiling in law?

22. What is the practicability as well as the desirability of establishing an independent government agency which will be responsible for the IR&D program on a government-wide basis, as opposed to the present separate agency basis?

APPENDIX II

KEY TO LOCATION OF ANSWERS
TO SENATORS' 22 QUESTIONS

Question	Pages of this report	Pages of report of 8-16-74
1 to 5	24 and 27	1 to 10
6	40	11
7	37	
8 and 9	76 and 77	13
10	27 and 37	19
11	43	
12	11 and 17	
13 and 14	21	
15	18 and 44	
16	73	
17	48	
18 to 20	50 and 51	
21	42	
22	78	

Senator McINTYRE. I yield to Senator Proximre.

Senator PROXMIRE. Thank you, Senator McIntyre. Today's hearings will bring us hopefully toward a final solution of the independent research and development problem that Congress has been struggling with for more than 5 years. In the past decade I.R. & D. costs have more than doubled. The official estimate is that the Department of Defense and NASA spent $900 million for I.R. & D. in 1974. However, this estimate is not a comprehensive one, and it can be confidently asserted that the Federal Government today is spending at least $1 billion for I.R. & D. The reason the program has been controversial is simple. It has not been adequately justified with Congress or with the public. Why not? Well, when you don't disclose the essential facts about a program such as this to the Congress and the public, there is a strong presumption that the program cannot survive the light of day. What we may have in I.R. & D. is a $1 billion gravy train, it may be a good time for Congress to blow the whistle and stop.

It is to a large extent a secret program. It does not appear as a line item in the budget. It receives virtually no review or scrutiny in the ordinary authorization and appropriation process. Now, if this were a program like a CIA appropriation, I could understand that. I think we have to be very careful about disclosing our military or our intelligence secrets, we have to safeguard our agents in every way we know how. And yet there has been a great outcry for further disclosure, and there are committees in the House and the Senate investigating the CIA among other intelligence agencies. But here is a program that costs more than the CIA in all likelihood. And it has not been justified by any kind of cost-benefit analysis.

Senator McIntyre and I specifically requested the General Accounting Office to measure the benefits versus the cost of I.R. & D. And GAO cannot get the data on which to make such an evaluation. And that fact alone, it seems to me, should be a tipoff to Congress that there is something wrong with this program. I.R. & D. has not been justified from an administrative standpoint, it has not been justified from the standpoint of democratic government. Now that we have the final GAO report, the case that this program should be abolished is in my view very strong indeed. It may well be, although my mind is perhaps not quite as open as that of the distinguished Senator from New Hampshire, I have not closed my mind, and I can be persuaded if I can hear arguments to the contrary, but it appears to be a subsidy and a giveaway to a select group of giant defense contributors. If I am wrong, I would like to be corrected and I hope we can discover whether that is right or wrong in the process of the hearing.

Senator McINTYRE. Thank you, Senator Proxmire. This afternoon we are pleased to welcome Mr. Elmer Staats, the Comptroller General, who will lead as the first witness. Mr. Staats, we are pleased to welcome you here, and you may proceed with your statement. First, for the record, would you identify your associates at the witness table with you?

[Statement of Comptroller General Staats follows:]

You asked us to appear before you today to present the results of our study of contractors' independent research and development (IR&D) and bid and proposal (B&P) costs. As you know, the study was requested jointly by your chairmen and a report was issued on June 5, 1975.

In March 1970 I testified on IR&D before the Research and Development Subcommittee. At that time I stated that the extent to which Government agencies

should participate in contractors' IR&D costs had been a matter of serious concern within the executive branch for many years but no satisfactory solution had been reached to the many problems involved. I expressed the belief that the hearings would prove very helpful.

Now, 5 years later, and in spite of the enactment of legislation; increased regulation by the Department of Defense (DOD); and studies by the General Accounting Office (GAO), DOD, and the Commission on Government Procurement; a solution satisfactory to all has not been reached. The Government's support of contractors' IR&D and B&P remains a controversial and emotional issue.

We looked upon the request for our latest study to be asking whether expenditures for IR&D and B&P result in benefits to the Government and whether there is a better way to support IR&D and B&P programs than through acceptance of these costs as overhead on Government contracts.

We found that it was not possible for us to determine whether the benefits to the Government from contractors' IR&D efforts are worth the costs incurred by the Government. Agencies such as DOD and the National Aeronautics and Space Administration (NASA) feel that the benefits to their research and development (R&D) missions are worth the costs. Industry believes that the Government benefits by having access to more R&D than it pays for because other customers as well as the contractor also share in the cost.

Critics view the Government's participation as a giveaway. They believe that the Government's cost should be more tightly controlled or eliminated altogether and the R&D obtained by other methods.

In our opinion, the Congress must resolve this issue by a statement of policy on the Government's support or nonsupport of IR&D and B&P.

HOW THE GOVERNMENT PAYS FOR IR&D AND B&P

When a contractor sells a product or service to the Government on a fixed-price, price-competitive basis, it is presumed that a share of the contractor's IR&D and B&P costs is included in the selling price. However, when effective price competition is lacking and a cost-plus or other flexibly priced contract is entered into, the final price is based on actual costs incurred. In a procurement of this type, IR&D and B&P are included as items of indirect cost or overhead and a portion is allocated to the contract price.

DOD AND NASA

The major defense and space contractors incur most of the IR&D and B&P costs paid by the Government. The schedule which I would like to submit for the record shows that total IR&D and B&P has grown from $1.1 billion in 1971 for 84 contractors to $1.7 billion in 1974 for 90 contractors. During this period the Government accepted on the average about 83 percent of these costs for allocation to all contractor work performed—Government and commercial. Of the amount accepted, the share paid by DOD and NASA combined declined from 70 percent in 1971 to 63 percent in 1974.

Section 203 of Public Law 91-441, enacted October 7, 1970, requires DOD to negotiate advance agreements to establish dollar ceilings on both IR&D and B&P costs with all companies which, during their preceding fiscal year, received more than $2 million of IR&D and B&P payments from DOD. The law also provides that the work should have a potential relationship to a military function or operation, and that the IR&D portions of the negotiated advance agreements are to be based on company-submitted plans that are technically evaluated by DOD.

NASA cooperates with DOD in controlling the level of IR&D and B&P expenditures by accepting all advance agreements executed by DOD. The only major difference in their procedures is the result of the statutory requirement that projects accepted by DOD have military relevancy. NASA has had no relevancy requirement placed upon its payments.

The Atomic Energy Commission (AEC), before its functions were assumed by the Energy Research and Development Administration (ERDA), followed a more restrictive policy than that of DOD and NASA.

About 80 percent of AEC's procurement activity was represented by AEC's contracts for the management of Government-owned plants and laboratories under no-risk, cost-type contracts. AEC owned the facilities, provided the materials, and advanced the funds. The generation of new ideas was an integral part of the AEC-financed R&D program and there was no IR&D.

The remaining 20 percent of AEC's business generally was with contractors which performed the contract work in their own facilities without advances of Government funds. AEC accepted a limited amount of IR&D costs incurred by those contractors to the extent set forth in the contract and to the extent that the projects provided a direct or indirect benefit to the contract work. AEC allowed $1.9 million for IR&D in 1972, $1.4 million in 1973, and $1.6 million in 1974.

AEC required B&P costs to be applicable to the AEC program to be allowed as a contract cost. The contractors' costs of preparing bids or proposals were allocated to t e contract as indirect costs and were limited to 1 percent of the direct material (exclusive of capital equipment) and the direct labor costs of the contract work.

ERDA

Effective July 29, 1975, ERDA issued a temporary regulation. ERDA's new policy allows IR&D if the costs are reasonable and allocable; research is allocated to all of the work of the contractor and is of benefit to the ERDA program; and development is related to product lines or fields of effort in which the Government has contracts and is of benefit to the ERDA program.

ERDA is allowing bidding costs up to a ceiling amount equal to the average annual bidding costs computed from the actual c sts for the contractor's 3 most recent years.

OTHER AGENCIES

IR&D and B&P costs are minor in the procurements of agencies other than DOD and NASA. Although the Federal Procurement Regulations allow IR&D and B&P as indirect costs on cost-reimbursable-type contracts, similar to the DOD and NASA approach, Federal agencies have the option of using these principles or alternative principles. Some agencies, as a policy, do not allow IR&D or B&P because of the nature of the products or services furnished by their contractors.

STUDIES BY GAO

At the request of the Senate Committee on Armed Services, we reported on DOD's implementation of section 203 of Public Law 91–441 for each of the first 3 years that the law was in effect. These reports, issued in 1972–74, were concerned with the effectiveness of DOD's policies and regulations in implementing the restrictions imposed by section 203, recommending improvements in DOD's implementation, and ascertaining the effect of the law and DOD's regulations on defense contractors.

We advised the committee that DOD's implementing guidance was a generally realistic interpretation of the law. Overall, we found DOD's implementation to be quite satisfactory.

I will mention briefly two points regarding the provisions of section 203.

Our studies have found that the relevancy requirement has had no effect on DOD's reimbursement of contractors' costs. Some attempts have been made to screen out as nonrelevant those projects in areas where DOD does not have primary responsibility. However, the large majority of contractors' projects are determined to have a potential military relevancy. The costs of relevant projects have always exceeded the amounts allocated to DOD contracts; therefore, the cost to DOD for sharing in IR&D programs has not been reduced.

We reported on a second facet of DOD's implementation of section 203—the technical evaluation. We found that many personnel performing these evaluations have minimal or general knowledge of, and interest in, the particular projects they are asked tc evaluate. We suggested that DOD consider procedures to assign projects to evaluators more in line with their areas of expertise and that evaluations not be precisely scored for use by negotiators in arriving at contractor ceilings.

We would like to see consideration given to ways to produce a better exchange of information on the results of DOD's IR&D for use by other agencies conducting grant and contract programs in similar areas.

Our report of June 1975 was the result of a more comprehensive study than just DOD's implementation of section 203, although DOD's policies and procedures logically formed the basis for our evaluation.

BENEFITS OF IR&D

We were asked to identify "specific developments" made by major defense contractors with respect to the amounts of IR&D received during 1968–72. We interpreted the question to be asking whether the results of IR&D could be

identified and quantified on a project-by-project basis, thus providing an output for every dollar and a basis for measuring the benefits versus the cost. Our field staffs made pilot tests at four contractors.

We found that we could not make such an evaluation. For one thing, the time interval between conception of an idea and completion of a specific development is generally many years. DOD, in its attempt to identify reasons for successful development, traced specific systems over a 20-year period. The study showed that the time between predecessor and successor in defense equipment was typically 10 to 20 years.

The National Science Foundation sponsored a recent study which documented significant events during the innovative process for 10 innovations that first came to realization during 1933–66. The average time from conception to realization for the 10 innovations studied was about 19 years.

We initially looked into the feasibility of identifying IR&D benefits by tracing individual projects funded in 1968 to their ultimate use. This approach proved to be impracticable because projects were too numerous and most projects did not, in themselves, become specific developments. Projects are often aimed at advancing technology without a known product application.

We, therefore, decided to evaluate the IR&D programs of the four contractors for a 2-year period on the soundness of the companies' bases for undertaking projects. In other words, since the objective of an IR&D program is to put a company in a position to meet customers' needs, we examined the business reasons for undertaking projects in the test period.

Evidence showed that contractors' IR&D programs were generally related to customers' needs, were undertaken to serve a Government purpose, or were directed toward meeting agency program goals.

PATENT AND DATA RIGHTS

Government contracts for R&D require contractors to convey certain property rights in whatever new or improved concepts result from the contract effort. DOD and NASA do not require contractors to furnish property rights in inventions or data arising from IR&D. One of the controversial issues of IR&D is the equity of this policy when contractors recover from the Government a major part of the costs of their IR&D programs.

DOD POLICIES

DOD believes that its IR&D patent practices are compatible with Government policy. This policy is to promote, insofar as feasible, the commercial exploitation of patents derived from Government-sponsored work, even to the extent of granting exclusive licenses to private companies who will undertake productive exploitation.

We were asked in our study to identify patent applications, issued patents, and patent income resulting from the IR&D programs of major defense contractors. As previously noted, our study was confined to four contractors.

According to information furnished by the contractors, patents arising from IR&D were not numerous and patent income was described as modest, although two of the contractors considered the income figures to be proprietary. One contractor reported no income from patents resulting from work done under IR&D programs during a 6-year period.

A study in 1972 by a DOD working group showed that most companies seldom applied for patents. Fewer than 10 percent of IR&D projects resulted in patent applications. A small number of companies, however, made patent applications on the results of most of their IR&D projects.

AEC POLICIES

AEC's regulations provided for AEC to acquire rights to technical data and inventions made or conceived under an IR&D project based upon its percentage share of the total project cost. When AEC's cost participation was less than 20 percent, the agency did not seek patent rights. When AEC's cost participation was between 20 and 75 percent, the contractor was required to give AEC a nonexclusive, irrevocable, paid-up license for AEC purposes and could also be required to submit a complete and detailed technical report.

If AEC's cost participation exceeded 75 percent, the contractor was required to furnish scientific and technical data and to give the Government a nonexclusive, irrevocable, paid-up license for all purposes and the right to grant sublicenses for all purposes.

When we inquired into this matter before the 1970 hearings, we noted that AEC's participation was consistently under 20 percent and no instance has arisen under which either data or patent rights had been acquired.

AEC said in 1974 that its field offices had identified a small number of instances in which AEC had received licenses, licenses had been tendered, or contractors had applied for patents where AEC was entitled to rights.

ALTERNATIVES TO THE DOD–NASA METHOD

We were asked for alternative recommendations to give the Senate Armed Services Committee a choice of actions which might be adopted. We asked a number of knowledgeable persons with a wide range of views to comment on alternatives to the DOD–NASA system which allows contractors to recover IR&D costs as an overhead or indirect charge to contracts.

We received responses from 18 individuals and one industry association. The individual respondents represented Government, industry, and academia. All had direct working experience with IR&D programs from one or more of these vantage points.

The alternatives included:

A budget line item for R&D now funded as IR&D with direct contracting with companies

Those favoring this approach pointed out that:

The Government would buy only what it needs.

Relevancy to agency programs would be assured.

Patent and technical data rights would be obtained by the Government.

Disadvantages were cited as:

A loss of independence by the contractor in selecting areas of technical effort.

A loss to the contractor of the flexibility to alter programmed work without the administrative formalities of negotiating a contract change.

Increased administrative costs because of the problem of allocating the appropriated funds.

Increased R&D costs to maintain the present level of effort since contractors now share IR&D costs.

Recovery of IR&D as an indirect charge only if there is benefit to the contract

This approach, which was the AEC method, provides the Government with work relevant to its needs, minimizes IR&D costs and gives the Government rights in the results commensurate with its participation. Critics pointed out that AEC's operation was unique for Government agencies and, if applied to other agencies, would discourage long-range IR&D, complicate contractor planning because recovery is determined after-the-fact, and tend to confine industry to its present lines of business.

Recovery of IR&D through overhead by a formula-type approach

These alternatives would determine the reasonableness of contractors' IR&D costs by a more mechanical means, such as broadening the application of DOD's contractor weighted-average share (CWAS) rating; extending to all contractors DOD's formula now applicable to contractors not required to negotiate advance agreements; or accepting as overhead all reasonable costs of contractor cost centers with 50 percent or more fixed-price Government contracts and commercial sales.

Those favoring this type of approach noted the potential for reducing administrative costs and achieving uniform application for all contractors. Opponents commented that ceilings have been found to be necessary when real competition is lacking, formulas do not recognize changes in the size or technical content of programs, and the Government would lose visibility of contractors' resources and technical results.

IR &D allowed as an element of profit

Objections to this approach centered around the difficulty in arriving at a basis for computing the profit factor and assuring the contractor some financial stability from contract to contract and year to year. This approach is seen as simplifying administrative procedures and providing the contractor with incentive to eliminate unproductive work.

Removal of most present controls

This alternative would reduce administrative costs by placing more reliance on competitive restraints on spending. Proponents believe that restraints of the

marketplace are effective while opponents see IR&D costs increasing and the present controversy over reasonableness continuing.

CONSENSUS OF EXPERTS' OPINIONS

Most respondents favored retaining the DOD-NASA method. Comments included the belief that none of the proposed approaches represented enough of an improvement to warrant a change; that many of the proposals had been considered and rejected in fashioning the present method; and that the present method represented much deliberation and compromise and should not be discarded lightly.

Some of the alternative approaches were considered worthy of further consideration, but no single proposal was supported by more than one or two individuals.

PROPOSALS FOR AN EXECUTIVE BRANCH POSITION

In June 1975 the General Services Administration (GSA) provided the Office of Federal Procurement Policy with an interim report on its efforts to develop an executive branch position on the treatment of IR&D and B&P costs. After considering the recommendation of the Commission on Government Procurement, the dissenting positions to the recommendation of the Commission's majority, the report of the interagency task group which considered the Procurement Commission's report, and the views of Federal agencies and the private sector on the task group's position, GSA suggested four alternatives for consideration.

Tests of reasonableness and allocability

This alternative would allow equitable allocation of IR&D and B&P to Government contracts subject to general tests of reasonableness and allocability, with advance agreements and dollar ceilings when appropriate, but no Government-wide criteria or tests.

Commission on Government procurement recommendation

The Commission recommended that IR&D and B&P be accepted without question as an overhead item for contractor cost centers with 50 percent or more fixed-price Government contracts and commercial sales and that other contractors be subject to the present DOD formula; also, that there be a relevancy requirement of potential relationship to the agency function or operation for contractor cost centers with more than 50 percent cost-type contracts. Six Commissioners supported this recommendation.

Interagency task group's proposed position

The task group, with DOD as lead agency, considered the Procurement Commission's recommendation and dissenting positions and proposed that the executive branch:

Adopt ASPR policies and procedures for IR&D and B&P costs as the standard for the executive branch.

Broaden the relevancy requirement to encompass Government-wide relevancy and amend ASPR and section 203 of Public Law 91-441 accordingly.

Consider applying CWAS to the IR&D and B&P cost principles of ASPR and the executive branch document which would implement, Government-wide, similar policies and procedures.

Commission on Government procurement dissenting position 1

Four of the Commissioners and I opposed the majority recommendation of the Commission because it would relax the controls in use by DOD and thus increase costs.

NEED FOR A CONGRESSIONAL POLICY

Government agencies have been placed in the difficult role of trying to assert the proper degree of control over a program which has as one of its basic principles the maintenance of contractors' independence. The nature of research and development being what it is, the issue has been compounded by the lack of a capability to measure the results of the work. We believe that, if financial support by the Government is to be continued, the Congress should clarify the policy by establishing guidelines setting forth:

The purpose for which the Government supports IR&D.

The appropriate amount of this financial support.

The degree of control to be exercised by the Government over contractors' supported programs.

We continue to support the views represented by dissenting position 1 of the report of the Commission on Government Procurement.

Dissenting position 1 agreed with the majority position in recommending the following:

Recognize that IR&D and B&P expenditures are in the Nation's best interests to promote competition, advance technology, and foster economic growth.

Establish a policy recognizing IR&D and B&P efforts as necessary costs of doing business.

Provide that IR&D and B&P receive uniform treatment, Government-wide, with exceptions treated by the Office of Federal Procurement Policy.

The policy recommended by dissenting position 1 differed from the majority's policy in its other provisions, as follows:

Reasonableness of costs

The Commission majority recommended that contractor cost centers with 50 percent or more fixed-price Government contracts and sales of commercial products and services have their IR&D and B&P costs accepted as an overhead item without question as to amount. For other contractors, the DOD formula should be used to determine the reasonableness of costs.

We found, however, that adoption of the majority recommendation would increase DOD's costs between $50 and $100 million annually. In dissenting position 1, we proposed to continue negotiation of advance agreements with contractors who received more than $2 million in IR&D and B&P during their preceding year, and in all other cases, use the DOD formula for reasonableness.

Relevancy

The Procurement Commission majority recommended that only those contractor cost centers with more than 50 percent cost-type contracts should be subject to a test of potential relevance to the agency function or operation. Dissenting position 1 recommended that all allowable projects of contractors receiving more than $2 million in annual IR&D and B&P payments have a potential relationship.

The interagency task group proposed that ASPR and section 203 of Public Law 91–441 be amended to broaden the relevancy requirement to the Government's interest. In establishing a standard for Government-wide use, the desirability of a requirement of Government-wide relevancy will have to be considered.

Access to records

Dissenting position 1 recommended that the Government be given enough access to the contractor's records of its commercial business for determining that IR&D and B&P costs are allowable. The majority position did not include this recommendation, which resulted from a situation we reported to the Congress in December 1974.

In this instance, DOD allowed projects in IR&D for a development which we believed was already required of the contractor by agreements with commercial customers and, therefore, did not meet the ASPR definition of IR&D. Neither we nor DOD were granted access to the contractor's records of commercial business. We recommended that IR&D agreements specifically authorize access to commercial records, not without limitation, but to the extent necessary for Government officials to determine the propriety of questionable charges.

Direct contract agreements

Nothing in the provisions of dissenting position 1 was intended to preclude a direct contract agreement for specific R&D projects proposed by a contractor. We believe that the agencies will be able to achieve a reduction in IR&D costs and better control if early in the R&D cycle they make their problems known to industry without stating preconceived solutions. Agencies may then use contracts with short time spans and limited commitments as a means of narrowing down those competing solutions, providing an objective comparison of alternative systems before entering into larger commitments.

In our testimony of 1970 we suggested that the Congress may wish to consider how greater use could be made of direct contracting to obtain contractor's research and development efforts. We suggested exploration of the extent to which agencies could identify development projects of the type now included in IR&D for review and authorization in the same manner as those that are funded from research and development appropriations.

Other provisions

In establishing a Government-wide policy, we suggest that the Congress consider having the Government present one face to industry. That is, with

each contractor, have one advance agreement, a joint agency technical review, and a single overhead rate for IR&D and B&P, to ease the administrative burden for both Government agencies and contractors.

We also suggest that the Congress consider the desirability of providing in advance agreements for the Government to receive rights to patents and technical data arising from IR&D. A sliding scale based on agencies' cost participation in the contractor's program, such as AEC had, could be the basis for determining the rights received.

Gentlemen, this concludes the prepared statement. I will be glad to answer any questions the Subcommittees may have.

STATEMENT OF ELMER B. STAATS, COMPTROLLER GENERAL AND CHAIRMAN, COST ACCOUNTING STANDARDS BOARD, ACCOMPANIED BY RICHARD W. GUTMANN, DIRECTOR, PROCUREMENT AND SYSTEMS ACQUISITION DIVISION; JACK S. HEINBAUGH, ASSISTANT DIRECTOR; PAUL SCHNITZER, ASSOCIATE GENERAL COUNSEL; AND ARTHUR SCHOENHAUT, EXECUTIVE SECRETARY, COST ACCOUNTING STANDARDS BOARD

Mr. STAATS. Thank you very much, Mr. Chairman.

To my immediate left is Richard Gutmann, the head of our Procurement and Systems Aquisition Division. To his left is Mr. Jack Heinbaugh, an Assistant Director of that division. To my right, Mr. Paul Schnitzer, Associate General Counsel of the General Accounting Office. We are happy to be here today, Mr. Chairman, essentially to report on the effort which you referred to, our report to these two committees dated June 5. You have asked us to appear before you today to present results of our study. It was a joint request, as you have already indicated. In March 1970, I testified on I.R. & D. before the Research and Development Subcommittee. At that time I stated that the extent to which Government agencies should participate in contractors' I.R. & D. costs had been a matter of serious concern within the executive branch for many years but no satisfactory solution had been reached to the many problems involved. I expressed the belief that the hearings would prove very helpful.

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We found that it was not possible for us to determine whether the benefits to the Government from contractors' I.R. & D. efforts are worth the costs incurred by the Government. Agencies such as DOD and the National Aeronautics and Space Administration (NASA) feel that the benefits to their research and development (R. & D.) missions are worth the costs. Industry believes that the Government benefits by having access to more R. & D. than it pays for because other customers as well as the contractor also share in the cost.

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Overall, we found DOD's implementation to be quite satisfactory.

I will mention briefly two points regarding the provisions of section 203.

Our studies have found that the relevancy requirement has had no effect on DOD's reimbursement of contractors' costs. Some attempts have been made to screen out as nonrelevant those projects in areas where DOD does not have primary responsibility. However, the large majority of contractors' projects are determined to have a potential military relevancy. The costs or relevant projects have always exceeded the amounts allocated to DOD contracts; therefore, the cost to DOD for sharing in I.R. & D. programs has not been reduced.

We reported on a second facet of DOD's implemention of section 203—the technical evaluation. We found that many personnel performing these evaluations have minimal or general knowledge of, and interest in, the particular projects they are asked to evaluate. We suggested that DOD consider procedures to assign projects to

evaluators more in line with their areas of expertise and that evaluations not be precisely scored for use by negotiators in arriving at contractor ceilings.

We would like to see consideration given to ways to produce a better exchange of information on the results of DOD's I.R. & D. for use by other agencies conducting grant and contract programs in similar areas.

Our report of June 1975 was the result of a more comprehensive study than just DOD's implementation of section 203, although DOD's policies and procedures logically formed the basis for our evaluation.

We were asked to identify "specific developments" made by major defense contractors with respect to the amounts of I.R. & D. received during 1968–72. We interpreted the question to be asking whether the results of I.R. & D. could be identified and quantified on a project-by-project basis, thus providing an output for every dollar and a basis for measuring the benefits versus the cost. Our field staffs made pilot tests at four contractors.

We found that we could not make such an evaluation. For one thing, the time interval between conception of an idea and completion of a specific development is generally many years. DOD, in its attempt to identify reasons for successful development, traced specific systems over a 20-year period. The study showed that the time between predecessor and successor in defense equipment was typically 10 to 20 years.

The National Science Foundation sponsored a study which documented in a 1973 report significant events during the innovative process for 10 innovations studied that first came to realization during 1933–66. The average time from conception to realization or the 10 innovations was about 19 years.

We initially looked into the feasibility of identifying I.R. & D. benefits by tracing individual projects funded in 1968 to their ultimate use. This approach proved to be impracticable because projects were too numerous and most projects did not, in themselves, become specific developments. Projects are often aimed at advancing technology without a known product application.

We, therefore, decided to evaluate the I.R. & D. programs of the four contractors for a 2-year period on the soundness of the companies' bases for undertaking projects. In other words, since the objective of an I.R. & D. program is to put a company in a position to meet customers' needs, we examined the business reasons for undertaking projects in the test period.

Evidence showed that contractors' I.R. & D. programs were generally related to customers' needs, were undertaken to serve a Government purpose, or were directed toward meeting agency program goals.

Government contracts for R. & D. require contractors to convey certain property rights in whatever new or improved concepts result from the contract effort. DOD and NASA do not require contractors to furnish property rights in inventions or data arising from I.R. & D. One of the controversial issues of I.R. & D. is the equity of this policy when contractors recover from the Government a major part of the costs of their I.R. & D. programs.

DOD believes that its I.R. & D. patent practices are compatible with Government policy. This policy is to promote, insofar as feasible,

the commercial exploitation of patents derived from Government-sponsored work, even to the extent of granting exclusive licenses to private companies who will undertake productive exploitation.

We were asked in our study to identify patent applications, issued patents, and patent income resulting from the I.R. & D. programs of major defense contractors. As previously noted, our study was confined to four contractors.

According to information furnished by the contractors, patents arising from I.R. & D. were not numerous and patent income was described as modest, although two of the contractors considered the income figures to be proprietary. One contractor reported no income from patents resulting from work done under I.R. & D. programs during a 6-year period.

A study in 1972 by a DOD working group showed that most companies seldom applied for patents. Fewer than 10 percent of I.R. & D. projects resulted in patent applications. A small number of companies, however, made patent applications on the results of most of their I.R. & D. projects.

AEC's regulations provided for AEC to acquire rights to technical data and inventions made or conceived under an I.R. & D. project based upon its percentage share of the total project cost. When AEC's cost participation was less than 20 percent, the agency did not seek patent rights. When AEC's cost participation was between 20 and 75 percent, the contractor was required to give AEC a nonexclusive, irrevocable, paid-up license for AEC purposes and could also be required to submit a complete and detailed technical report.

If AEC's cost participation exceeded 75 percent, the contractor was required to furnish scientific and technical data and to give the Government a nonexclusive, irrevocable, paid-up license for all purposes.

When we inquired into this matter before the 1970 hearings, we noted that AEC's participation was consistently under 20 percent and no instance had arisen under which either data or patent rights had been acquired.

AEC said in 1974 that its field offices had identified a small number of instances in which AEC had received licenses, licenses had been tendered, or contractors had applied for patents where AEC was entitled to rights.

We were asked for alternative recommendations to give the Senate Armed Services Committee a choice of actions which might be adopted. We asked a number of knowledgeable persons with a wide range of views to comment on alternatives to the DOD-NASA system which allows contractors to recover I.R. & D. costs as an overhead or indirect charge to contracts.

We received responses from 18 individuals and one industry association. The individual respondents represented Government, industry, and academia. All had direct working experience with I.R. & D. programs from one or more of these vantage points.

The alternatives included:

A budget line item for R. & D. now funded as I.R. & D. with direct contracting with companies.

Those favoring this approach pointed out that: The Government would buy only what it needs. Relevancy to agency programs would

be assured. Patent and technical data rights would be obtained by the Government.

Disadvantages were cited as: A loss of independence by the contractor in selecting areas of technical effort.

A loss to the contractor of the flexibility to alter programed work without the administrative formalities of negotiating a contract change. Increased administrative costs because of the problem of allocating the appropriated funds. Increased R. & D. costs to maintain the present level of effort since contractors now share I.R. & D. costs. Second, recovery of I.R. & D. as an indirect charge only if there is benefit to the contract.

This approach, which was the AEC method, provides the Government with work relevant to its needs, minimizes I.R. & D. costs and gives the Government rights in the results commensurate with its participation. Critics pointed out that AEC's operation was unique for Government agencies and, if applied to other agencies, would discourage long-range I.R. & D., complicate contractor planning because recovery is determined after-the-fact, and tend to confine industry to its present lines of business. The next alternative is recovery of I.R. & D. through overhead by a formula-type approach.

These alternatives would determine the reasonableness of contractors' I.R. & D. costs by a more mechanical means, such as broadening the application of DOD's Contractor Weighted-Average Share (CWAS) rating; extending to all contractors DOD's formula now applicable to contractors not required to negotiate advance agreements; or accepting as overhead all reasonable costs of contractor cost centers with 50 percent or more fixed-price Government contracts and commercial sales.

Those favoring this type of approach noted the potential for reducing administrative costs and achieving uniform application for all contractors. Opponents commented that ceilings have been found to be necessary when real competition is lacking, formulas do not recognize changes in the size or technical content of programs, and the Government would lose visibility of contractors' resources and technical results.

The next alternative was to have I.R. & D. allowed as an element of profit. Objections to this approach centered around the difficulty in arriving at a basis for computing the profit factor and assuring the contractor some financial stability from contract to contract and year to year. This approach is seen as simplifying administrative procedures and providing the contractor with incentive to eliminate unproductive work.

The next alternative was the removal of most present controls. This alternative would reduce administrative costs by placing more reliance on competitive restraints on spending. Proponents believe that restraints of the marketplace are effective while opponents see I.R. & D. costs increasing and the present controversy over reasonableness continuing.

Most respondents favored retaining the DOD–NASA method. Comments included the belief that none of the proposed approaches represented enough of an improvement to warrant a change; that many of the proposals had been considered and rejected in fashioning the present method; and that the present method represented much deliberation and compromise and should not be discarded lightly.

Some of the alternative approaches were considered worthy of further consideration, but no single proposal was supported by more than one or two individuals.

In June 1975, the General Services Administration (GSA) provided the Office of Federal Procurement Policy with an interim report on its efforts to develop an executive branch position on the treatment of I.R. & D. and B. & P. costs. After considering the recommendation of the Commission on Government Procurement, the dissenting positions to the recommendation of the Commission's majority, the report of the interagency task group which considered the Procurement Commission's report, and the views of Federal agencies and the private sector on the task group's position, GSA suggested four alternatives for consideration.

Tests of reasonableness and allocability. This alternative would allow equitable allocation of I.R. & D. and B. & P. to Government contracts subject to general tests of reasonableness and allocability, with advance agreements and dollar ceilings when appropriate, but no Governmentwide criteria or tests.

Commission on Government Procurement recommendation. The Commission recommended that I.R. & D. and B. & P. be accepted without question as an overhead item for contractor cost centers with 50 percent or more fixed-priced Government contracts and commercial sales and that other contractors be subject to the present DOD formula; also, that there be a relevancy requirement of potential relationship to the agency function or operation for contractor cost centers with more than 50 percent cost-type contracts. Six Commissioners supported this recommendation.

Interagency task group's proposed position. The task group, with DOD as lead agency, considered the Procurement Commission's recommendation and dissenting positions and proposed that the executive branch:

Adopt ASPR policies and procedures for I.R. & D. and B. & P. costs as the standard for the executive branch.

Broaden the relevancy requirement to encompass Governmentwide relevancy and amend ASPR and section 203 of Public Law 91-441 accordingly.

Consider applying CWAS to the I.R. & D. and B. & P. cost principles of ASPR and the executive branch document which would implement, Governmentwide, similar policies and procedures.

Commission on Government Procurement dissenting position 1. The Commission's report presented two dissenting positions. In the first of these, four of the Commissioners and I opposed the majority recommendation of the Commission because it would relax the controls in use by DOD and thus increase costs.

Government agencies have been placed in the difficult role of trying to assert the proper degree of control over a program which has as one of its basic principles the maintenance of contractors' independence. The nature of research and development being what it is, the issue has been compounded by the lack of a capability to measure the results of the work. We believe that, if financial support by the Government is to be continued, the Congress should clarify the policy by establishing guidelines setting forth:

The purpose for which the Government supports I.R. & D.

The appropriate amount of this financial support.

The degree of control to be exercised by the Government over contractors' supported programs.

We continue to support the views represented by dissenting position 1 of the report of the Commission on Government Procurement.

Dissenting position 1 agreed with the majority position in recommending the following:

Recognize that I.R. & D. and B. & P. expenditures are in the Nation's best interests to promote competition, advance technology, and foster economic growth. Establish a policy recognizing I.R. & D. and B. & P. efforts as necessary costs of doing business.

Provide that I.R. & D. and B. & P. receive uniform treatment, Governmentwide, with exceptions treated by the Office of Federal Procurement Policy.

The policy recommended by dissenting position 1 differed from the majority's policy in its other provisions.

The Commission majority recommended that contractor cost centers with 50 percent or more fixed-price Government contracts and sales of commercial products and services have their I.R. & D. and B. & P. costs accepted as an overhead item without question as to amount. For other contractors, the DOD formula should be used to determine the reasonableness of costs.

We found, however, that adoption of the majority recommendation would increase DOD's costs between $50 and $100 million annually. In dissenting position 1, we proposed to continue negotiation of advance agreements with contractors who received more than $2 million in I.R. & D. and B. & P. during their preceding year, and in all other cases, use the DOD formula for reasonableness.

The Procurement Commission majority recommended that only those contractor cost centers with more than 50 percent cost-type contracts should be subject to a test of potential relevance to the agency function or operation. Dissenting position 1 recommended that all allowable projects of contractors receiving more than $2 million in annual I.R. & D. and B. & P. payments have a potential relationship.

The interagency task group proposed that ASPR and section 203 of Public Law 91–441 be amended to broaden the relevancy requirement to the Government's interest. In establishing a standard for Governmentwide use, the desirability of a requirement of Governmentwide relevancy will have to be considered.

Dissenting position 1 recommended that the Government be given enough access to the contractor's records of its commercial business for determining that I.R. & D. and B. & P. costs are allowable. The majority position did not include this recommendation, which resulted from a situation we, the GAO, reported to the Congress in December 1974. That had to do with the *Pratt & Whitney* case.

In this instance, DOD allowed projects in I.R. & D. for a development which we believed was already required of the contractor by agreements with commercial customers and, therefore, did not meet the ASPR definition of I.R. & D. Neither we nor DOD were granted access to the contractor's records of commercial business. We recommended that I.R. & D. agreements specifically authorize access to commercial records, not without limitation, but to the extent necessary for Government officials to determine the propriety of questionable charges.

Nothing in the provisions of dissenting position 1 was intended to preclude a direct contract agreement for specific R. & D. projects

proposed by a contractor. We believe that the agencies will be able to achieve a reduction in I.R. & D. costs and better control if early in the R. & D. cycle they make their problems known to industry without stating preconceived solutions. Agencies may then use contracts with short time spans and limited commitments as a means of narrowing down those competing solutions, providing an objective comparison of alternative systems before entering into larger commitments.

In our testimony of 1970 we suggested that the Congress may wish to consider how greater use could be made of direct contracting to obtain contractors' research and development efforts. We suggested exploration of the extent to which agencies could identify development projects of the type now included in I.R. & D. for review and authorization in the same manner as those that are funded from research and development appropriations.

In establishing a Governmentwide policy, we suggest that the Congress consider having the Government present one face to industry. That is, with each contractor, have one advance agreement, a joint agency technical review, and a single overhead rate for I.R. & D. and B. & P., to ease the administrative burden for both Government agencies and contractors.

We also suggest that the Congress consider the desirability of providing in advance agreements for the Government to receive rights to patents and technical data arising from I.R. & D. A sliding scale based on agencies' cost participation in the contractor's program, such as AEC had, could be the basis for determining the rights received.

We have included as an attachment a table showing the I.R. & D. and B. & P. cost for major contractors for the years 1971 through 1974. You will see here that there has been a rather sharp increase over this 4-year period. Inflation has undoubtedly affected this, but the increase is substantial nevertheless.

[The table follows:]

I.R. & D. AND B. & P. COSTS FOR MAJOR CONTRACTORS

[Dollars in millions]

	1971	1972	1973	1974
Number of contractors	84	77	83	90
Contractor costs:				
I.R. & D.	$703	$936	$1,164	$1,148
B. & P.	427	469	553	546
Total	1,130	1,405	1,717	1,694
Accepted by the Government:				
I.R. & D.	567	725	896	901
B. & P.	390	431	515	504
Total	957	1,157	1,411	1,405
Percent accepted	85	82	82	83
DOD's share:				
I.R. & D.	$354	$392	$441	$457
B. & P.	265	306	360	351
Total	619	698	801	808
NASA's share:				
I.R. & D.	41	40	40	41
B. & P.	51	50	49	41
Total	92	90	89	82
DOD's and NASA's combined share	711	788	890	890
Percent of accepted	70	67	63	63

This concludes our statement, Mr. Chairman. We will be happy to answer questions.

Senator McINTYRE. We will follow the 10-minute rule. Mr. Staats, you began your statement on a very sobering note. Five years after you last testified before the R. & D. Subcommittee and with 5 years of experience under section 203 of Public Law 91–441, increased regulation by DOD, and studies by GAO, DOD, and the Commission on Government Procurement, you state that a solution satisfactory to all has not been reached—and that the Government's support of contractors' I.R. & D. remains a controversial and emotional issue.

Do you believe that a solution satisfactory to all is even a possibility?

Mr. STAATS. I do not think that it would be possible to reach an agreement among all the elements either within Government or in industry. So in the final analysis, we think that this is going to require legislation.

I cite a great deal of the history of this issue in this statement today—and I apologize for the length of the statement—to emphasize that the issues are pretty deep seated. We had three different positions in the Government Procurement Commission. And I think the Office of Federal Procurement Policy and the OMB are now getting into some of the same kind of differences that we experienced in the Procurement Commission. So in the final analysis it seemed to us, like many other issues of this type, that legislation is about the only way to settle it.

Senator McINTYRE. Speaking of legislation, are you not impressed by the fact that DOD, and to a somewhat lesser degree industry, have come to accept the existence of law on this suggestion and no longer argue that there should be no legislation? Are you impressed, in other words, by the position that DOD has taken now, and even to a less extent, industry?

Mr. STAATS. Yes. Back in 1969–70 the Defense Department, as you are well aware, opposed any kind of legislation on the suggestion. I think that that attitude has changed. I think that the DOD's position is pretty clear; they would like to have at least as much flexibility as they have today. They would prefer not to see further restrictive action in this area. But, I do think that they recognize now that the legislative route is an appropriate one to resolve this point.

Senator McINTYRE. Mr. Fine and I remember that the testimony back in 1970 was very strong that there was no legislation needed by DOD and industry. You state that it was not possible to determine whether the benefits to the Government from contractors' I.R. & D. efforts are worth the costs paid by the Government. Yet, you say that both DOD and NASA feel otherwise. Can you explain this basic difference of opinion among three separate and responsible agencies of the Government?

Mr. STAATS. We may have a matter of wording or semantics here. A cost-benefit type of analysis, as we have always interpreted that term, meant that you substantially have to quantify the results of analysis. It is going to want what you can't get back from it. And if you could not quantify it in some numerical terms, at least you could quantify it in the way of specific results. I do not think you can do that in this area. I do not think anyone can. I think, like the efforts of the National Science Foundation or the National Institute of Health,

many of these other areas where research is involved, great uncertainties prevail as to whether anything will come from that research.

You have the same situation here to a large extent in the case of I.R. & D. This varies considerably within the total I.R. & D. effort because you have so many different kinds of research being carried on within that framework. Much of this related to the efforts of the contractor to win more business. He is trying to get a product on the market. He is trying to get a breakthrough. He is trying to capitalize on the expertise of some leading researcher that he may have on his staff. But on an overall basis, I don't believe that it is possible for anyone to come before this or any other committee of Congress and make a demonstration in tangible terms numerically or otherwise that you have got a dollars worth of benefit for a dollars worth of cost. I don't believe it is that kind of program.

Senator McINTYRE. In commenting on your report, DOD states that over the past 5 years or more they have made several fairly comprehensive surveys of this question concerning benefits of I.R. & D., and that in each case the evidence indicated that I.R. & D., is of benefit to DOD and to the Federal Government. Did your agency examine the results of these surveys? If so, why did you arrive at a different conclusion?

Mr. GUTMANN. Mr. Heinbaugh has some information on that, Mr. Chairman.

Senator McINTYRE. Mr. Heinbaugh.

Mr. HEINBAUGH. We have a copy of DOD's letter. I cannot say for certain, but I believe what they are referring to is that each year they have the contractors identify for them specific results that have come out of the programs; many are developments. I do not think they attempt to account for each dollar, which is what we said that we could not do. By a cumulative total, a cumulative picture of everything that has been identified, they demonstrate benefits, and industry too can point to different types of developments. But we have not looked into their reports, no.

Senator McINTYRE. Mr. Fine, will you pursue that?

Mr. FINE. The answer that has been given largely focuses attention on the attempt to address a dollar relationship, the benefits, if you will. The results of the reports we have had from the Department of Defense represent a voluminous volume of notifications which is not in terms of dollar values, but in terms of technical accomplishment and items of development and the whole spectrum of technology. And the sense of the question is largely, not is it worth the cost in terms of relating specific dollars to end items, but in the overall technology, and in the overall development of new equipment, is there a feeling, has there been an attempt made to evaluate the work, what has been expended on I.R. & D.?

Mr. STAATS. I would like to make a response to that general point. I think any evaluation of the type we are talking about here has to be largely in judgmental and somewhat subjective measures. I do not think that you can measure a dollar relationship as you have indicated and come out with a cost-benefit ratio, you can with respect to a piece of capital equipment, or you can in a water resources project or many other things where we have used cost-benefit analysis. I have dealt with research and development programs for the last 25 years, going back to World War II, actually. And one of the things

that I have been impressed with in budgeting for R. & D. is that when you get into basic research or general purpose research—and much of this is in those categories—you have to do it more as an act of faith that research and development is necessary for the general welfare of the Nation and its economy. When you move from that to applied research, and to project research, then I think you have a different test to be applied. I think for that reason, one of the issues—and we have referred to that in our statement—is whether or not you can firm up and make more specific the elements of what is now in I.R. & D. so that you can contract for it. And you specify your objective in the contracting process, rather than in a process of trying to make a judgment overall as to the worthiness, the level of effort of a contractor's general purpose research—this used to be called general purpose research, up until 1959, and then it became independent research and development. So that I would suggest that perhaps we will get further with this question of costs and benefits if we can look at the way in which the budget is justified to the Congress and the manner in which these authorizations are made by the Congress.

I do not personally question the need for a strong R. & D. program. I do think there are questions as to whether or not this is the best way to attain the R. & D. effort.

Senator PROXMIRE. I want to follow up on that a little further, Mr. Staats. The evidence is pretty overwhelming that very little of this goes into basic research, most of it goes into the other areas, as you have indicated, not in your report to us today, but the basic report. I want to get to that a little later. One of the things that troubles me about this is that when we talk to people in the Defense Department and people in the Space Agency and people at ERDA, informally, they will frankly tell us that the program is not worth anything like what it costs. But they are loyal to their agency, and of course, they are under constraint when they speak publicly, and all of us have those constraints. But it is so hard to get any kind of clear justification of the kind we ought to have if we are going to spend $1 billion a year on any kind of a program.

Let me start off by asking you about this justification. I have heard military I.R. & D. compared to commercial research, in which they say that a commercial firm will charge more when it sells its product, and the consumer does not really realize what is happening, but some of that money is taken and put into research. And there is some kind of an analogy here. The defense contractor's customer is Uncle Sam, so he wants to charge a little more so that he can put some of that into research. The difference is that in the commercial area there is the tough discipline of the marketplace. The businessman had better be sure that when he charges more for research, and when he engages in that research, he is going to produce something that he can sell. If he cannot sell it, it comes out of his pockets.

Compare that with what happens to this R. & D. It does not come out of his pockets at all. Uncle Sam pays for it. Uncle Sam never finds out whether or not that is worth anything, you say you cannot tell, you cannot really give a benefit in relationship to the cost. We just approximate the money, and we never know after years and years of this program, spending billions of dollars, whether we have gotten anything like the cost of the program. What is your response to that?

Mr. STAATS. There is no question about the fact that in the commercial practice, and with respect to Government competitive fixed price advertised procurements, that whatever costs the contractor incurs he has to calculate in his selling price. And he may or may not recover his research and development costs on a particular contract. He may have to assume that recovery is going to come out of several contracts over several years of operation. If he happens to be in a good market position, maybe even a monopolistic position, he does not really have to worry about that. But if he is in a really competitive situation he does.

Senator PROXMIRE. Certainly most people, if they are in some kind of monopoly position, are regulated, and their returns are held down, and I presume though if they have a proper regulation by a public service commission or something of the kind, that they are required to justify their expenditure. But by and large there is some degree of competition, whether it is the automobile industry, the aluminum industry, or steel, or whatever it is, there is some degree of competition. Therefore, there is the recognition, I would think, on the part of any competent management that if they do not come out on that project they have to take it out of the profits. Therefore there must be relevance. There must be a benefit exceeding the cost. If they do not get results from a certain research team, they get a new one if they are going to be a profitable business. They just do not go on with something and spend a figure like $1 billion or $100 million or $1 million a year, and say we do not know, maybe we are getting something out of this, and maybe it will come out all right, but it is too complicated to understand.

Mr. STAATS. I agree that there is a very poor distinction here. And I also am aware, although we do not have figures, that contractors are using some of their profits for I.R. & D., some have told me that if they have a real promising area, that they do not stop with what is in the I.R. & D., they will go ahead and spend it out of profits. But, the distinction here, the reason it is so important is that it is similar to a grant for research and development. It is very similar in many ways to grants which are made through agencies like EPA and ERDA.

Senator PROXMIRE. It is a subsidy, it is a subsidy not paid in the generality on any kind of basis, it seems to me, but it is based on payment to the big firm. Let me give you some statistics. As I understand it, the top hundred prime contractors regularly account for about 70 percent of the total value of DOD prime contracts. The top 50 companies received 60 percent and the top 25 about 50 percent. Now, I.R. & D.—B. & P. is far more concentrated. In 1973 about 55 contractors with advanced agreements for I.R. & D.—B. & P. received about 97 percent of DOD's total reported reimbursement for I.R. & D.—B. & P. So here is a program which is highly concentrated, highly selective, highly discriminatory; it goes only to certain contributors, big contributors, and smaller contributors get almost nothing. If this is a subsidy for the purpose of achieving research, it seems to me that it is discriminatory and unfair.

Mr. STAATS. You can argue, to pursue your point, that if it is good for a contractor to have funds of this type from the Federal Government for research and development, it is also good for a noncontractor. In fact the Commerce Department, in years gone by, has argued that this should be a generalized thing.

Senator PROXMIRE. Maybe it should be. The fact is that it is not, the fact is that it is concentrated, the fact is that it goes to the big firms, and it tends to be exclusive. Let me ask you about the secrecy involved in this program. This is something that really bothers me a great deal. And as I say, I can understand that if it were a matter like the CIA or some matter that should be concealed, I could understand that. But here we have a situation in which the amounts spent by individual contractors are not identified in public reports, they are submitted to Congress by the Pentagon, the total spent or made available, but not the amount spent by each contractor. This makes it very difficult for any of us to have any notion of whether this is justified, or whether there is favoritism, or whether the program should be challenged, because we do not have the information. As Lyndon Johnson used to say, knowledge is power. And that is the case here. When we do not have the knowledge there is no way we can challenge the spending in dollars per year. Do you agree with the policy of keeping the contractors' names secret?

Mr. STAATS. I am sorry, I did not hear the question.

Senator PROXMIRE. Do you agree with this policy of keeping the contractors' names secret? And if you do, what is the justification for it?

Mr. STAATS. I am not familiar with the specific situation that you are referring to. Perhaps my colleagues here are.

Senator MCINTYRE. May I just interject and say that I am sure the Senator realizes that we do get this information. But it is classified.

Senator PROXMIRE. We have been trying to get this information in the Joint Economic Committee, and we have not been able to get it. This is Mr. Kaufman of the Joint Economic Committee.

Mr. KAUFMAN. I think the point that the Senator is getting to is that the names of the contractors and the amounts that each contractor spends is not made public. Therefore, there can be no public review or public scrutiny of individual contractors and I.R. & D. activities. The matter cannot be discussed at any kind of a public session of any committee of Congress, and the committees are thereby restricted from reviewing on an individual contractor or an individual project basis any specific R. & D. activity.

Senator PROXMIRE. Let me give you an example. I am chairman of the subcommittee of the Appropriations Committee that has the responsibility for NASA. And NASA comes before us every year. I have been chairman of that subcommittee now for 3 years. And I must say, we had no idea that they were spending a couple of years ago $90 million, now $80 million, in this area, it was not disclosed to us, and it was not revealed to other members of the committee or of the Senate. And I am sure the same situation was true in the House. We did not even know it was there, No. 1; and No. 2, we certainly did not know what firms were getting this I.R. & D., so that we could challenge it and determine whether or not it was worth while, or decide whether to reduce it or increase it as we can with any other expenditures.

Mr. STAATS. I would like to call your attention to the last page of our statement where we suggest that the policies include one where each contractor would have one advance agreement, a joint agency technical review, and a single overhead rate for I.R. & D., B. & P. That would produce the total information on I.R. & D. and B. & P.

for each contractor. We think another advantage would be to the agencies who have R. & D. programs in-house, whether they were making grants for various programs like energy, or any other programs, to have knowledge of how much a contractor is getting in the nature of I.R. & D. from all of the agencies of the Government. It could very substantially affect how much money they would spend.

Senator PROXMIRE. My time is up. I did not understand that from your recommendation. Your recommendation sounded to me as if you wanted to apply a single rate, which made sense.

Mr. STAATS. That is part of it.

Senator PROXMIRE. I did not realize that you also would favor disclosing the amount paid to each contractor, that would not necessarily be encompassed in the recommendation as it was framed in your statement.

Mr. STAATS. We spelled this out more specifically in one of our earlier reports, I believe it was back in 1970.

Senator PROXMIRE. So that you would favor disclosing the amount paid to each contractor?

Mr. STAATS. But within whatever limits there are with respect to classified information, yes.

Senator PROXMIRE. What is classified about this? Why should it be classified?

Mr. STAATS. Nothing about the total, if you are talking about the——

Senator PROXMIRE. Why should it be classified? We know how much we are spending up and down the line with Lockheed, and with Northrop and so forth, why should we not know this.

Mr. STAATS. There is nothing classified about the total.

Senator PROXMIRE. Why should the individual be classified?

Mr. GUTMANN. Let me ask a question here.

Senator, I wonder if we are talking here about proprietary information?

Senator PROXMIRE. They may call it proprietary. But why is it proprietary? The Federal Government pays money. Why should that automatically be proprietary?

Mr. GUTMANN. I would agree with you that this should be made public. But I am just speculating as to why the Department of Defense suggests that the names and the amounts paid to each of the contractors not be revealed.

Senator PROXMIRE. Then I get from you, Mr. Gutmann, that you would agree that the public interest would be served if we could identify the contractor who was getting the payment.

Mr. GUTMANN. I would have one reservation. And that is, if all of the contractors know how much I.R. & D. reimbursements their competitors are getting, they would tend to use that as a lever against the agencies who are trying to hold their I.R. & D. down a little bit.

Senator PROXMIRE. You get that all the time. They know about everything else, all the other payments are made public, all the ordinary research and development is, all of the other procurement elements are made public. And they compete on this basis. And I think it is a good, healthy thing that they do it.

I am sorry, I am taking too much time, Mr. Chairman.

Senator MCINTYRE. Senator Leahy.

Senator LEAHY. I do have a couple of questions.

Senator PROXMIRE. Will you just permit one more point, Senator Leahy?

Senator LEAHY. Sure.

Senator PROXMIRE. As I understand it, we had the same problem with foreign aid while I was chairman of that subcommittee. They would not tell us the names of the countries that got the money; they said the other countries would put all kinds of pressure, and we will have a terrible diplomatic mess. We did make that country allocation public, and now we know it, it is no longer classified. And it seems to me that we have better control and better knowledge, and certainly the taxpaying public has a right to know where their money goes.

Mr. STAATS. This is the first time I have heard the objection to it, Mr. Chairman, so I would have to know what their arguments are.

Senator MCINTYRE. Senator Leahy.

Senator LEAHY. Mr. Staats, have there been any instances of independent research and development which the GAO has found not to be relevant to a military purpose?

Mr. STAATS. Yes; we filed a report on a case to the Congress last year. And I think Mr. Gutmann or Mr. Heinbaugh could comment on that.

Mr. GUTMANN. I think Mr. Heinbaugh is much more familiar with the details of the case.

Mr. HEINBAUGH. Relevance was not the important issue in this case. I think it would be hard to say that research in the jet aircraft engine area would not be relevant or potentially relevant to the military. This case hinged on the definition of I.R. & D. contained in ASPR, as to whether the work that was being done was not already required of the contractor under his agreements with commercial customers.

Senator LEAHY. But you submitted a report on that to the Congress last year?

Mr. HEINBAUGH. Yes; in December.

Senator LEAHY. Could you let us subsequent to this hearing have a copy of that report so that we have it for the record.

Mr. HEINBAUGH. Yes; you may have it for the record, no problem.

(See Report to the Congress, "Independent Research and Development Allocations Should Not Absorb Costs of Commercial Development Work", (B–164912), December 10, 1974, page 177.)

Senator LEAHY. Have there been—aside from that question—and I realize that in talking about jet propulsion you could crowd just about anything into it. And one of the problems of the aircraft is the ripoff involved in the crafts program, the commercial interests seem to be able to designate anything as having a military connection if they want. But have there been any other incidents that you can think of which have been independent R. & D. which you found not to be relevant to a military purpose?

Mr. HEINBAUGH. In almost any contractor program there could be projects that are not relevant. But they are never of sufficient quantity that the payments that DOD makes do not fall within the law. The amounts that DOD pay are always lower than the amount of the relevant projects.

Senator LEAHY. Which is——

Mr. HEINBAUGH. Which then makes the payments legal as far as section 203 is concerned.

Mr. GUTMANN. May I add just a word to that?

Senator, we do not make the relevancy determinations. We have looked at those determinations made by the agency, and indeed have found cases where they have found projects nonrelevant and excluded their cost from the I.R. & D. basis.

Senator LEAHY. Does anybody make those determinations besides the agencies involved?

Mr. GUTMANN. Just the agencies, yes, sir.

Senator LEAHY. GAO is never called upon to do that?

Mr. GUTMANN. No; we have not been.

Senator LEAHY. But you have reviewed somewhere the agencies themselves and have found them not to be relevant?

Mr. GUTMANN. That is correct.

Senator LEAHY. Do you have that information fairly available?

Mr. GUTMANN. We do have some here, yes sir. They are in the nature of examples of the type of thing that we have found where DOD has made the determination of nonrelevancy.

In the case of one contractor a determination was made that an I.R. & D. project dealing with ophthalmic surfacing was thrown out.

Solar cell studies——

Senator LEAHY. How much did that cost, the ophthalmic surfaces?

Mr. HEINBAUGH. We do not have the costs.

Mr. GUTMANN. We do not have the costs, sir, on any of those.

There was a copier duplicator in one case; another contractor's I.R. & D. program had a considerable amount of research applied to energy alternatives, and DOD threw that out. Another contractor, had some planetary exploration studies that DOD threw out.

Senator LEAHY. What in of exploration studies?

Mr. GUTMANN. Planetary.

Senator LEAHY. Is this under defensive or offensive weapons?

Mr. GUTMANN. We do not know the classification. It sounds like something that they thought NASA should be doing.

Senator LEAHY. I see.

Mr. STAATS. We can supply a list of the four contractors that we looked at as a part of this study.

Senator LEAHY. I would like that, Mr. Staats.

[The information follows:]

Examples of projects which DOD determined in its pre-evaluation to be nonrelevant, i.e., not having a potential relationship to a military function or operation, in 1972 or 1973 at four contractor locations included in our study:

	Proposed costs
Contractor A:	
Environmental systems engineering	$134,400
Advanced mobility and logistics concept development	253,100
Space support and propulsion systems growth applications	223,700
Spacecraft operations studies	152,500
Aerospace technology applications to new community developments	72,600
Surface transportation technology	582,800
Systems engineering studies—national functional needs	980,300
Space exploration systems	780,600
Urban and biosciences research	42,900
Contractor B: Advanced systems concepts	1,013,000

	Proposed costs
Contractor C:	
System concept formation and analysis based on advanced data base technology from corporate R. & D. programs	$60,000
Multi-gas atmospheric remote sensing approach investigation	310,000
Crucibleless processing of metals	30,000
Space processing of ceramic crystals	30,000
Correlation of interferometry techniques	30,000
Laser techniques	60,000
Electrophoresis space processing	50,000
Laser resonance fluorescence sensors	50,000
Spacecraft integration	50,000
Terrestrial technology	65,000
Visual system test device	45,000
Contractor D: None	
Examples of projects determined to be nonrelevant in 1975 (selected in some instances because they illustrate areas of primary interest to other Federal agencies):	
Contractor E:	
Ophthalmic surfacing	104,700
Frames materials and processes	40,300
Finishing of ophthalmic lenses	27,000
Solar cell studies	102,700
Dynamics of residual image removal	128,300
Copier duplicator	356,500
Contractor F:	
Fast breeder reactors (FBR) and preliminary engineering	110,000
Coal gasification research	200,000
Geothermal engineering research	25,000
Coal utilization	50,000
Advanced energy storage	50,000
Coal conversion	80,000
Solar energy	30,000
Air quality monitoring systems	200,000
Space sciences	50,000
Energy conversion and storage	360,000
Contractor G:	
Planetary exploration studies	164,000
Foreign commercial systems (B & P)	1,950,000
Planetary exploration studies (B & P)	100,000
Contractor H: Coating for blades and vanes (Interior Department B & P)	3,800

Senator LEAHY. I understand that you do not normally make such studies of relevancy, that is done by the Department itself.

Mr. STAATS. We have no authority and responsibility to make independent judgments with respect to relevancy.

Senator LEAHY. And the other case you were talking about was the Pratt & Whitney one, $87 million for the jet engine.

Mr. GUTMANN. Yes.

Senator LEAHY. And the Boeing 747 and DC–10.

Has there ever been an audit made by GAO of various independent research and development projects?

Mr. GUTMANN. We have not audited independent research and development projects per se. But over the years, over the past 10 years, we have done quite a few studies of the general question of independent research and development.

Senator LEAHY. Do you believe there is a necessity for legislation similar to Senator Mansfield's amendment, section 203? I notice you mention it in your testimony, Mr. Staats. Do you feel that is good legislation?

Mr. STAATS. We would recommend that there be further legislation on this subject. Otherwise we believe that this argument is going to

continue, it will not be settled. And it will not be a satisfactory arrangement.

Senator LEAHY. Do you have the means of evaluating the cost-effectiveness of such research? Can GAO really do that? Or are we back to a smoke-shoveling kind of situation?

Mr. STAATS. I think there is a question as to whether or not the independence argument may have been overstated. There are some who feel that even the advance agreement is an unfair and undesirable imposition of the Government's judgment on the contractor. But I would suggest that perhaps there is at least as much latitude in grants that are made by NSF or NIH or other agencies, and perhaps even with respect to the contracts which are made.

Senator LEAHY. In 1971 Senator McIntyre proposed a ceiling on total research and development spending on DOD. Do you think that such a ceiling is desirable? Would you agree with that philosophy?

Mr. STAATS. I went back and looked into the hearing before Senator McIntyre in 1970——

Senator LEAHY. Senator McIntyre is not going to disagree with them just because he is chairing this hearing.

Mr. STAATS. What I said then I would substantially support today. That is, I think, one, there needs to be a test of relevance; and two, I would say a test of relevance to the mission of each agency and not the Government as a whole. I think a test for the Government as a whole would be meaningless.

Senator LEAHY. What about a ceiling?

Mr. STAATS. I think a ceiling would be essential. There has to be some disclosure. And it seems to me that it is not difficult to provide an estimate of what is required a year in advance, because you can relate this to, say, the 3 prior years. DCAA has that information and it is readily available. The question of whether you put on a ceiling, with Congress having the option of establishing a ceiling and the guidance for it, I think is a matter for the committee. But I think the kind of review which we would like to see here would approach the kind of review similar to that which prevails with respect to evaluations and approvals. The simple fact that you have a contract does not necessarily mean that the executing agent, the contractor in this case, is going to be tied up in knots. I think that all depends on how you write it. I do not think anybody would argue that you need to have the same degree of specifics in a contract for some of these exploratory type of research projects as you have when you are trying to develop a very expensive piece of hardware. But I do not think it is impossible to have them come before the Congress and outline their total requirement, the general area that they think should be emphasized. The Congress then has the option of putting on a ceiling or for giving guidance in the committee report.

Senator LEAHY. Thank you.

Thank you, Mr. Chairman.

Senator MCINTYRE. Mr. Staats, do you agree with the critics who view Government's participation as a giveaway?

Mr. STAATS. I do not think it is a giveaway. I said in my statement that some of the critics have charged it as being a giveaway. I do not think it is a giveaway.

Senator MCINTYRE. Based upon your own experience as Deputy Director of OMB and now as Comptroller General, do you believe

that the benefits of I.R. & D. to the Government are worth $750 million annually?

Mr. STAATS. I really cannot say whether or not they are in terms of that amount of money, because I have not looked at it from that standpoint. If I were to do that, I think I would have to do what I did when I was in the Budget Bureau. That would be to go through it item by item pretty much with the agency's justification for those items. But again, the total has to be related somewhat to how much we can afford to spend for defense as a whole, or NASA as a whole, or any other agency. But within that kind of a total it seems to me that the agency could develop reasonable justification to support the amounts they contemplate spending for I.R. & D. The National Science Foundation has to come before Congress and make that kind of judgment. And NIH does. And ERDA has to make that kind of presentation. So I really do not see this being all that much different from the kind of thing Congress reviews and OMB reviews from year to year.

Senator MCINTYRE. I will insert a table at this point in the hearing which shows for the 5-year period 1970 through 1974 the amounts authorized and appropriated for the total DOD-R.D.T. & E. appropriations and the amounts of Defense I.R.&D.-B. & P. payment and the relationship between the two sets of periods.

[Document follows:]

COMPARISON OF DOD R.D.T. & E. APPROPRIATIONS AND I.R. & D. AND B. & P. PAYMENTS

[Dollar amounts in millions]

	R.D.T. & E. appropriation	Defense I.R. & D. and B. & P. payments	Percen
1970	$7,406.7	$654	8.83
1971	7,004.2	619	8.84
1972	7,519.0	698	9.28
1973	7,959.5	801	10.06
1974	8,175.9	808	9.88

Senator MCINTYRE. It is interesting to note that the ratio increased steadily from 8.83 percent in 1970 to 10 percent in 1973 and 1974. Do you agree that there should be a consistent relationship between those amounts, since in the aggregate they represent the amounts spent by DOD for research and development?

Mr. STAATS. I think the situation here is very similar to that which we have in other programs. It is very important to have continuity in terms of level of effort. That is essentially what is involved here. The contractor gets a team together. You cannot start that kind of a team over night and you cannot close it out over night. There has to be some continuity there, otherwise you would not get much out of your investment. These things do not pay off in the short term, they pay off in the long term. So some consideration, and I think a very important consideration, should be given to continuity and the level of effort to support these programs.

Senator MCINTYRE. Would you agree that if a ceiling payment for I.R. & D. and B. & P. is considered for adoption, it would be reasonable to relate it to the annual appropriation for R.D.T. & E?

Mr. STAATS. Yes; I would be inclined to favor that as very important relationship.

Senator McINTYRE. Would not such an approach provide a measure of stability and perhaps equity to the Government as well as to the industry?

Mr. STAATS. The answer to your question is "yes". But I do think also that some broad definition of priority should be made there. After all, there is a good deal of latitude within these big contracting organizations to redirect their effort over a period of time to give higher emphasis to things where judgment requires that they be emphasized. So, except for that point I agree with your point.

Senator McINTYRE. Can you suggest any means whereby Congress can exercise control over the total amount spent for I.R. & D. without interfering with the freedom of enterprise desired by DOD, NASA, and industry?

Mr. STAATS. This is a relative type of thing. What many people in Government feel is not interfering, contractors feel is interfering. Where you stand depends a great deal upon where you sit on some of those issues. But I would be willing to argue, I think, that all the essential freedoms can be worked out within a limitation. Now, whether you need to go to a contracting system completely, Senator, I do not know. I doubt it. But I do think that within the framework of what is now I.R. & D., a great deal of it could be translated into contracts. That eliminates a lot of argument. It might be, though, that over and above what you could break out for contracts there could be something in the nature of allowance for general purpose research.

Senator McINTYRE. I would like Mr. Fine to inquire at this point.

Mr. FINE. Mr. Staats, what do you have in mind when you use the word "in the form of contracts", what form of contract do you have in mind?

Mr. STAATS. I would be thinking here of a contract on a level of effort embracing pretty much what would be in the advance agreement. It might be no more specific than that.

Would you want to comment on that Mr. Gutmann?

Mr. GUTMANN. I think that the level of effort contract would be a suitable way to approach the problem. The advantage of obtaining this service with the contractor by contract is that it would give Congress the visibility in advance that you do not have at the present time. And it would enable the Congress to control the total level. Contracts would be awarded up to the level that the Congress decided was appropriate, and there would not be any more awarded. They would cover the same kinds of efforts that are presently being performed by contractors under the I.R. & D. programs which become an overhead item for allocation of all of their contracts.

Mr. FINE. Is this based upon the assumption that the moneys involved would be appropriated, or they would be treated as reimbursements to the contractor as written?

Mr. GUTMANN. No, I think the moneys would be appropriated.

Mr. FINE. Specifically for this purpose?

Mr. GUTMANN. Yes, sir.

Mr. STAATS. That would be what I would say too.

Mr. FINE. Is it your understanding that if you use it as a basis for developing budget estimates for such requirements, you would have sufficient detail available from the contractors which now are largely plans, if you will, which are subject to postaudit, and necessarily so because much of it is reaching out into the far reaches of technology,

and then try to make a judgment on the basis of how you slice the pie among the contractors if, in fact, you can arrive in total for all of them? How could this be translated into a meaningful basis for congressional consideration of requirements?

Mr. GUTMANN. The advantage of doing it, Mr. Fine, under a contract would be that it would be at one place in the appropriations where you could see it. At the present time R.D.T. & E. costs show up in the procurement authorization, and in operation and maintenance in some cases. And there is no real way for Congress to come to grips with it except from a hindsight basis and the Department of Defense reporting to you in accordance with the legislation.

Mr. FINE. How would the Department of Defense be able to develop the details necessary to justify such a requirement to Congress in a finite total dollar amount?

Mr. STAATS. I doubt if it would be necessary for them to develop it in the same detail as they do project authorizations. But here again I do not see this as being anything really different from the justifications which are put together now for many of the research programs, where you are justifying it in terms of the capability of the research centers and the level of effort, the kinds of people that are there, the areas that they are working in. These are much broader types of judgments that have to be made than you would if you were contracting for a very specific piece of hardware.

Mr. FINE. Would you for the record undertake to elaborate in some detail as to how you would propose this be done.

Mr. STAATS. I would be happy to do that.

Senator MCINTYRE. Senator Proxmire.

Senator PROXMIRE. I think this has been most constructive, and I think we are really moving toward something which at least as far as this Senator is concerned is to get GAO to support something which can be very helpful.

I say that because of the study that you made, as I understand it, much of your information was obtained from a study of four contractors, who received I.R. & D. and B. & P. And what was learned in that study was in three categories. Only one of those categories had anything to do with new concepts or pure research or anything of that kind which has some need for flexibility and making all those arguments that have been made for it. The first category was to improve existing products. Heaven knows, here is certainly something that is very close to R. & D., plain R. & D., simply R. & D. It is something on which we can have a line item full contractor identification with no problem.

Second is to respond to specific questions of the services, such as they say we want to improve these wings, we want to do something about this engine, we want more thrust. So that, too, would be subject to contractural agreement, definition, measurement, and so forth, with no problem on publicity.

It was fascinating to me to find that when you looked at these supposedly typical contractors they spent almost no money on new concepts, almost all of it was in the first two categories. One did spend 11 percent of his R. & D. on new concepts. Another spent 1 percent. A third spent zero, and a fourth spent zero. Now that seems to me to indicate that the new concept justification under which they are riding a gravy train of secrecy and getting $1 billion is a phony.

The bulk of this money is something that could be clearly and easily identified as relating to a specific project in contract, and should be disclosed fully to the Congress, so that we can debate and discuss it and determine whether or not we think that that particular expenditure was worth while. What is wrong with that.

Mr. STAATS. I cannot quarrel with your basic point.

Senator PROXMIRE. The basic point then, which is the point I take it you have made in your previous soliloquy, was that much of this might very well be subject to contractural examination.

Mr. STAATS. I think we are talking about the same thing.

Senator PROXMIRE. When we come to that, why not make this a line item in the budget, at least a lion's share of it, unless the study that you made was somehow not at all typical? And I am sure that you would have selected firms and situations which would be as typical as you can get. Why could we not make this as something that would be reported as a line item so that we could review it? As I understand it, when you reported to us in 1971, you concluded that it would be feasible to make I.R. & D. a budget line item, but at that time you advised taking no legislative action pending evaluation of the then recently enacted legislative restriction. Do you still take that position?

Mr. STAATS. Of course, we have had more experience now under the legislative restriction. Mr. Chairman, you are quite right, we did conclude it was feasible, and we spelled out in some detail why we felt it was feasible and how it should be done. But we did suggest that since it would be a departure from past practice, that you might want to put it to a trial basis say for 2 or 3 years until there would be an opportunity to assess how it would work.

Senator PROXMIRE. But you would work toward that objective?

Mr. STAATS. That is right.

Senator PROXMIRE. You would think in general the principle at least of making this a line item would be desirable?

Mr. STAATS. What I said earlier in response to Senator McIntyre's question was that I see the question of whether it is a line item as being of lesser importance than the question of full disclosure as to what the total amount would be——

Senator PROXMIRE. But you see, if it is a line item—I know that is a mechanical factor, however you disclose it, the disclosure is the fundamental, important thing. But if it is a line item I think we are much more likely to scrutinize it and compare it and determine whether this should be a top priority or less priority and determine whether you ought to increase it or decrease it; you have the very valuable advantage—I think it is very valuable—of open public discussion.

Mr. STAATS. No question. But it is a matter of judgment as to how far the Congress wants to go in an initial step. But there is no question about your point.

Senator PROXMIRE. Mr. Kaufman.

Mr. KAUFMAN. I wonder, Mr. Staats, if you could tell us whether in your opinion it would be desirable to convert the I.R. & D.-B. & P. outlays to a line item in the budget?

Mr. STAATS. I think the line item would certainly fulfill the main considerations that we see as being desirable, namely, full disclosure, a look at it in advance, rather than after the fact, which is the process today. We think that this would have the additional advantage of

dealing with the patent question, which is troublesome. So that again, I think, it is a question of how the Congress wants to go as a matter of policy in the initial step. Certainly—and this is what I said in 1970—we think there ought to be an advance review, a look at the total, and then the Congress can decide in its judgment whether it wants to establish——

Senator PROXMIRE. We have decided, but we would like your recommendations, you are our expert in this area. And you are an expert accountant, and you understand the budget as we don't. So your recommendations would have great force with us.

Mr. STAATS. I think this would be subsumed in what we have just talked about. We will supply to the committee our analysis of what kind of justification we think should be presented here, and that would be within the spirit and purpose of the program.

[Subsequent to the hearing, the following information was received:]

COMPTROLLER GENERAL OF THE UNITED STATES,
Washington, D.C., December 10, 1975.

B-164912.
Hon. THOMAS J. MCINTYRE,
Chairman, Subcommittee on Research and Development,
Senate Armed Services Committee,
Washington, D.C.

DEAR MR. CHAIRMAN: We are responding to your letter dated September 30, 1975,* asking for details on the implementation of the concept of line-item control of contractors' independent research and development (IR&D) and bid and proposal (B&P) costs.

In March 1971 we reported that we believed a line-item control of payments to major defense contractors could be developed. However, we suggested that such controls not be imposed by legislation at that time pending evaluation of the controls of section 203 of Public Law 91-441, which had become effective January 1, 1971. We felt that the statute's restrictions might achieve results comparable to those sought by a line-item control mechanism.

The Commission on Government Procurement studied the controls developed under section 203 for IR&D and B&P. In its report, issued in December 1972, six Commissioners supported a majority position which was directed toward a reduction in the administrative activities related to IR&D and B&P by relaxing controls over some contractors. I was one of five dissenting Commissioners who felt this recommendation would increase IR&D costs. We supported instead the procedures adopted by DOD pursuant to section 203, with certain modifications.

In our report to you, dated June 5, 1975, we suggested that the issue be resolved by a statement of congressional policy. We recommended that this policy be based on a combination of the principles on which the Procurement Commissioners agreed and those contained in dissenting position 1. This position was the basis for our statement before your Subcommittee on September 17, 1975.

Many of the questions which followed our prepared statement were directed toward the use of a line item for controlling IR&D and B&P costs. If the Congress desires advance cost visibility and more control than is provided under the present method, I said in my testimony that I did not think it impossible for an agency to come before the Congress and outline its total requirement, the general areas it wants to emphasize. The Congress would then have the option of putting on a ceiling or giving guidance in a committee report. I saw the question of a line item as being of lesser importance than full disclosure as to what the total amount would be.

I responded favorably that there ought to be full disclosure, an advance agreement by the Congress as it considers the budget, and an opportunity to establish limitations or give directions. I preferred the line item as being perhaps the simplest way to accomplish this objective. I saw no need or the feasibility of requiring the same detailed justification as you now have with respect to project authorizations.

*See p. 802.

This method would provide greater assurance that IR&D would compete with other research activities for RDT&E funds and would be considered along with R&D in competing with other DOD activities for DOD funding in the budget. In the absence of evidence of waste or lack of benefit under present practice, we assume that the amount of the line item that could be justified would be about the same as the Government now shares through the operation of the IR&D advance agreements.

The Government could also contract directly with contractors for the IR&D it wants. The work statements for these contracts could be based on the IR&D brochures that are currently prepared by companies and are the basis of the IR&D advance agreement negotiations. The method of contracting for this effort should be a level-of-effort type contract with flexibility on the part of the contractor to start projects, stop them, revise and reprogram them as necessary, thus giving the contractor the necessary independence required for these activities.

All companies could be covered by the direct contracting for IR&D effort or as an alternative direct contracting could be limited initially to those major contractors presently required to negotiate advance agreements. Smaller contractors not now covered by advance agreements could continue to receive reimbursements under the present method.

Assuming a system of limiting payments by a statutory ceiling and entering into a special contractual arrangement for the contractor's current year's effort, there will be a need in the initial year for a special provision to provide for amending long-term contracts awarded in past years which provided for IR&D and B&P payments through overhead. This could be accomplished by contract amendments negotiated with individual contractors as required.

Sincerely yours,

ELMER B. STAATS,
Comptroller General of the United States.

Senator PROXMIRE. I would like to ask you about this *Pratt & Whitney* case. That seems to me to be an indication of the possibility of abuse of I.R. & D. operation as it presently functions. You are familiar with that *Pratt & Whitney* case, their report in December 1974 following an investigation of one aspect of the Pratt & Whitney aircraft I.R. & D. activity. Is it not correct that Pratt & Whitney charged off the cost of developing a commercial engine as an I.R. & D. cost, and that the Navy paid the company about $87 million over a 5-year period for work that was essentially commercial?

Mr. HEINBAUGH. If I may answer, we figure that $87 million of I.R. & D. funds went to projects that were for development of that engine. The Navy picked up this cost. Since the Navy does not pay for particular projects, it is hard to say just how much of that has been disallowed. But based on the evidence we had, we felt that there were commercial agreements under which Pratt & Whitney should not have included this work in their I.R. & D.

Senator PROXMIRE. Is it not true that the engine in question was used in the Boeing 747 and the McDonnell DC–10?

Mr. HEINBAUGH. That is correct. But what we were not allowed to see, or could not get a hold of, were the agreements between the customer and Pratt & Whitney so that we do not know just what the arrangements with Pratt & Whitney were.

Senator PROXMIRE. What were the other questions you raised with respect to Pratt & Whitney expenditures of I.R. & D. funds in 1974, do you remember?

Mr. HEINBAUGH. Basically we raised a question of whether the work complied with the definition of I.R. & D. and whether the Navy agreed that it did not and should seek refund.

Senator PROXMIRE. What was done about this? You say you found that it was something—I gather from your response that this was

unallowable. What action was taken, or has been taken by the Defense Department with regard to it?

Mr. HEINBAUGH. The last word we had from the Defense Department was that the Navy felt that the Government had not been hurt by the transactions, and that they were not, as far as I know, going to seek any recovery.

Senator PROXMIRE. In other words, the Navy agreed to pay and in fact paid the cost of developing an engine for the DC-10 and the Boeing 747 commercial planes used for commercial purposes, and the poor old taxpayer, thinking that this is essential to national defense money, put it up, is that right?

Mr. HEINBAUGH. Pratt & Whitney had other projects in their programs. And the Navy pays, I think, around 30 to 35 percent of their total I.R. & D. program. So, it would take a calculation by the Navy to determine just how much of the work on that engine the Navy had paid for.

Senator PROXMIRE. I do not want to be unfair to the Navy, but frankly it looks to me like a clear case of a ripoff, until you can explain why it was not. I.R. & D. money, R. & D. money, money from the Defense Department, should not go to the development of a commercial engine.

Mr. HEINBAUGH. If they had agreements to develop that engine, we felt they clearly should not have.

Senator PROXMIRE. That money should be reclaimed.

Mr. STAATS. Let me get into this.

We made the effort to find out what was in those agreements, and we were not allowed to see them. That is very important to answer your question.

The second is that absent that, the only judgment we could make was that I.R. & D. money has been used for an unauthorized purpose. So we recommended—and this is in our report—that: "The Secretary of Defense determine how much of the JT9D technical effort for 1972 and subsequent years is not allowable as I.R. & D. because it was sponsored by or required in performance of contracts and obtained price adjustment where appropriate." That was our recommendation.

Senator PROXMIRE. And the Navy refuses to do it?

Mr. STAATS. The Navy has not taken any action.

Senator PROXMIRE. My time is up.

Mr. STAATS. This report was dated December 10 of last year.

Senator MCINTYRE. Senator Leahy.

Senator LEAHY. Mr. Staats, in your prepared statement you reported on the DOD implementation of section 203, the Mansfield amendment, the technical evaluation. Let me just read two sentences: "We found that many personnel performing these evaluations have minimal or general knowledge of, and interest in, the particular projects they are asked to evaluate. We suggested that DOD consider procedures to assign projects to evaluators more in line with their areas of expertise and that evaluations not be precisely scored for use by negotiators in arriving at contractor ceilings."

I am concerned that the personnel have minimal or general knowledge of an interest in the particular projects they are asked to evaluate. I hope I am not being overly cynical when I ask, do we have a situation where the military just assumes that a certain amount of money is going to be set aside for these large defense contractors, and they are

really not all that interested in determining whether indeed it is applied appropriately to the I.R. & D. act?

Mr. STAATS. I would like for Mr. Gutmann and Mr. Heinbaugh to respond more in detail.

Part of this goes to the question of manpower, of having the kind of skills on the staff necessary to make these kind of judgments. And part of it goes to the fact that under the law they are not allowed any reimbursements for the fiscal year unless the agreement has been approved before the end of that fiscal year. And so that this becomes kind of an end of the year traffic jam to get all of these agreements in place.

I think Mr. Gutmann and Mr. Heinbaugh have been much more directly involved and can answer your question more directly.

Senator LEAHY. I might say before you gentlemen start, so that you may know of my own basic biases here, I do feel that most of the I.R. & D. money should be a line item basis, and we should be able to point out, and the public should know, exactly where it is going, and how much is going, and basically what it is going for. And I think unless you do you are always going to have a feeling that in some way we are subsidizing private contractors. And with the record of some of these contractors, I suspect the public might not be too happy to subsidize them. We have a situation, as I mentioned to one person, now with Lockheed on their C–5–A plane, that they want a billion dollars now to fix it up. And what they have done, they have built an airplane and they are telling us as optional equipment we can get some wings for it. The public becomes cynical about this. And I appreciate what you have done Mr. Staats to answer this. But I just wonder, in connection with what we are going to discuss now, again keeping in context my own personal bias, that I feel most of this should be a line item budget and we should know exactly how much should be spent.

Either Mr. Gutmann of Mr. Heinbaugh.

Mr. GUTMANN. I believe Mr. Heinbaugh may be able to bring us up to date in terms of where the Department stands as far as improving their analysis of the data submitted for the advance agreements.

Senator LEAHY. Mr. Heinbaugh.

Mr. HEINBAUGH. I don't believe that it was a matter on the Department's part of not carring or not trying to have a good evaluation. One of the problems that brought down the percentages of those who have the expertise may have been that they did submit these projects to so many evaluators. I think two things probably went into it. One would be that the people that might have been the best available, the best experts in the area, were busy, and they substituted others. Then also, by spreading it so wide, they did not get people who were expert in a particular area. They probably could have used a narrower range of evaluators.

Senator LEAHY. What is the answer, then? What do we do to make it better?

Mr. HEINBAUGH. They have advised us, and I think they also advised Senator McIntyre in their letter responding to our report, that they have taken this under study. They feel that they can make improvements, and by a combination of better use of their evaluators plus the I.R. & D. data bank, improve their process.

Senator LEAHY. Thank you, Mr. Chairman.

Senator McINTYRE. Mr. Staats, you state that in your opinion the Congress must resolve this issue by a statement of policy on the Government support or nonsupport of I.R. & D. What is your recommendation for such a statement of policy?

Mr. STAATS. Perhaps I could reiterate some of the points I have made in response to questions. We think that several things need to be done which are pretty well recapitulated on the last page of our testimony today. First of all, there needs to be an advance agreement by Congress as it considers the budget for the agencies that have large amounts of I.R. & D. There ought to be full disclosure. And there ought to be an opportunity to establish limitations or give directions. I think our preference would be to have a line item as being perhaps the simple way to provide it.

In saying that we do not wish to imply that there needs to be the same detailed justification in this area as you have with respect to the project authorizations. And just to put a footnote here, or in parentheses, the main concern that the agencies have about a line item is the fear that they will be required to develop the same detailed justification, reprograming requirements, and contract adjustment processes, amending contracts, the whole procedure that relates to contracting.

I think that we would not see it either necessary or desirable to have all these detailed requirements apply in this area. They do not apply in other agencies where you have similar programs. And I don't think they need to apply here.

Then on the last page we suggested one advance agreement, a joint agency technical review, and a single overhead rate for I.R. & D. and B. & P., to ease the administrative burden to both Government agencies and the contractors.

I believe that pretty well summarizes it.

Mr. GUTMANN. I think that covers it, Mr. Staats.

Senator McINTYRE. You state that no single alternate proposal was supported by more than 1 or 2 of the 18 individuals. Doesn't this make a very strong case for retaining the DOD–NASA method?

Mr. STAATS. I think it makes a very strong case for needing to have the issue settled. Obviously, if the DOD practice were established by statute, then that would settle it. You can settle it in more ways than one. But I think all that this proposal emphasizes is the diversity of views of the subject, and the lack of agreement.

Senator McINTYRE. You state that in June 1975, GSA provided the Office of Federal Procurement Policy with an interim report in its efforts to develop an executive branch position on the treatment of I.R. & D. and B. & P. costs. GSA suggested four alternatives for consideration.

Were these discussed in your June 1975 report to the subcommittee?

Mr. STAATS. I can't answer that myself.

Mr. HEINBAUGH. If I may answer, Senator, the Commission on Government Procurement recommendation, exempting cost centers with 50 percent fixed-price commercial sales, was one of the alternatives that we sent out for comment for our report, and the responses were included in the report.

The interagency task group's position was not available when we sent out these alternatives, but we did discuss it in our report. And

we also discussed dissenting position 1 of the Procurement Commission in quite some detail, because that was the position that we continued to support.

Their fourth alternative was a general test of reasonableness and practicability, which was probably the defense arrangement before they got into advance agreements and relevancy tests.

Mr. STAATS. But Defense is not even supporting that fourth alternative now.

Senator MCINTYRE. If there were any of those reports that were made by GSA that you haven't commented on, would you please comment on them for the record.

I thought as you talked you indicated that there were various GSA reports you did comment on in your report for 1975, but some you may not have commented on.

Mr. HEINBAUGH. GSA, in summing up the alternatives, reported the comments that they received from agencies and private firms and individuals on the interagency task group's position. I am sure that all these positions have been discussed at one time or another. I don't believe any of them are new.

Senator MCINTYRE. Mr. Staats, you recommend that I.R. & D. agreements specifically authorize access to commercial records to the extent necessary for Government officials to determine the propriety of questionable charges. Should this be required by law?

Mr. STAATS. Yes. I should have added that to my list of changes in the legislation. We did cover that in our statement. We do not ask for unlimited access, but we feel that greater access to nonfinancial records, such as agreement with commercial customers is necessary to go behind situations like we had in the Pratt & Whitney case. Their financial records are not really very useful without that kind of information.

Senator MCINTYRE. You state your belief that if financial support by the Government continues, the Congress should clarify the policy by establishing the following guidelines: One, the purpose for which the Government supports I.R. & D.; two, the appropriate amount of this financial support; and three, the degree of control to be exercised by the Government over contractors' supported programs. DOD does not concur with your second and third proposed guidelines because these are executive management considerations for which flexibility of action must be retained to adapt to the many differences among contractors. What are your views of the DOD disagreement?

Mr. STAATS. We obviously disagree with them. And I think this disagreement was shared by the members of the Procurement Commission, at least 11 out of the 12. But we did have six members on position one, and five of us voted on position two, and the 12th member felt that the whole subject should receive further study. So we did have three different positions. But I can't really see a situation where we are spending this amount of money as being something that ought to be left entirely to the discretion of the executive. If this were money to be spent by the National Science Foundation, it would go through an authorization process, and through an appropriation process. NSF spends a good deal less money for its total budget than there is in I.R. & D.

Senator McINTYRE. You state that you agree with those unanimous views of the Commission on Government Procurement which; one, recognize that I.R. & D. and B. & P. expenditures are in the Nation's best interest to promote competition, advance technology, and foster economic growth; two, establish a policy recognizing I.R. & D. and B. & P. efforts as necessary costs of doing business; and three, provide that I.R. & D. and B. & P. receive uniform treatment, Government-wide, with exceptions treated by the Office of Federal Procurement Policy. Should any or all of these be made part of existing law?

Mr. STAATS. I have no problem with writing them in as part of a statement of the law. I believe as far as the OMB is concerned they have that responsibility by law now, and I doubt if it would be necessary to repeat that. But the first two parts of that I think would be very desireable to be put in as a statement of purpose in one section.

Senator PROXMIRE. I have a question I would like to ask at this point of Mr. Staats.

Mr. Staats, on page 11 in your prepared statement you say: "We received responses from 18 individuals and one industry association. The individual respondents represented Government, industry, and academia. All had direct working experience with I.R. & D. programs from one or more of these vantage points." Around then you gave us the score on the various alternatives. Would you give us the names—not necessarily how they responded, because of course that may be something that you wouldn't want to reveal, but the names of people and their qualifications and their background.

Mr. STAATS. I would be happy to supply that.

[The information follows:]

The following 18 individuals responded to our request for comments on alternatives to the present IR & D method:

Dr. Harold Brown, president, California Institute of Technology; formerly Director of Defense Research and Engineering;

James Carpenter, Science and Technology Policy Office, National Science Foundation; formerly with the Commission on Government Procurement;

Charles E. Deardorff, Directorate for Procurement Policy, Office of Assistant Secretary of Defense (I&L);

Rear Admiral Claude P. Ekas, Jr., Deputy Chief of Naval Material/Chief of Naval Development; foemerly Project Manager, HARPON, Naval Air Systems Command;

Joseph Garcia, Director, Pricing Division, Office of Procurement, NASA

Dr. Wayland C. Griffith, Director, Engineering Design Center, North Carolina State University;

Elliott B. Harwood, Corporate Manager, IR & D Activities, The Boeing Company; formerly Assistant Director, Plans and Policy, Office of Director of Defense Research and Engineering

Dr. D. Max Heller, Director of Research, Martin-Marietta Aerospace;

Dr. Bill B. May, President, Argosystems, Inc.;

Frederick Neuman, Deputy Director, Defense Contract Audit Agency;

Donald N. Pitts, Director, Government Business Policy, TRW, Inc.;

James W. Roach, Assistant Director for Engineering Policy, Office of Director of Defense Research and Engineering; formerly with the Commission on Government Procurement;

Edward F. Ronan, Comptroller, Optical Group, The Perkin-Elmer Corporation;

Vice Admiral H. G. Rickover, Deputy Commander, Nuclear Power Directorate, Naval Sea Systems Command;

Robert C. Seamans, Jr., Administrator, Energy Research and Development Administration; formerly President, National Academy of Engineering;

Arthur Schoenhaut, Executive Secretary, Cost Accounting Standards Board; formerly Deputy Controller, Atomic Energy Commission;

Joseph L. Smith, Director of Procurement, Energy Research and Development Administration; and

Dr. Norman Waks, Chief Management Scientist, The MITRE Corporation; formerly with Office of Director of Defense Research and Engineering.

Senator PROXMIRE. I do have questions for another witness who is in the room, and we can either call him up now or call him up later when the chairman finishes his questions.

Senator MCINTYRE. If it would be helpful to you, I have a number of other questions that I have to ask this panel for the record. We have a lot of questions for the record so why don't I ask Jack there to move out and—come up and answer a couple of questions and then go back.

Senator PROXMIRE. Fine. Mr. Heinbaugh, would you sit on the side and we will call you back.

Mr. Schoenhaut.

Mr. Schoenhaut is Executive Director of the Cost Accounting Standards Board, and an extremely able accountant.

Mr. STAATS. Mr. Chairman, I am the Chairman of the Cost Accounting Standard Board, and I would like to say a word about where we are with respect to the standards involving I.R. & D. and B. & P.

Actually we are just in a very preliminary state of research on this subject and we have had no discussions at all within our Board about it. So that neither Mr. Schoenhaut or I can comment substantively with respect to where we are coming out with regard to the standards in this area. We have done research on the subject. And we developed questionnaires and sent them out to about 50 companies. Our staff is presently in the process of analyzing the responses. I asked Mr. Schoenhaut today when he thought we would have a draft that we could consider in our Board. It is quite some time off. He estimates somewhere between a year and 18 months. So I don't believe that there is really very much that we can say here today that would be helpful to you on this subject. But I will be happy to have——

Senator PROXMIRE. Let me ask these questions, and then if you feel you are not prepared to answer now, fine, we will ask them later on when you are prepared.

Mr. Schoenhaut, the contractors argue that I.R. & D. are ordinary and necessary business expenses, and therefore legitimately charged as overhead. In the noncompetitive environment in which defense contractors operate, would you agree that decisions to spend money for I.R. & D. is really a capital investment kind of decision, and it should not be treated as an ordinary, necessary business expense?

Mr. SCHOENHAUT. Let me try to turn the question around a little bit, if I may. I do not think I could categorically answer the question yes or no. In a commercial environment where you have the competitive forces of the marketplace, there is a built-in control on how much a company will spend for I.R. & D. as well as many other things. And the funds that are expended are really coming out of profit. In the Government, negotiated contract environment, where there is not the same degree of competition, there are several situations in which the money must be spent to keep the company viable and growing. One way would be to spend it out of profit as they do in a commercial environment. Another way would be for the Government to contract for the effort in order to keep the company viable. And a third way would be to do it through overhead, which is what has been done for many years.

Senator PROXMIRE. Do you feel at the present time—and if not, I can certainly understand it—in view of what Mr. Staats has told us, do you have any position on whether it should be treated as an ordinary necessary business expense?

Mr. SCHOENHAUT. I don't think it is really an accounting question, Senator Proxmire. I am not trying to evade it. But I do think it depends on the degree of control the Congress wants to exercise over the expenditures.

Senator PROXMIRE. If you want to control it, what would be the way to treat it?

Mr. SCHOENHAUT. You could control it through direct contracting at a level of effort, or you could control it by insisting that it be a part of profit, and that some recognition of it be included in profit.

Senator PROXMIRE. You see, it is hard to control it if it is overhead, if it is another overhead item.

Mr. SCHOENHAUT. That apparently has been the experience of the Government up to now.

Mr. STAATS. I think that is what the problem is all about, if I may say so.

I would like to say here, though, Senator Proxmire, that it would be very helpful to our board to know whether Congress is or isn't going to legislate on this subject, because it will make a very substantial difference in terms of what kind of a standard we write.

Senator PROXMIRE. Neither Senator McIntyre nor I can tell you. We may have our own strong convictions that we would like to pass a bill, but we don't know whether we can get it out of the subcommittee, the committee, or the Senate, and passed by the House and signed by the President.

Mr. STAATS. I appreciate that. But all I am suggesting now is that since this is a matter that may be legislated upon, it will affect the timetable in which we will develop our standards. We will have a standard one way or the other. But the kind of standard we will write will depend a great deal on whether there is or there isn't new legislation on the subject. That is all I am saying.

Senator PROXMIRE. Mr. Schoenhaut, strickly as an expert accountant, do you agree that it would be preferable from the standpoint of better Government accountability to contract directly for I.R. & D.?

Mr. SCHOENHAUT. I personally think so, yes, sir.

Senator PROXMIRE. I have seen proposals for using some form of cost-sharing in the I.R. & D. program. For example, the Government would agree to contribute $1 for every dollar spent by the contractor on I.R. & D. How much confidence do you have that if cost-sharing were adopted the contractors would spend their own money on Government-related I.R. & D. rather than shifting other costs into the I.R. & D. account, and how difficult would it be for the Government to verify how the money was spent and how much would cost-sharing contribute to better cost control of the I.R. & D. program, in your view.

Mr. SCHOENHAUT. I think if you got into a cost-sharing arrangement there are precedents for that kind of an arrangement, in the Federal Aid Highway program, and other civil programs, where the Government does participate in a percentage of the costs incurred on given projects. Research would probably have to be done on those programs

to get the benefit of the best aspects of those programs in order to control the cost.

Mr. STAATS. We have a great deal of cost-sharing today in this program.

Senator PROXMIRE. What is that, sir?

Mr. STAATS. We have cost-sharing today in the I.R. & D. program, there is no question about that. That is demonstrated by the figures in terms of total cost and how much of it the Government picks up. And the converse, to take the other side, is that the Government is getting now a lot of benefit out of money which is spent by the contractors out of their profit. So you have cost-sharing today, there is no doubt about that.

Senator PROXMIRE. Can you document that? Can you give us any notion of how much cost-sharing it is?*

Mr. SCHOENHAUT. Sure, you can document it. But there is a second question; was it the right share? That is a judgment that I think may be made better if you have a specific appropriations review of the total. I think that is a part of the argument for it.

Senator PROXMIRE. Thank you, Mr. Schoenhaut.

You can step down and we will permit Mr. Heinbaugh to resume his place.

Senator MCINTYRE. Mr. Staats, considering that DOD, NASA and ERDA account for practically all of the Government I.R. & D. and B. & P. expenditures, why should a Government-wide policy be established? Why not continue with legislation that is unique to each agency?

Mr. STAATS. Well, even though the amounts are the largest in the three agencies that you referred to, the fact is that we think the Government should operate with a single face to each contractor. We think that this would be something that the contractors, by and large, would favor having a single policy instead of separate policies.

Senator MCINTYRE. In the face of very strong industry arguments, why do you suggest that the Congress consider the desirability of providing in advance agreements for the Government to receive rights to patents and technical data arising from I.R. & D., perhaps using the AEC sliding scale approach?

Mr. STAATS. This would happen only in the event that the legislation does not require a contract. You can have a line item without a contract. And one of the options would be to include a requirement for contracting or simply to provide for advance review, and a line item in the appropriation. I realize that the patent issue is a very sensitive one, and a very controversial one. We do not have general legislation on the subject of patents today, all we have is executive issuances, one going back to 1963 and one to 1971.

Senator MCINTYRE. A basic argument in favor of allowing I.R. & D. as a necessary business cost is to provide competitive sources for future procurements. Where a company has established a separate division for a unique system, such as the B–1, and direct research and development contracts are awarded to enable this division to develop and produce this system for a 10- to 15-year period, do you feel that the Government should pay for any I.R. & D. performed by such division?

*See letter to Senator Proxmire, dated Oct. 20, 1975, p. 166.

If so, how would payment of such I.R. & D. costs lead to competition for future business?

Mr. GUTMANN. Sir, I am not at all sure that the same division that produces the B–1 would be engaged in I.R. & D. But assuming it would, it seems to me the same rationale for allowing I.R. & D. under any circumstances would apply, that is, it is a necessary cost of doing business, it is necessary for a contractor to retain his competitive position. Now, again, it is simply a matter of what level of control the Congress wants to apply to those expenditures. Congress has the dilemma in that if it agrees that the independence of I.R. & D. is an important element, then the question comes, to what degree can you apply controls without diminishing the independence. We tend to believe that more controls are necessary than now exist.

Mr. FINE. Mr. Gutmann, with respect to the question on the B–1, here you have a case of a single cost center having been established by a contractor specifically to develop and produce a single major weapons system. As I understand it, that is the only work they do. And it is the only work they plan to do at that particular site. Do you know otherwise, incidentally.

Mr. GUTMANN. No, I do not.

Mr. FINE. Let's assume for the purposes of discussion that I am correct. Now, you no longer have a competitive situation there. So there is not a need for the purposes of competition to have I.R. & D. in so far as that division or cost center is concerned, recognizing that the contractors have cost entries for other geographically located plants where he does have a competitive element, and he does have other work which is unrelated and is perhaps unsusceptible to the normal approach that we discussed. Now, in the situation where you do have a single weapons system and no competition, a long-term program, perhaps 15 to 20 years, the Government now funds directly anything which it considers to be necessary in the way of developmental work relating to the B–1. There is no need for the contractor to use his own resources for this purpose in order to save the Government's performance requirements. However, it is my understanding that in the case of the B–1 the contractor does acquire reimbursement as part of either the existing contractor the followup production contract if and when it is awarded. In that sense can you reply to the original question?

Mr. GUTMANN. I would expect, Mr. Fine, that the I.R. & D. total is allocated to all cost centers, including the B–1, even though the I.R. & D. being performed at any point in time does not relate specifically to the B–1. And I must emphasize that I am in an area of conjecture here, I have not looked into the contractor's accounting system or its organization. But it would not surprise me to see some I.R. & D. apply to the B–1 program, as part of the contractors total business. I.R. & D. is an overhead item and is allocated proportionately to each element of his total business.

Mr. FINE. The question, then, boils down to whether there is equity in that kind of allocation, and whether the Defense Department is proper in reimbursing the contractors for those costs which are allocated to the B–1. I suggest in the interest of time that you look into that if you will and perhaps comment for the record.

Mr. GUTMANN. Very good. I will be glad to do so.

[The information requested follows:]

Under the presently recognized concept of IR&D, the R&D performed by a contractor in the current period to achieve the know-how to compete for future sales is properly charged off against the current year's sales or work in process of the contractor's products or services. This is the situation for the B–1 contractor, Rockwell International Corporation, and the B–1 Division.

Prior to 1973, Rockwell International was known as North American Rockwell Corporation. In 1972 North American Rockwell formed the B–1 Division and the Los Angeles Aircraft Division from the existing Los Angeles Division. At that time the B–1 program comprised about 90 percent of the Los Angeles Division's work. The objective of the B–1 Division is the accomplishment of the successive phases of the B–1 program. The role of the Los Angeles Aircraft Division encompasses the entire spectrum of R&D activities that can both benefit the B–1 and/or support future advanced aircraft system development and system activities that pursue new aircraft system contract acquisition.

Beginning with the contractor's fiscal year ended September 30, 1973, Rockwell International negotiated separate divisional ceilings for IR&D for its participating divisions with limitations on interchangeability between divisions. There is a common ceiling for the B–1 and Los Angeles Aircraft Divisions. These divisions, co-located at the Los Angeles facility, have separate functional management organizations, but share a common cost accounting center. The IR&D program is common to both divisions and is participated in by technical personnel from both divisions. The execution of the IR&D program is independent of organizational changes and personnel transfers.

The costs of the IR&D program are allocated through overhead to the total business of both divisions. The IR&D program proposed for the Los Angeles Aircraft and the B–1 Divisions for 1975 consisted of projects relating to advanced aircraft and supporting technology programs for the Government.

Rockwell's program illustrates the concept that over the long term it is reasonable to allocate IR&D through overhead to current business. According to Rockwell International's IR&D Technical Plan, the current B–1 program requirements and system specifications were finalized in the 1969–70 time period and were based on then current state-of-the-art technologies and concepts established during the mid-1960s. While the requirements are still valid, significant advancements have been achieved since that time in most technology areas. Therefore, investigation of both the technology impact at the total system level and the potential value of the B–1 in expanded roles are deemed valuable by Rockwell.

Also, Rockwell's current effort in flight and dynamic technology is part of a long-term plan initiated in 1973. A previous long-term plan completed in 1973 led to many capabilities which were subsequently incorporated into the B–1 air vehicle.

On the basis of the foregoing we believe that it is equitable for current contracts to bear an allocable share of IR&D costs because past contracts bore the costs of IR&D which helped to establish the B–1 technology, and current IR&D work potentially can both benefit the B–1 in expanded roles and have general application to future advanced aircraft system development, leading to new business.

Mr. FINE. On page 20 of your August 16, 1974 partial report, you state that you plan to explore the matter relating to seeking practicable means of estimating the amounts paid to contractors not meeting the $2 million ceiling criteria. Has anything been done about this?

Mr. HEINBAUGH. Mr. Fine, we went back and asked DOD to try again. And their answer to us was that they couldn't come up with anything that they thought would be worth putting on the record. Does that satisfy your interest in the matter?

Mr. FINE. It may not satisfy our interest, but we didn't know how else to go about it.

Mr. FINE. Does GAO have any other views as to what might be an approach which the Defense Department has not identified?

Mr. HEINBAUGH. I have no idea how we go about getting such a figure, except to assume that if some percentage of I.R. & D. and

B. & P. is included in the sales we know about, maybe the same percentage might be included in the sales that are not recorded by the DCAA. However, a lot of the total sales of DOD are probably not the type that bear I.R. & D. So I don't know how you could make a decision as to what sales would and what sales would not.

Mr. FINE. You state on page 19 of your June 5, 1975, report that "DOD's concern is that defense contractors not develop items in defense plants and then spin them off to other commercial divisions, depriving the defense plant of the additional sales that would tend to reduce indirect costs allocated to Government contracts." Do you agree with this concern?

Mr. HEINBAUGH. Mr. Fine, we agree with the concern to the extent that we made an effort to try and identify some of those situations. We went to contractors, we went to DCAA, we went to the plant representatives, and we did not come up with situations that indicate that it is widespread.

Mr. FINE. Do you believe, Mr. Staats, that in matters pertaining to I.R. & D. and B. & P. payments by the Government, small businesses are being treated less favorably than big business?

Mr. STAATS. I don't think we have had any special analysis to respond to that. But I think there is a good point that can be made, that small businesses do not share largely in the contracting business of the Government. And that is why we have section 8 and small business set asides. So I think it is logical to conclude that they are not getting very much out of I.R. & D. And besides, most of these small businesses are involved in competitive, advertised, fixed price procurements, and not very many of them are involved in negotiated procurements. The broader question which has not really been addressed is whether or not the Government should have a program to support technological innovation for industry as a whole. We are dealing here with one segment of American industry, that part of it which is engaged in Government contracting. So that really it seems to me you are touching on the broader issue—if these are in the nature of support, grants or whatever you want to call them, then isn't there a similar interest in ways of supporting industry generally to develop technological innovations?

Mr. FINE. Of course the National Science Foundation program does address that program.

Mr. STAATS. And so does ERDA, and other agencies as well. I am not suggesting that we don't have an overall program which is viewed by the Congress as to its broad objective.

Senator PROXMIRE. Why does not the National Science Foundation have an overall program? Why are there limits on that?

Mr. STAATS. Its charter is pretty broad but it does not have a program of the scope I am talking about. The GAO now is doing a review of this whole program. And we hope we will have useful suggestions to make to Congress on it.

Senator PROXMIRE. Why not locate that kind of a program in NSF? Or wouldn't that be the proper place to put it? After all, that is across a broad spectrum that would permit research that would be related to defense, industry, transportation, and whatever.

Mr. STAATS. I have no quarrel with the idea of putting it there. Commerce would be another possibility. But the so-called Rann program, research applied on national needs, does have this as part of its objective. But NSF would be a perfectly good place to locate it.

Mr. FINE. Mr. Staats, do you believe, referring to an earlier discussion, that with respect to cost-sharing, if the Government were to adopt a policy of matching dollar for dollar what the contractor were willing to provide, that this can be an equitable approach to the objective of R. & D. and B. & P.?

Mr. STAATS. I think I would personally favor something more flexible. Maybe that is what you have in mind also. It wouldn't have to be 50–50, in other words, that we usually have with respect to research grants. In the area of research grants and research contracts there do exist policies now that call for sharing by the recipient, depending in part on the Federal interest as against the institutional interest of the recipient of the grant.

Senator MCINTYRE. A few questions I would like to ask on the Pratt & Whitney case.

Your report of December 10, 1974,* concerned allocation of I.R. & D. costs for the Pratt & Whitney aircraft engine for the Boeing 747 aircraft, and is the basis for your recommendation, as stated in your current report on I.R. & D., that the Government have access to contractors' commercial records when needed to determine that costs are allowable. In his letter of March 25, 1975 to the subcommittee, commenting on the December report, Mr. Bennett, the Assistant Secretary of Defense for Installations and Logistics, states that the Navy contends that no recovery of costs is necessary as its advance agreements "were sound business transactions and were clearly in the Government's best interests." A copy of this letter will be inserted at this point in the hearings.

Do you agree with the DOD/Navy position? If so, how do you reconcile your position with the fact that GAO discussed the case with Navy contracting officials before the Navy executed the advance agreement in April 1972 for I.R. & D. with Pratt & Whitney?

Mr. STATTS. I guess a short answer to that is that we are not able to find out what basis the Navy has for making the statement that it was in the Government's best interests. I suppose if they were able to give us the specifics of that we might be able to discuss it with them. But I think that was our fundamental problem.

We do think, also, that if that were the case, then there should have been no reason why we could not have had access to the information which we sought to corroborate their position. But we were not able to get that.

Senator MCINTYRE. Mr. Bennett's letter states that he is considering the feasibility of requiring contractors with whom advance I.R. & D. agreements are negotiated to certify that costs incurred for I.R. & D. projects sponsored by or required in the performance of a contract or other arrangement will not be allocated to DOD contracts. Has GAO followed up on this?

Mr. GUTMANN. No, we are not aware of progress on that, Mr. Chairman.

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*See General Accounting Office Report to the Congress, December 10, 1974, p. 177.

Senator McINTYRE. Is there any intention on your part to follow up on Mr. Bennett's suggestion?

Mr. GUTMANN. Yes, I think we should.

Mr. STAATS. Would you like for us to supply something for the record on that, Senator McIntyre?

Senator McINTYRE. Yes.

[The information follows:]

Mr. Bennett's letter of March 25, 1975, stated that a certification was being considered. The Navy is now requiring such a certification. The Air Force, however, has elected to notify contractors in writing that the meaning of ASPR must be understood and adhered to. Evaluation of the two approaches and the matter of a single approach will receive consideration by the DOD IR&D Policy Council.

We believe that the Government must have access to contractors' commercial records to go behind the certification and determine which projects are unallowable because they are sponsored or required by a commercial contract. This does not mean that the Government should always examine these records or that the authority should be without limitation. But, when analysis of available evidence raises questions, this authority should permit examination to assess the propriety of IR&D charges to the Government.

Senator McINTYRE. Do you think that there should be a Government-wide policy covering patents and technical data resulting from I.R. & D., instead of a separate policy for DOD/NASA and AEC?

If so, should it grant the Government royalty-free licenses and data rights without regard to Government cost participation?

Mr. STAATS. This is an issue, as you imply, that goes beyond the question of I.R. & D. The Procurement Commission, of which I was a member, reviewed this. And I would just like to tell you where we came out. And this, I believe, was a unanimous view of the commission.

We felt that the 1971 policy, which was essentially the same policy of 1963, was generally along the right track. But we did feel that there should be some provision whereby the Government would have march-in rights where a contractor had been given a patent and then had not developed it. We felt that the Government's interest here, since the Government financed the research, was such that if the contractor did not develop that patent, then the Government ought to have a right to march in and either give the patent to somebody else or develop it themselves. That was a primary change that we suggested be made in the 1971 policy. But whether or not it is done by legislation, Senator, or whether it is a uniform policy promulgated by the Executive, I am not certain.

There are some statutory provisions which I believe, if I am not wrong, would have to be changed in order to get a uniform policy. But I do think there should be a uniform policy.

Senator McINTYRE. On page 17 of your June 5, 1975 report you state that the Government policy is to promote the commercial exploitation of patents derived from Government-sponsored work, even to the extent of granting exclusive licenses to companies which will undertake productive exploitation.

Do you support this policy?

Mr. STAATS. Yes, that is consistent with our position.

Senator McINTYRE. Why should the Government grant exclusive licenses to companies under any circumstances? Doesn't this contradict the objective of free and open competition?

Mr. STAATS. I think that is related to the question of whether there shouldn't be march-in rights. It was our feeling in the Procurement

Commission that the only way you are going to get a patent developed and have anyone willing to put out the capital to develop it would be to give him exclusive rights. By the same token, if he didn't go ahead with the development, the Government ought to have march-in rights.

Senator McINTYRE. On relevancy, do you recommend continuation of the present relevancy provision of section 203, limited to each agency's own determination, even if the Armed Services Procurement Regulation (ASPR) is established as the standard for Government-wide use.

Mr. STAATS. As long as it is a policy which is applied across the board—and we think the Office of Federal Procurement Policy has a responsibility—we would support the relevancy rule that is now in the statute. We do think there ought to be a review from time to time by the Office of Federal Procurement Policy and by the GAO as to whether or not a reasonable test of relevancy is involved. But in general we think the present rule, as set forth in section 203, is satisfactory.

Senator McINTYRE. Wouldn't the establishment of a requirement for Government-wide relevancy undermine the objective of this requirement?

Mr. STAATS. We think so.

We think the Government-wide test of relevancy is tantamount to no test at all.

Senator McINTYRE. Page 36 of your report states that DOD's mission is so broad that almost all efforts of defense contractors can be shown to have potential military relevance. If so, why bother with requiring a relevancy test either for DOD or Government-wide?

Mr. STAATS. As Mr. Gutmann previously pointed out—and we would be glad to supply this for the record—for four contractors that we reviewed, there must have been 15 or 20 different projects that were ruled out as nonrelevant. And I think this is a good discipline upon the Agency to have to make this kind of a judgment as a part of the advance agreement.

What we have said in our testimony is that this didn't necessarily reduce the cost to the Government, because the Government didn't pick up all the costs anyway. But it is a good discipline, and I think should be continued.

Senator McINTYRE. Page 40 of your report indicates that the estimated cost to DOD for administering the I.R. & D. program is $223,500 for negoatiation and $1,898,500 for technical evaluation, making a grand total of $2,122,000.

Do you believe that the investment in technical evaluation is wasted, considering that only 45 percent of the 1974 technical evaluations showed that the evaluators had specific knowledge of work in the area or on similar projects?

Mr. STAATS. I would say that that is a very small investment, considering the total of I.R. & D.

Do you want to comment on that?

Mr. GUTMANN. Yes. I would agree with that.

There is something close to $900 million being spent on I.R. & D. by the Government, and $2 million to look at that program in some depth. It doesn't seem too high a price to pay. The fact that the study of relevancy does not result in a great many things turned down I

don't think is all that important. One important benefit that comes to the Government as a result of these studies is that they have greater visibility of the various contractors' programs than they have had in the past. They can spot whether there is perhaps some duplication and overlap as between the contractors. And of course we have recommended that a data base and data dissemination system be improved for this purpose.

Senator McINTYRE. I want to thank you, Mr. Staats, and all of you for your testimony here. We will have a number of questions to submit to you for the record. And I also think that if you want to elaborate further on your testimony, that is certainly permissible.

Thank you all very much.

(Subsequent to the hearing the following information was received from the Comptroller General:)

COMPTROLLER GENERAL OF THE UNITED STATES,
Washington, D.C., October 20, 1975.

DEAR SENATOR PROXMIRE: During my testimony of September 17, we discussed briefly the matter of contractors' sharing in the costs of IR&D and B&P. However, the subject was not dealt with in depth, and because of its importance, I would like to submit some amplifying comments.

There is cost sharing now to the extent that a contractor incurs costs in excess of the amount accepted by the Government for allocation to all of the contractor work performed—Government and commercial. The figures reported for 1974 illustrate the results of the Government accepting less than the total costs incurred.

	I.R. & D.	B. & P.	Total
Reported by DCAA:			
Costs incurred by 90 contractors	$1,148,000,000	$546,000,000	$1,694,000,000
Accepted by Government	901,000,000	504,000,000	1,405,000,000
Contractors' share (not accepted)	247,000,000	42,000,000	289,000,000
DOD's share of accepted	457,000,000	351,000,000	808,000,000
NASA's share of accepted	41,000,000	41,000,000	82,000,000
Sharing of I.R. & D./B. & P.:			
DOD's share (percent)	39.8	64.3	47.7
NASA's share (percent)	3.6	7.5	4.8
Other customers' share (percent)	35.1	20.5	30.4
Accepted by Government (percent)	78.5	92.3	82.9
Contractors' share (percent)	21.5	7.7	17.1
Costs incurred (percent)	100.0	100.0	100.0

The above table shows that the 90 major contractors cumulatively shared more in IR&D than they did in B&P.

Individually, contractor sharing varies. Some contractor cost centers have their programs accepted in full. Most absorb some of their costs, depending on the results of advance negotiations. As shown above, the average is around 20 percent for IR&D. However, a few contractors absorb larger amounts. For example, Pratt & Whitney Aircraft Division of United Aircraft Corporation, which was discussed at length during the hearing, in 1974 had 46 percent of its IR&D program accepted by the Government and absorbed the other 54 percent of the costs itself. DOD's share amounted to 35 percent of the accepted amount and 16 percent of the total costs incurred by Pratt & Whitney. About 33 percent of Pratt & Whitney's sales in 1974 were to DOD.

Cost sharing was one of the factors that made it difficult to determine how much of Pratt & Whitney's IR&D work on the engine for the 747 aircraft was paid for by DOD. Our figures were calculated on the assumption that DOD shared pro rata in every project in the entire program, not on the basis of selected projects. The Navy contended that it recognized the commercial application of Pratt

& Whitney's IR&D programs by accepting 66 percent and paying for only 27 percent of Pratt & Whitney's incurred costs from 1968 through 1973.

Advocates of cost sharing have suggested that a stated percentage of sharing be required of every contractor from the first dollar of cost incurred. Others have pointed out that a single percentage applied uniformly to all contractors would not be equitable for some contractors and could increase the Government's share in other cases. They suggest that a minimum share be established, at least for larger contractors.

Regardless of whether cost sharing is required or not by the Government-wide policy established for IR&D and B&P, we wanted to make the record clear that there is cost sharing taking place under the DOD/NASA method.

Sincerely yours,

ELMER B. STAATS,
Comptroller General of the United States.

PREPARED QUESTIONS FROM SENATOR MCINTYRE

[Questions submitted by Senator McIntyre with response from Mr. Staats.]

Question. Mr. Staats, you began your statement on a very sobering note. Now, five years after you last testified before the R&D Subcommittee and with five years of experience under Section 203 of P.L. 91-441, increased regulation by DOD, and studies by GAO, DOD, and the Commission on Government Procurement, you state that a solution satisfactory to all has not been reached . . . and that the Government's support of contractors' IR&D remains a controversial and emotional issue.

Do you consider that the Government would be better or worse off if no legislation had been in effect for the past five years?

Answer. Public Law 91-441 brought a measure of discipline and uniformity to DOD's procedures for controlling costs of its major contractors. The relevancy requirement has had a minimal effect in reducing payments to contractors but did cause contractors and the military to pay closer attention to military technology in, respectively, proposing and reviewing IR&D programs.

The statutory requirements for negotiating advance agreements and performing technical reviews have resulted in the preparation of programs in more detail. Military personnel have had greater visibility over the technical content of projects and have been better able to track project results from year to year. While most contractors incurred increased administrative costs, some acknowledged improvements in their management stemming from those expenditures.

The requirement that an annual report be submitted to the Congress has provided disclosure of costs incurred by major defense contractors and paid for by DOD. Senator McIntyre's analyses of DOD's data for insertion into the Congressional Record have been instrumental in making information available to the entire congressional membership.

Whether the Government would be better off if there had been no legislation is of course a subjective judgment. We believe that the legislation has served to get contractors and DOD working together to establish a system which is an improvement over the system that was in effect prior to the enactment of Public Law 91-441.

Question. You state that industry believes that the Government benefits by having access to more R&D than it pays for because other customers as well as the contractor also share in the cost.

Do you share this belief?

Doesn't industry benefit more than the Government by having access to more R&D that the Government pays for?

Answer. In 1974 DOD technically reviewed contractors' IR&D programs amounting to more than $1.1 billion. Over 90 percent of the projects were found to be relevant to DOD's operations. DOD's share of the cost was $457 million. Therefore, DOD considers that it had access to twice as much technical effort as it paid for.

Conversely, industry had $901 million of incurred costs allocated to contracts of customers, while using $247 million of its funds. Thus, the major defense contractors also benefitted by being able to recover most of the cost of maintaining their viability and competitive position through sales to Government and commercial customers.

There appear to be benefits on both sides, but the exact amounts are not measurable with any preciseness.

Question. You state that some agencies, as a policy, do not allow IR&D or B&P because of the nature of the products or services furnished by their contractors. Will you identify these agencies and comment on their practices?

Answer. The Department of Housing and Urban Development (HUD) advised us that it did not allow IR&D and B&P expense to its contractors. Contractors providing research efforts for HUD generally were small businesses, such as management or consulting firms, which did not normally have requirements for IR&D. Occasionally, HUD contracted for services from large businesses which had sizeable IR&D programs and in those instances such costs were negotiated or excluded from the procurement costs on an individual baiss.

At the time of the IR&D hearings HUD had not commented on the proposal of the interagency task group that the policies and procedures of the Armed Services Procurement Regulation be made the standard for the executive branch.

The Department of Health, Education, and Welfare (HEW) follows a policy which allows B&P costs of the current accounting period as an item in the indirect cost pool in accordance with applicable cost principles of the Federal Procurement Regulations. Generally it is HEW's policy not to allow IR&D costs as either direct or indirect costs.

An exception to this policy on IR&D is made when HEW awards a contract to a profitmaking contractor doing most of its business with DOD, and the HEW contract represents a small portion of the contractor's total business. Under this condition, the contract could expressly provide for these costs. If it does not, these costs, including their appropriate share of indirect and administrative costs, would be unallowable.

HEW takes this position because many of its contracts and grants directly support research and it feels that IR&D is not appropriate for agencies which directly support research as one of its major objectives.

HEW advised the Office of Federal Management Policy in March 1975 that it is opposed to the recognition of IR&D costs as proposed by the interagency task group report and recommended that HEW's present policies be continued.

IR&D and B&P costs are not significant in Department of Commerce procurements. Such costs are not incurred on most of its contracts and grants. However, when IR&D and B&P costs are included, either directly or indirectly, in a cost proposal or in a statement of costs incurred, those costs are examined for reasonableness, allocability and allowability in accordance with the terms of the agreement, the applicable cost principles and any advance the contractor has entered into the Government. In those situations where Commerce allows IR&D, it does so to the extent it gains something from it directly or indirectly.

The Department of Commerce advised the Office of Federal Management Policy that it does not concur with the recommendation of the Commission on Government Procurement or the proposed position of the interagency task group without a more thorough study and recommends that the Federal Procurement Regulations be left substantially as now written.

Question. In describing the alternatives to the DOD-NASA method, you state that of the 18 individuals and the one industry association respondents questioned, most favored retaining the DOD-NASA method. How many of the 18 individuals favored retaining this method and how do they break down Government, industry and academia?

Answer. Ten of the individuals expressly favored retaining the DOD-NASA method. One other considered only alternatives with fewer controls to be as acceptable as the present method. Another rejected all of the proposed alternatives. Six of these individuals were from the Government, four from industry, one from academia, and one was an official of a professional engineering society.

Question. You state your belief that the agencies will be able to achieve a reduction in IR&D costs and better control if early in the R&D cycle they make their problems known to industry without stating preconceived solutions. Is this being done to a significant degree now by the military departments and DDR&E? Is DOD in effect being too influential in directing contractors' IR&D efforts?

Answer. The Commission on Government Procurement reported in connection with its review of the acquisition of major systems that the technological efforts of the military services and contractors' IR&D efforts were not oriented to problem statements of mission needs and goals and program approvals at the Secretary level. Also, there was no early systems-level competition from which the most promising system candidates could be chosen for exploration. The Commission found that the amount of technological and cost competition in systems acquisition is dependent on how mission needs and goals are stated in the first place, the level of their approval, and whether the needs and goals are stated independently of solutions.

DOD is considering changes in its policy in conjunction with its review of the proposed circular drafted by OMB on major system acquisitions. The circular, sent out for comments to executive departments on August 28, 1975, calls for achieving the optimum system through encouraging innovation and competition by the solicitation of concept design alternatives from all competent sources. Requests for concept design proposals would explain the agency's mission need, time, cost and capability goals, and operating constraints. Each offeror would propose his own technical approach, main design features, and alternatives to time, cost, and capability goals. In the conceptual and less than full-scale development stages, contractors would not be restricted by a wide spectrum of detailed Government specifications and standards.

The circular proposes that contracts covering relatively short time periods at planned dollar levels be used during the uncertain period of identifying and exploring alternative system concepts. A timely technical review of alternative concepts should be made to effect the orderly elimination of those least attractive.

A report released recently by the Chairman of the Joint Subcommittee on Economic Growth concluded that the desirable coupling of technology with user needs requires that Government programs start out on a problem-oriented basis and that the problem-solving, user-need emphasis be carried over into all aspects of Government policymaking. Such an approach, the report said, should make use of experimental development and incremental funding—the R&D strategy of the more successful private firms—to increase the range of technological options and to improve the environment for technological progress and innovativeness, including the entry of new firms.

Although the Commission on Government Procurement was unable to document that Federal agencies were solving mission problems by using their early technical R&D money to create competing alternative choices at a systems level for exploration and possible demonstration and procurement, we believe that this most innovative part of systems acquisition can be conducted quite inexpensively with the use of small creative design teams, short time span contracts, and limited commitments on both the Government and industry sides.

Question. How significant is the problem of industry having to deal with different agencies for IR&D and B&P instead of the Government presenting one face to industry?

Answer. Any organization—a large contractor, small businessman, university, not-for-profit research laboratory—contracting with the Federal Government has its administrative effort reduced to the extent that the various agencies have uniformity in their regulations, cost principles, contract clauses, requirements for record keeping and data submissions, etc. In addition to the normal administrative costs of contracting, contractors with significant IR&D and B&P programs have the added burden of preparing technical plan brochures, participating in technical evaluations and relevancy reviews, and negotiating advance agreements with Government representatives.

It certainly has been economical on both sides for contractors doing business with the three military services and NASA to have negotiated a single advance agreement after a joint evaluation. We believe it could not be otherwise if the contractor's other Government customers were to participate in the established procedure.

Question. Question No. 1 of the 22 questions asked of GAO was "What accounts for the increase in ratio of IR&D costs to defense sales from 2.73% in 1968 to 3.83% in 1972, . . . even in the face of declining defense sales?" Your answer on Page 1 of your partial report dated August 16, 1974, adjusts these percentages for comparability but still shows a significant increase compared with declining sales. Can you explain why this occurs and why it shouldn't follow the trend of sales to DOD?

Answer. Contractors use IR&D to develop new concepts, new and improved products, and ultimately increased sales. In most cases this cycle takes place over a period of years. Therefore, it does not seem unreasonable that, at the beginning of a period of declining sales, IR&D efforts would be increasing to bolster a forecasted sales decline. As declining sales continue, B&P efforts increase to take advantage of the technical knowledge gained through IR&D, while IR&D would continue. In such a situation, it could be that IR&D and B&P would not level off until sales were well on the upswing.

Another factor which could cause the IR&D trend to not parallel the sales trend is that looking at DOD's IR&D alone may be too narrow a view. In any particular year, a contractor with heavy sales volume to customer A may be heavy in IR&D with customer B and B&P with customer C. The ratios would

vary from year to year. Over a long period allowable costs by one customer would tend to equate with its share of the sales of the contractor. For the 4-year period 1971–74, DOD's share of accepted costs for IR&D and B&P was 58 percent. During the same period, the portion of major contractors' sales that were to DOD was also 58 percent.

Question. On page 76 of your report you state "DOD acknowledges that creating and maintaining multiple-bidding sources in the various technologies necessarily results in some duplicative effort among contractors in any particular area. DOD believes that this duplication provides alternative approaches to a problem and is thus beneficial to some degree." Do you agree with this use of IR&D funds paid by the Government?

Answer. Multiple exploration of the options that are available to meet an agency need could provide a basis for the agency to narrow down alternative solutions and pursue those it prefers on a direct basis. DOD has the means to discourage outright duplication by downgrading contractor's programs which are not innovative and lessening its support of those contractors. Having a choice of solutions of varying costs could favorably impact on DOD's procurement expenditures. To this extent, somewhat similar technical efforts could be beneficial.

Question. You state on Page 27 that DOD has estimated that it has reported 80 to 85 percent of the IR&D costs over which it has access to records for the purpose of audit, and that the Defense Contract Audit Agency (DCAA) stated that an inordinate amount of effort would be required to obtain detailed data for the balance of costs since thousands of small companies were involved. Do you agree with that position or would you recommend a change in procedures?

Answer. DCAA includes in its report contractors which incur total costs of $15 million or more on negotiated flexibly priced contracts (as opposed to firm fixed-price contracts) or require more than 4,000 man-hours of direct audit effort per year. The report also includes contractors negotiating advance IR&D and B&P agreements even if the above criteria is not met. DOD continues to believe that most of the IR&D and B&P costs that it can control are reported since many of the contracts not included would be firm fixed-price or based upon rates set by law.

If the Congress desires this information, DOD could explore the feasibility of adding another element of a contractor's operation to the reporting system on contracts included in DOD's data bank.

Question. You state on page 44 of your June 5, 1975 report, that the value of a requirement for submission of certified data with IR&D proposals in your opinion seems to instill some discipline in program preparation; also that DOD is considering an ASPR change which would establish as a policy the requirement that certified cost or pricing data be submitted with IR&D proposals. Do you agree with this plan?

Answer. While there may be some question as to the legal value of a certification for a project which will not be paid for directly and may not be performed in the scope originally planned, we believe that it causes the contractor's investigators and the Government evaluators and negotiators to consider the cost implications of the project. It also could provide DOD with a tool for questioning future proposals if a contractor consistently presents incorrect project costs.

Question. Question 12 of the list of 22 questions asked GAO to identify specific developments and projects made by the top 25 contractors receiving IR&D amounts, and data relating to patents. Your study provides much in the way of narrative but little data. Why haven't you been more responsive to this request?

Answer. As our work progressed it became evident that we could not comply literally with question 12 and identify developments or other results of projects of the top 25 contractors over a 5-year period. It was estimated that this would involve examining in detail well over 1,000 projects for each of the 5 years. The required manpower would have been staggering and the reporting voluminous, assuming that we were able to describe each project in nontechnical terms. Industry's technical papers needed 200 pages to document 48 examples of benefits (major systems, subsystems, new components, and technology advancement) from IR&D.

When we looked at the IR&D projects of four contractors for a 2-year period, we found other reasons why it was not feasible to be more responsive. For those projects which would ultimately become or contribute to developments, even a 5-year time span was too short, and for the great number of those that represented knowledge which contributed indirectly to many other projects, tracing the impact was a time-consuming task.

We identified some examples of specific products or developments to which IR&D projects contributed. But, we could not practicably produce an evaluation of a total IR&D program for a specified period which would enable a cost-benefit evaluation. We do not believe that it is possible to demonstrate in tangible terms numerically or otherwise that a dollars worth of benefit has been received for a dollars worth of cost.

Question. The current ASPR provides that Bid and Proposal costs *will* include technical costs incurred to specifically support a contractor's bid or proposal and may include administrative costs such as the non-technical costs for physical preparation of technical proposal documents. Thus contractors have the option of including or excluding administrative costs involved in preparing technical proposal documents. Under such circumstances it would seem to be impossible to make any valid comparisons between contractors. In your capacity as head of the Cost Accounting Standards Board, please comment on whether a single uniform system would improve management of IR&D/B&P. If so, is CASB taking any action to eliminate the present dual system?

Answer. ASPR allows a contractor the option of not separately identifying and classifying the administrative costs of proposal preparation as B&P costs, provided it is done in accordance with the contractor's normal accounting practice. The Cost Accounting Standards Board, which has been charged with promulgating cost accounting standards to achieve uniformity and consistency in the cost principles followed by defense contractors and subcontractors under Federal contracts, is in the preliminary stages of research on standards for IR&D and B&P. When the standard or standards on IR&D and B&P are issued by the Board, they will be designed to achieve increased conformity and consistency in the manner in which the cost of IR&D and B&P is accounted for.

Question. Inasmuch as the purpose of IR&D is to enable the company to compete for future business and as the amount devoted to IR&D is discretionary to the company, it has been argued that IR&D is in effect a profit factor. Since IR&D is included in the company's overhead costs which are subject to the profit factor for a contract, and the amount of IR&D therefore is being increased by the profit factor, should IR&D be allowed as an element of cost with an addition of profit?

Answer. To the extent that IR&D is recognized as a normal cost of doing business and allowed as an overhead cost, it should be treated like any other overhead cost and allowed with the addition of profit.

Question. As you know, DOD has opposed placing a monetary ceiling on IR&D and B&P on the basis that it would be impossible to administer. Yet when legislation was enacted in 1969 to limit DOD's spending for IR&D/B&P to 93% of what "would otherwise have been spent," the amount actually spent turned out to be 93.6% of the 1969 figure. And when a ceiling of $625 million was proposed in the legislation leading to the FY 1971 appropriations, the FY 1971 expenditures reported were only $619 million. Based on this experience, don't you agree that DOD control of a ceiling amount authorized for IR&D is feasible?

Answer. We have no information as to whether the amounts spent in these particular years were controlled or the results were coincidences. The figure included only those amounts reported by DCAA and, therefore, did not represent control of all of the amounts expended annually.

Question. DOD has used the CWAS (Contractors Weighted Average Share) concept as a means of eliminating the need for reviews and audits where they believe the contractor bears sufficient risk. Do you feel that contractors who qualify under CWAS should be exempted from the need for negotiation of advance agreements?

Answer. CWAS is a technique set forth in ASPR for determining and expressing numerically the degree of financial risk a contractor has assumed. To become CWAS-qualified, a contractor must operate in a competitive environment where awards are based primarily on price. It is therefore, assumed that competition for available contracts would restrict expenditures to those determined to be essential to economic survival.

CWAS, if applied to IR&D, could be administratively easier to administer than the present negotiation and technical evaluation procedures but would likely result in less control over costs. Critics have said that the amounts determined to be allowable under a computation mechanism would not take into consideration the technical merit of an IR&D program nor the expertise of the contractor.

The interagency task group which studied the Procurement Commission recommendations reported that the laborious data collection and rating calculation requirements and the number of cost principles to which CWAS is not applicable

have worked against its widespread use. Nevertheless, the task group recommended that the executive branch consider the application of CWAS to IR&D and B&P cost principles. We understand that DOD has undertaken a study to revise CWAS.

Question. The GAO report discusses on pages 64–67 the possibility of substituting for the present system a method of using a profit factor for IR&D cost recovery. The report points out that this approach received many favorable comments because it would eliminate the need for advance agreements and give contractors the incentive to eliminate unproductive egineering efforts, while permitting industry the opportunity for original thinking. Conversely, this approach was criticized for possibly leading to reduced allowances for IR&D and loss of technical visibility. What are your views on this approach? If a profit approach should be adopted, do you feel that the rate of profit should be computed on the basis of sales or on the company's invested capital?

Answer. The Commission on Government Procurement reported that the philosophy of an approach which would increase the profit level sufficiently to reimburse contractors for IR&D and B&P is sound. The Commission believed that most everyone would agree that, since profits are used at the contractor's discretion, this approach should eliminate controversial areas such as relevancy, uniformity, etc.

However, the Commission felt that there were obstacles in establishing a profit level. The use of judgmental factors on an individual basis would be difficult to administer, and use of arbitrary percentages could be inequitable. Also, profits are vulnerable to contract negotiations and the Commission saw difficulty in convincing the Congress and the public that a contractor's profits should be increased.

The agency would have to enter into contractual arrangements to require contractors to furnish the technical data that is made available under the present system.

The primary objective of considering contractor-invested capital in negotiating profit is to reduce reliance on capital provided by the Government by motivating contractors in invest their own funds in cost-reducing equipment and facilities. We support this goal. In our report, "Defense Industry Profit Study," dated March 17, 1971, we recommended that uniform Government-wide guidelines be developed for determining profit objectives for negotiating Government contracts that will emphasize consideration of contractor capital required.

DOD's Profit '76 study might be a vehicle for considering the possibility of including IR&D and B&P as a profit factor.

Question. Analysis of DOD reports of IR&D and B&P expenditures for the past several years reveals that some of the major defense contractors receive between 85 and 100 percent of their expenditures for IR&D and B&P. In these cases, little or none of the contractors' own funds are invested in these programs although they will realize very substantial benefit. Do you agree that a maximum of perhaps 75 percent should be established as the Government's share of IR&D and B&P costs? Do you believe that an alternative formula should be considered which would limit the Government's share to 50 percent with a dollar ceiling so that the principle of cost sharing may become a reality?

Answer. In answering the question, we are assuming that the reference to major defense contractors receiving between 85 and 100 percent of their expenditures for IR&D and B&P means the amounts reported by DCAA as accepted by the Government for allocation to all of the contracts of the contractor—DOD, other Government, and commercial.

From 1971 through 1974, major defense contractors had about 83 percent of their IR&D and B&P costs accepted for allocation to the contracts of all customers. This meant that the contractors absorbed the costs of the remaining 17 percent. Some contractors had 100 percent of their programs accepted for allocation. DOD's share of the accepted amount varied with each contractor depending on the ratio of DOD sales to sales to other customers. DOD paid for 58 percent of the accepted costs, which amounts to 47 percent of the incurred costs.

Thus, the contractors' share of IR&D and B&P costs was 17 percent, DOD's share was 47 percent, and the other customers, Government and commercial, shared 36 percent. Over the 4-year period, 58 percent of the major contractors' total sales were to DOD.

Last year, when the 1973 cost figures were reported by DCAA, we made an analysis of the impact on DOD's share if the Government had accepted for allocation no more than 75 percent of contractors' costs. All other factors were assumed to have been the same. We found that DOD's costs for IR&D and B&P would have been reduced by about $130 million.

It might not be necessary to have a 50-50 cost sharing arrangement with every contractor. We would favor a more flexible approach.

Question. On November 11, 1974 you addressed a letter to the Secretary of Defense on the subject of establishing guidelines for consideration of contractor invested capital in negotiating profit. Your letter indicates that you support this goal and recommend that this policy be made mandatory.

Do you feel that IR&D and B&P payments by the Government also should be based on invested capital instead of on sales?

Do you consider that Defense industry profit margins are adequate and reasonable based upon invested capital?

If so, don't you agree that DOD's Profit "76 study plan should recognize that increasing profits may not be the means for strengthening our competitive industrial base and reducing the cost of systems and hardware?

Answer. As our letter indicated, we support the use of contractor-invested capital as a basis for determining profit on negotiated contracts. If it should be decided that IR&D and B&P are considered to be elements of profit, then we believe that invested capital should be a basis for determining the amount of such payments.

We reported the results of our study of defense industry profits to the Congress in March 1971. We found that when profit was considered as a percent of total capital investment (total liabilities and equity but exclusive of Government capital) used in generating sales, profit before income taxes on defense work was 2.8 percent lower than on comparable commercial work. When profit was considered as a percent of equity capital investment of stockholders, there was little difference between the rate of return for defense and commercial work.

Since profits on DOD contracts averaged 5.6 percent lower than comparable commercial work when measured as a percentage of sales, we concluded that consideration should be given to capital requirements, as well as to such other factors as risk and complexity of the work, in determining profit objectives for negotiated contracts where effective price competition is lacking.

On October 2, 1975, in a letter to DOD, we noted the view expressed by DOD officials that unless contractors are given new incentives, including higher profits, there will be a continuing erosion of the industrial base upon which our Nation's defense ultimately depends. We said that it seems to us that, rather than being detrimental, this process may be healthy evidence of the competitive marketplace in action. The long term effect could be the elimination of marginal producers and the development of a nucleus of efficient defense contractors. We believe that the matter of how much capacity or how many contractors are needed to maintain a strong national defense should be considered prior to reaching any decision on whether profits on defense work should be changed.

Question. Questions 17 through 22 of the set of questions originally transmitted to you deal with the various possibilities for controlling total DOD payments for IR&D and B&P. Your report of June 5, 1975 discusses these in detail but does not specifically provide a GAO position or recommendation. Will you address each of these now and indicate your position since this represents the essence of the entire study?

Answer. Our report discussed many possibilities for controlling IR&D and B&P payments, including the variations embodied in questions 17 through 21. After due consideration, we took a position in support of the views represented by dissenting position 1 of the report of the Commission on Government Procurement. Dissenting position 1 proposed to continue advance agreements, technical reviews, and relevancy tests required by section 203, provide access to commercial records, and encourage contracting for R&D. Our recommendation was that the Congress should issue a policy statement regarding the emphasis it believes should be applied to IR&D and B&P.

In response to questions at the IR&D hearings, we suggested that if the Congress wants more visibility, accountability, and control that is afforded by the present method, it could consider a line item control. We believe that it is not impossible for an agency to come before the Congress and outline its total requirement, the general areas it wants to emphasize. The Congress would then have the option of putting on a ceiling or giving guidance in a committee report. There ought to be full disclosure, an advance agreement by the Congress as it considers the budget, and an opportunity to establish limitations or give directions.

The Congress could establish a line item in the appropriation with IR&D and B&P being contracted for directly. This method would require IR&D to compete with other research activities for RDT&E funds and to be considered along with R&D in competing with other DOD activities for DOD funding in the budget.

In the absence of evidence of waste or lack of benefit under present practice, we assume that the amount of the line item that could be justified would be about the same as the Government now shares through the operation of the IR&D advance agreements.

The Government could contract directly with contractors for the IR&D it wants. The work statements for these contracts could be based on the IR&D brochures that are currently prepared by companies and are the basis of the IR&D advance agreement negotiations. The method of contracting for this effort should be a level-of-effort type contract with flexibility on the part of the contractor to start projects, stop them, revise and reprogram them as necessary, thus giving the contractor a measure of independence.

All companies could be covered by the direct contracting for IR&D effort or as an alternative direct contracting could be limited initially to those major contractors presently required to negotiate advance agreements. Smaller contractors not now covered by advance agreements could continue to receive reimbursements under the present method.

We feel that there is no need for an independent IR&D agency (question 22) now that the Office of Federal Procurement Policy has been established and has statutory responsibility for overall direction of procurement policies, regulations, and procedures for the executive branch.

Question. DOD and NASA policies do not require contractors to furnish property rights in inventions or data resulting from IR&D. Do you believe that this should be required at least in those cases where the Government pays for a major part of the IR&D costs?

Answer. About 10 years ago we raised the question of the Government acquiring patent rights if it supported IR&D. DOD took the position that it should not expect any more in the way of patent rights than the rights any other customer would receive when paying for products at a price which included costs of IR&D. Even if the contractor's sales were predominately to the Government, DOD felt this rule should apply provided the expense was allocated to all customers on a fair and reasonable basis.

DOD has continued to maintain this position. AEC had a policy of obtaining patents and rights based on participation in the particular project. When we inquired in 1970, AEC had not participated in any project more than 20 percent. AEC said in February 1974 that it had identified a small number of instances in which AEC had received licenses, licenses had been tendered, or applications had been made by contractors for patents where AEC was entitled to rights.

The proposals for an executive branch position on IR&D deriving from the Procurement Commission's and other studies are silent on patent and data rights. We suggested that, in formulating a Government-wide policy, consideration be given to having the contractors provide the Government with licenses and data rights. We felt that these rights would be based on the agencies' cost participation, similar to the ranges that AEC had, but recognizing that AEC participated on a project basis while DOD and NASA share in a total program.

DOD advised that, while it continues to support its present policy, it is studying its experience with this policy particularly as it impacts on the Departments' ability to use any innovation developed under IR&D in any DOD system or equipment.

We take the position that there should be a uniform patient policy applicable to all agencies. Further, there should be consistency in the policy whether the patents and technical data originate in IR&D or in contract R&D.

We support a policy of promoting commercial exploitation of patents derived from Government-sponsored work, even to the extent of granting exclusive licenses to companies which will undertake productive exploitation. The Procurement Commission found that a contractor will invest the capital to develop a patent only if he is granted exclusive rights. However, the Government should be provided march-in rights. If the contractor does not develop the product covered by the patent and the Government has helped substantially in financing the research, it is in the Government's interest to march-in and give the patent to someone else to develop the product covered by the patent or to allow the Government to develop the product itself. In the interest of increasing competition the Government should have the right to take the patent and have a second contractor develop the product represented by the patent.

Question. Do you believe that the present system involving the Government data bank is working satisfactorily or do you recommend any change?

Answer. The IR&D data bank located at the Defense Documentation Center was expanded July 1, 1975, to include all contractors with whom DOD negotiates

advance agreements. The data required of the contractors is identical to that prepared for their technical plans. DOD's R&D activities are required to query the bank before starting new in-house or contracted efforts. We believe these changes should greatly improve the usefulness of the IR&D data bank and satisfy our past concerns.

Question. Do you consider that the data bank system is equitable from both Government and industry points of view?

Answer. Under today's system the Government has access to listings and synopses of all IR&D projects being performed by major contractors. In terms of the benefits received by the Government from the data bank system as it now operates, compared to the contribution made by the Government in the reimbursement of contractors' IR&D, neither the presence nor absence of equity has been established. The Government does not have access to the technical data or royalty-free licenses emanating from these projects. It was for this reason that in our report of June 5, 1975, we recommended that any new legislation on this subject provide for "* * * provisions granting the Government royalty-free licenses and data rights * * *."

Question. If a Government-wide relevancy requirement was established, could this be effectively administered? If so, how? By whom? At what estimated cost?

Answer. We support agency relevancy. If the Congress desires it, Government-wide relevancy could be administered in the same manner that the three military services administer the potential military relevancy requirement.

An agency with which the contractor does a significant portion of his business would act as lead agency. Lead agency representatives would review each of the contractor's projects for technical content and at the same time establish relevancy of the work to the agency's operation. Each of the other agencies having contracts with the contractor would participate in the technical review and have an opportunity to examine projects for relevancy to its function. Those projects not accepted by at least one agency would be declared nonrelevant to the Government' interests.

We have no way of estimating what the cost would be. It would depend on how many contractors would meet whatever Government-wide criteria are established for requiring advance agreements, technical evaluations, and relevancy tests. While it costs DOD about $2 million annually to technically evaluate the programs of its major contractors, the relevancy test is only one aspect of the evaluation.

Question. In commenting on technical evaluation of contractors' brochures, you state that Defense personnel performing these evaluations have minimal or general knowledge of, and interest in, the particular projects they are asked to evaluate, and that DOD should take corrective action. Has DOD taken such action? Has this practice been detrimental to the interests of the Government?

Answer. In commenting on our report of June 5, 1975, the Director of Defense Research and Engineering informed us by letter dated August 26, 1975, that DOD concurred in our suggestion and the DOD IR&D Technical Evaluation Group of the IR&D Policy Council is studying alternative ways for improving the effectiveness and efficiency of the technical evaluation process. The results of this study will be presented to the Policy Council within the next few months.

We do not believe that this practice has been detrimental to the interests of the Government. The technical evaluation is just one of many factors considered in arriving at a final agreement. Technical evaluations have satisfied the requirements for determining relevancy.

Question. You state you would like to see consideration given to ways to produce a better exchange of technical information on the results of DOD's IR&D program for use by other agencies. Have you any specific suggestions?

Answer. The single best source of technical data on the IR&D programs of major defense and space contractors is the DOD IR&D data bank located at the Defense Documentation Center. Starting July 1, 1975, this bank is to include data on the projects of all contractors with whom DOD negotiates an advance agreement. We would like to see consideration given to making these technology sources available to agencies for use in solving their problems while at the same time respecting the contractor's proprietary rights in the information.

Question. Your report of December 10, 1974, concerned allocation of IR&D costs for the Pratt-Whitney aircraft engine for the Boeing 747 aircraft, and is the basis for your recommendation, as stated in your current report on IR&D, that the Government have access to contractors' commercial records when needed to determine that costs are allowable. In his letter of March 25, 1975 to the Subcommittee, commenting on the December report, Mr. Bennett, the Assistant

Secretary of Defense for Installations and Logistics, states that the Navy contends that no recovery of costs is necessary as its advance agreements "were sound business transactions and were clearly in the Government's best interests."

What is GAO doing about this Pratt-Whitney case in view of your recommendation that the Government seek a price adjustment for the year 1972 and subsequent?

How much do you estimate it is costing the Government if such a price adjustment is not obtained?

Answer. We estimated that up to $87 million incurred by Pratt & Whitney from 1968 through 1973 could have been for development of an engine which, in our opinion, Pratt & Whitney was already required to develop because of agreements with commercial customers. We recognized, however, that the lack of clarity in ASPR prior to 1972 and the Navy's actions in accepting the costs prevented the Government from recovering costs for 1968–71.

We, therefore, recommended that the Secretary of Defense determine how much of the technical effort on the engine for 1972 and subsequent years was not allowable and to obtain price adjustments where appropriate. We estimated the costs incurred to be $10.9 million for each of 1972 and 1973.

The Navy decided that all of the 1972 development work was allowable as IR&D because none of it related to engines under contract. The Navy like GAO, did not have access to the contractor's commercial contracts but relied on the contractor's cost data. Because we had raised the issue, the Navy contracting officer negotiated Pratt & Whitney's 1973 IR&D ceiling at the 1972 level instead of $10 million higher as requested by the contractor.

The Navy, commenting on our report in March 1975, said that its knowledge and acceptance of Pratt & Whitney's IR&D program estops price reductions based on unallowability of these costs. Also, the Navy's adherence to a literal interpretation of ASPR would probably not have resulted in the negotiation of lower ceilings for 1973 and 1974.

Our information is that the General Counsel of the Navy has decided that there is no basis for recovery under the circumstances. The payments were made with the full knowledge of both parties and in consideration of the value of the contractor's program and the minimum investment of the Government.

REPORT TO THE CONGRESS

Independent Research And Development Allocations Should Not Absorb Costs Of Commercial Development Work B-164912

Department Of Defense

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-164912

To the Speaker of the House of Representatives
and the President pro tempore of the Senate

We are reporting that Department of Defense allocations to independent research and development should not absorb costs of commercial development work.

We made our review pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

We are sending copies of this report to the Director, Office of Management and Budget; the Secretary of Defense; and the Secretaries of the Navy and Air Force.

Comptroller General
of the United States

Contents

ABBREVIATIONS

ASPR	Armed Services Procurement Regulation
DCAA	Defense Contract Audit Agency
DOD	Department of Defense
GAO	General Accounting Office
IR&D	independent research and development

COMPTROLLER GENERAL'S REPORT TO THE CONGRESS

INDEPENDENT RESEARCH AND DEVELOPMENT ALLOCATIONS SHOULD NOT ABSORB COSTS OF COMMERCIAL DEVELOPMENT WORK
Department of Defense B-164912

D I G E S T

WHY THE REVIEW WAS MADE

In a review of defense contractors' independent research and development (IR&D) programs, GAO noted that Pratt & Whitney Aircraft Division, United Aircraft Corporation, had devoted over half its IR&D efforts to developing various models of its JT9D engine for the Boeing 747 and McDonnell Douglas DC-10 aircraft.

Because large amounts of money are involved and because the Department of Defense (DOD) contracts for military engine research and development directly with Pratt & Whitney, GAO wanted to find out whether DOD should have absorbed a share of the IR&D costs of the commercial JT9D engine.

FINDINGS AND CONCLUSIONS

Questionable allowance of JT9D engine development as IR&D

GAO questions DOD's acceptance of up to $87 million of JT9D development costs as IR&D from 1968 through 1973, because the development was sponsored by, or required in the performance of, contracts with commercial customers and therefore did not meet the Armed Services Procurement Regulation (ASPR) definition of IR&D.

Pratt & Whitney refused GAO access to its commercial agreements for JT9D engines; therefore, GAO could not verify how much of the JT9D development was sponsored by, or required in the performance of, these agreements.

Nevertheless, GAO thinks much of this development cost should not have been allowed as IR&D because the engines had not been developed when Pratt & Whitney contracted to deliver them to Boeing and McDonnell Douglas. (See p. 5.)

Pratt & Whitney said all JT9D development charges were allowable as IR&D under its interpretation of the ASPR definition because its production contracts did not specifically require, and thus did not sponsor, the development. (See p. 8.)

GAO believes that technical effort should not be considered IR&D if a company has an order requiring explicitly or implicitly that research and development be performed before that order can be filled. (See p. 10.)

The Navy made two interpretations of the ASPR definition of IR&D: Before a 1972 revision, the JT9D development was allowable as IR&D because the work was not sponsored by a contract; for 1972 and later, the revision made such development unallowable as IR&D if the work was required to fulfill the terms of a contract. (See p. 8.)

GAO believes both the Navy and Pratt & Whitney have interpreted "sponsored" too narrowly. According to the Navy, Pratt & Whitney alone assumed responsibility for the JT9D development and there was no evidence that Boeing

--provided financial support,

--assumed any risk, or

--exercised control over the development.

However, the agreements between Boeing and Pratt & Whitney contained elements of sponsorship.

--Boeing established the requirements to be met.

--Pratt & Whitney, by discontinuing development, would have provided a basis for legal action by Boeing.

--Boeing provided firm orders which lessened Pratt & Whitney's financial risk.

--Boeing assumed some risk by entering into binding commitments to its customers. (See pp. 11 and 12.)

Questionable allowance of other development as IR&D

From 1969 to 1971 about $3.9 million of JT8D-15 development costs were allowed as IR&D and allocated to DOD contracts. During 1972 and 1973 Pratt & Whitney undertook projects estimated to cost $26.4 million to develop or improve three stationary powerplants. GAO believes orders may have existed for these engines before development. If so, these costs should not have been allowed as IR&D. (See ch. 3.)

Price adjustments for unallowable IR&D efforts

Pratt & Whitney said retroactive price adjustments would be inequitable and inappropriate as the amounts were paid to Pratt & Whitne on advance understandings properly entered into between Pratt & Whitne and the Government. The Navy agreed that its past actions have estopped the Government from attempting to recover unallowable costs paid.

GAO believes that, while these costs should not have been allowed under ASPR either before or after the change effective in 1972, the lack of clarity in the pre-1972 regulation, together with the Navy's actions, estops the Government from recovering these costs. Costs incurred after the ASPR change are clearly unallowable, and any such costs included in IR&D are recoverable. (See p. 15.)

Inadequate reviews of IR&D programs

DOD needs to improve its administration of IR&D to insure that technical effort included therein is not sponsored by, or required in the performance of, commercial contracts. This need is evident in DOD's review of Pratt & Whitney's IR&D program in which the Navy did not determine whether the JT9D program met the definition of IR&D even though:

--Pratt & Whitney's 1968 IR&D program was the largest ever proposed to the Navy.

--An Air Force official in 1971 questioned the allowability of JT9D development as IR&D.

--GAO discussed the definition of IR&D with the Navy contracting officer in early 1972. (See p. 19.)

DOD believes no change is needed in its IR&D review procedures as the current IR&D definition clearly excludes work required by a commercial contract. GAO disagrees.

To be fully effective, DOD must require that the parties responsible for reviewing IR&D programs--technical review teams, Defense Contract Audit Agency, and contracting officers--insure compliance with the difinition of IR&D. (See p. 23.)

Access to records

The Government must have access to commercial records to verify whether technical effort is unallowable as IR&D because it is required by a commercial contract. Pratt & Whitney denied access to both GAO and the Navy.

Access is particularly needed for IR&D projects such as those described in chapter 3. Publicity given to them was small in comparision to the JT9D program. These projects may have been required under contracts with commercial customers. Pratt & Whitney said there were no commercial orders for one of these projects but did not comment on the other three. Accordingly, an independent determination on their allowability is not possible without access to the specific requirements of the commercial contracts.

Pratt & Whitney said GAO had demonstrated that, under GAO's interpretation of IR&D, there was no need for authority to examine commercial contracts to determine if an order existed.

But GAO believes the Government must have access to these contracts to determine which projects are unallowable because they are sponsored or required by a contract. In GAO's opinion, audits of multimillion-dollar matters cannot be left to newspaper articles or project descriptions in IR&D brochures.

DOD should provide for access through a clause in its IR&D advance agreements with contractors. A similar position was expressed by five of the 12 members of the Commission on Government Procurement in its recent report.

This does not mean the Government should always examine contractors' commercial records or that the authority should be without limitation. Instead, when analysis of available evidence raises questions, this authority should permit examinations to assess the propriety of IR&D charges to the Government. (See pp. 22-24.)

RECOMMENDATIONS

The Secretary of Defense should determine how much of Pratt & Whitney's technical effort in 1972 and later is not allowable as IR&D because it was explicitly or implicitly required in the performance of commercial contracts, and obtain price adjustments where appropriate. (See pp. 16 and 18.)

To improve the administration of IR&D, the Secretary of Defense should

--provide specific guidance to Government review teams and the Defense Contract Audit Agency to insure that technical effort allowed as IR&D is not sponsored

by, or required in the performance of, commercial contracts and

--expedite action under consideration to require that IR&D agreements specifically authorize access to contractors' commercial records for determining whether IR&D costs are allowable. (See p. 24.)

AGENCY ACTIONS AND UNRESOLVED ISSUES

Although agreeing that the 1972 ASPR revision made commercial development, such as that for the JT9D, unallowable if done to fulfill the terms of a contract, the Navy decided that Pratt & Whitney's 1972 JT9D development was not related to engines under contract. (See p. 9.) In GAO's opinion, some contractually required, and thus unallowable, development was charged to IR&D in 1972. (See p. 15.)

Because access to commercial records raises some far-reaching issues, DOD believes that an access provision should be extensively reviewed before it is adopted and that statutory authority may be necessary. DOD will consider the recommendation in IR&D reviews. (See p. 23.)

MATTERS FOR CONSIDERATION BY THE CONGRESS

This report should assist Committees and individual Members of the Congress concerned with legislative oversight of DOD's administration of IR&D programs.

CHAPTER 1

INTRODUCTION

Defense contractors perform independent research and development (IR&D) to provide the technical capabilities, concepts, and information needed to meet anticipated customer demands for new and improved products. The Department of Defense (DOD) recognizes IR&D as a necessary business expense and shares in its cost.

Pratt & Whitney Aricraft Division, United Aircraft Corporation, has developed various models of its JT9D engine for the Boeing 747 and McDonnell Douglas DC-10 aircraft. From 1968 to 1973, the effort to develop this engine was allowed as IR&D and part of these costs were allocated to defense contracts. Because this was a commercial engine, we wanted to find out whether DOD should have absorbed a portion of the development costs.

Pratt & Whitney refused us access to its commercial business records. Nevertheless, we pieced together the events that took place, and their effect, from United Aircraft Corporation annual report; Government records; company newspaper; the public press; and discussions with Pratt& Whitney, and Government officials.

Before 1968 Pratt & Whitney absorbed the cost of developing commerical engines, such as the JT9D. In 1968 the Navy and Pratt & Whitney began negotiating annual advance agreements to share the costs of an IR&D program. These agreements limit IR&D costs to be shared and provide that they will be treated as general and administrative expenses and allocated to commercial and DOD work on the ratio of total manufacturing costs.

Although new commercial engines are developed under Pratt & Whitney's IR&D program, military engines are usually developed under specific contracts with separate contracts for production engines. On December 31, 1973, the naval plant representatives was administering 29 active DOD contracts totaling $97 million for research and development of military products by Pratt & Whitney.

CHAPTER 2

QUESTIONABLE ALLOWANCE OF JT9D DEVELOPMENT AS IR&D

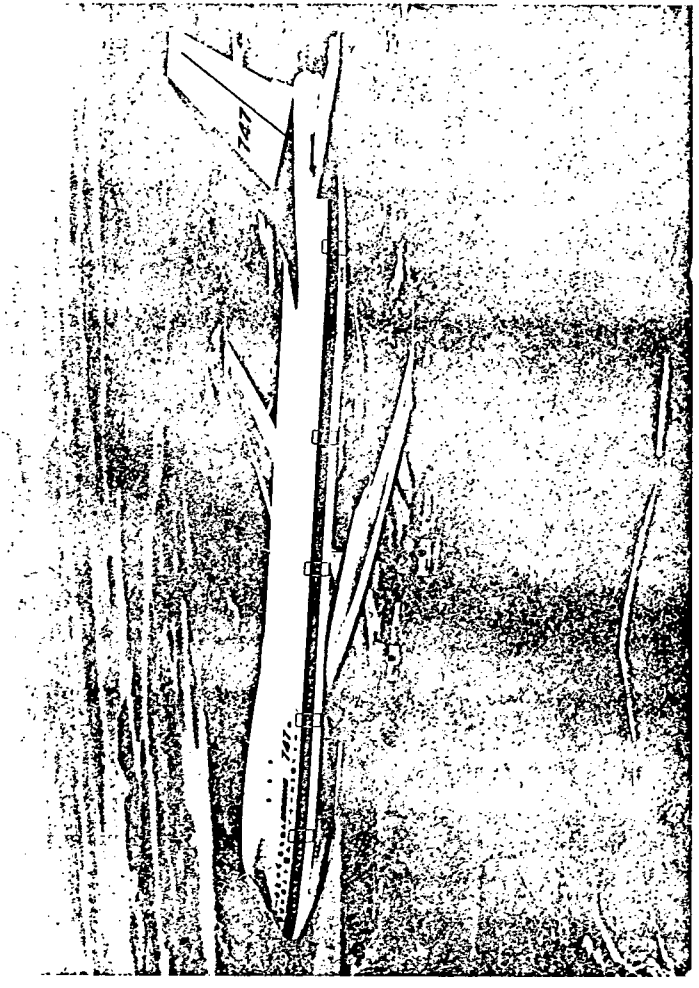
We question DOD's accepting allocations of up to $87 million for JT9D development costs from 1968 through 1973 because, in our opinion, the technical effort was performed to meet the requirements of agreements between Pratt & Whitney and airframe manufacturers. We believe these costs should have been borne by Pratt & Whitney.

The following table is an analysis of JT9D development costs from 1965 through 1973 and Pratt and Whitney's total IR&D costs from inception of the IR&D program in 1968 through 1973. Of the $566.1 million incurred for all IR&D projects, about $306.9 million, or 54 percent, was for the JT9D engines. We estimate that up to $87 million of JT9D development costs was allocated to DOD contracts under IR&D agreements from 1968 through 1973.

Pratt & Whitney Aircraft Division
IR&D and JT9D Development Costs

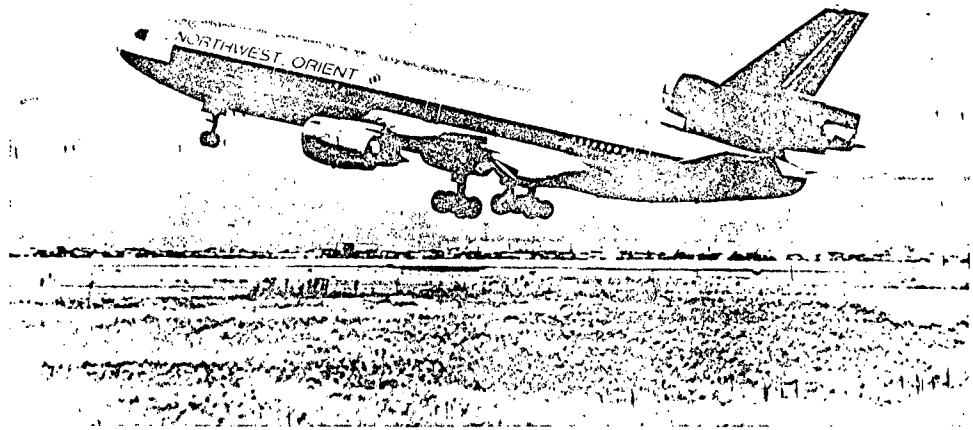
	JT9D development costs				
	Wholly absorbed by Pratt & Whitney	Charged to IR&D and shared by Pratt & Whitney	DOD	Total	Total IR&D costs
	(millions)				
1965	$ 2.1			$ 2.1	
1966	21.5			21.5	
1967	59.4			59.4	
Total	$83.0			$ 83.0	
1968		$ 51.5	$20.2	$ 71.7	$103.9
1969		31.6	18.9	50.5	81.7
1970		34.6	13.5	48.1	82.5
1971		31.6	12.6	44.2	74.4
1972		28.8	10.9	39.7	94.5
Total		178.1	[a]76.1	254.2	437.0
1973		41.8	10.9	52.7	129.1
Total		$219.9	$87.0	$306.9	$566.1

[a]Calculation of DOD share made by GAO with the same rationale as used by United Aircraft Corporation in annual reports to stockholders. Navy calculated the DOD share differently and arrived at a total of $48.9 million. (See page 14.)



BOEING 747 POWERED BY FOUR PRATT & WHITNEY JT9D ENGINES

(Photo Courtesy of Pratt & Whitney)



MCDONNELL DOUGLAS DC-10 POWERED BY THREE PRATT & WHITNEY JT9D ENGINES

(Photo courtesy of Pratt & Whitney)

COMMERCIAL ORDERS FOR JT9D ENGINES

Through 1973 Pratt & Whitney had delivered a total of 1,301 JT9D engines to Boeing for model 747 aircraft, to McDonnell Douglas for model DC-10 aircraft, and to various airlines.

The Boeing Company

In 1965 Boeing and Pratt & Whitney lost the competition for the military's C5A airframe and powerplant. However, in November 1965 Boeing proceeded with a development schedule for the 747 aircraft. Also, in 1965 Pratt & Whitney began design and configuration studies for the JT9D engine using experience gained in developing high-performance turbofan engines, including the engine proposed for the C5A competition.

In April 1966 Pan American World Airways, Inc., agreed to purchase the first Boeing 747 aircraft. Twelve other airlines also ordered 747s, and a total of 93 aircraft were on order at the end of 1966. These purchase agreements included Boeing's comprehensive guarantee on 747 performance, covering such aspects as fuel consumption, range, and altitude.

Also in April 1966 a business agreement between Boeing and Pratt & Whitney detailed the terms and conditions for Boeing's purchase of JT9D engines. The parties agreed to special terms relating to the initial production of JT9D engines, such as prices, delivery schedules, quantities, and detailed engine specifications. These specifications were developed by Pratt & Whitney in response to Boeing's engine requirements, including weight, size, heat, noise level, and fuel consumption.

At that time, neither the 747 airframe nor the JT9D engine had been fully developed. Boeing was responsible for delivery of 747 aircraft which met its performance guarantees to the airlines whether Pratt & Whitney succeeded in developing the engine or not. According to Boeing officials, if Pratt & Whitney had not met the agreed-to requirements and Boeing could not have delivered the aircraft, the airlines would have looked to Boeing for redress, and Boeing would have turned to Pratt & Whitney to make good.

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Boeing originally negotiated purchase of a 41,000-pound-thrust JT9D-1 and renegotiated the thrust requirement with Pratt & Whitney to 42,000 pounds later in the year. In the IR&D proposal for 1968, Pratt & Whitney said the objective of the JT9D development program was to develop and deliver a 42,000-pound-thrust engine by the end of 1968. The proposal did not mention that Pratt & Whitney had already agreed to deliver a 42,000-pound-thrust engine to Boeing.

In July 1967 Boeing negotiated the purchase of an increased thrust JT9D-3 engine rated at 43,500 pounds. The first production engine with this thrust rating was delivered in April 1969.

Later versions of the JT9D delivered to Boeing were outgrowths of the JT9D-3. To correct problems experienced with the engines delivered, Pratt & Whitney modified the JT9D-3 and shipped the first production unit of this modified version (the JT9D-3A) on December 31, 1969.

In August and September of 1967, Boeing discussed with Pratt & Whitney the development of a 45,500-pound-thrust engine to accomodate heavier versions of the 747 aircraft. Purchase orders were subsequently placed for this engine and Pratt & Whitney delivered the first production unit (the JT9D-7) on July 13, 1971.

In 1970 and 1972, respectively, Boeing and United Aircraft Corporation[1] entered damage claims against one another arising from the use of JT9D-3A engines in 747s. In announcing settlement of these claims, United Aircraft's annual report for 1972 states:

> "We are pleased to report that early in 1973 the managements of United Aircraft and The Boeing Company jointly announced the withdrawal of their claims against one another arising out the use of the JT9D-3A engine in the 747. As part of the agreement, our Pratt & Whitney Aircraft Division will develop a new, advanced model of the JT9D, designated the JT9D-70, capable of providing thrust up to

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[1] Pratt & Whitney is a division of United Aircraft Corporation.

> 60,000 pounds. Boeing will offer the 747 with the advanced engine for deliveries commencing in late 1975."

Early in 1973 Seaboard World Airlines ordered three 747s powered by JT9D-70 engines. Development costs of the JT9D-70 are being charged to IR&D. Development of advanced JT9D engine models is continuing in 1974 and is being charged to IR&D.

Boeing officials reviewed this and other pertinent sections of the report and had no major disagreements.

The McDonnell Douglas Corporation

In October 1968 United Aircraft entered into an agreement with McDonnell Douglas Corporation to provide JT9D engines for its wide-bodied, three-engined DC-10 aircraft. Presumably, McDonnell Douglas included specific performance requirements in its agreement for these engines which had not been developed at the time McDonnell Douglas agreed to purchase them. Pratt & Whitney agreed to assume up to $100 million of the costs of incorporating the JT9D engine in the DC-10.

Pratt & Whitney shipped the first production engine (the JT9D-15) for the DC-10 in June 1972. This engine, subsequently redesignated the JT9D-20, is essentially the same as the JT9D-7 with external parts rearranged to fit the DC-10 airframe. The costs of developing the JT9D-15 were charged to IR&D.

DOD REGULATIONS ON IR&D

Until 1972, section 15-205.35 (c) of the Armed Services Procurement Regulation (ASPR) stated,

> "A contractor's independent research and development is that research and development which is not sponsored by a contract, grant, or other arrangement."

This section was amended effective January 1, 1972, and now reads,

> "A contractor's independent research and development effort (IR&D) is that technical effort

> which is not sponsored by, or required in performance of a contract or grant * * *."

The DOD official who originated this change stated that the additional words, "or required in performance of," were not intended to broaden or change the definition of IR&D but just to clarify it. (See p. 9.)

PRATT & WHITNEY AND NAVY INTERPRETATIONS

Neither Pratt & Whitney nor the Navy agrees with the conclusion that much of the JT9D development work should not have been allowed as IR&D because it did not comply with the ASPR definition.

Pratt & Whitney contends that its practice since 1968 of charging the development costs of commercial engines, such as the JT9D, to IR&D is proper and allowable by ASPR because the production contracts do not specifically require, and thus do not sponsor, development of the engine. Pratt & Whitney acknowledges that the 1972 ASPR revision merely clarifies the preexisting definition but argues that acceptability of technical effort as IR&D still hinges on the word "sponsored." It stated:

> "* * * Sponsorship denotes one party's assumption of liability for the obligations of another, i.e., a surety relationship. We assume that your office is satisfied that our customers do not assume such a liability as to the development costs simply by placing production orders for commercial engines with us. * * *"

The Navy made two interpretations of the ASPR definition of IR&D. The Navy believes that, for the period prior to 1972, the words "sponsored by a contract" defined IR&D as research and development work for which a company alone assumed responsibility and for which no other party had accepted responsibility in the event of failure. According to the Navy, the JT9D development before 1972 was allowable as IR&D because Pratt & Whitney alone assumed responsibility for the development. There was no evidence of financial support from, or assumption of risk by, Boeing; and Boeing did not exercise control over the development.

The Navy considers that the 1972 revision, which added the words "or required in performance of," changed the meaning of ASPR and made development, such as that for the JT9D, unallowable if the work had to be accomplished to fulfill the terms of any existing contract. However, the Navy decided that all 1972 JT9D development was allowable as IR&D because none of the technical effort was related to engines under contract. (See p. 15.)

In our opinion, the interpretation of the ASPR definition of IR&D by Pratt & Whitney, and by the Navy for the pre-1972 period, is too narrow. Both interpret "sponsored" in the strictest dictionary sense of a surety relationship, that is, one party formally agreeing to be responsible for another's (in this case Pratt & Whitney's) failure to perform. Both maintain that the JT9D development was allowable as IR&D because only Pratt & Whitney had accepted responsibility in the event of failure. We believe the term "sponsored by" must be given a broader meaning. The added words "or required in performance of" provide such a connotation which, as explained below, was always intended.

The Navy contends that the definition must have changed because, under legal principles, added words are presumed to add meaning unless another intent can be established. The Navy discounted the statement of the DOD official who originated the revision that only clarification was intended.

REVIEW OF ASPR FILES

The ASPR case files and the files of an ad hoc committee of DOD officials who proposed this revision show that only clarification was intended.

The DOD official who originated the revision did not remember specifically when or why concern was first expressed over the definition, but isolated cases had turned up indicating a need for some clarification. He introduced the thought while acting as secretary to an informal DOD committee that was working on a new cost principle for IR&D and bid and proposal expenses.

In late 1967 the informal committee presented a proposed cost principle to the ASPR Committee, which sent it out in draft form to industry and Government agencies for comment in January 1968. It defined IR&D as:

> "* * * that technical effort which is not sponsored by, or in support of, a contract * * *"

Various organizations commented on different parts of the proposed cost principle. Only the Council of Defense and Space Industry Associations commented specifically on the additional words "or in support of." The Council was concerned that the new wording might preclude technical effort broadly related to a contract or grant. It suggested that ASPR not be changed and observed that:

> "* * * both Government and industry clearly do not intend to have IR&D effort defined as including that specific effort required to be performed as part of the scope of a particular contract or grant * * *."

The informal committee considered the Council's objection to the new wording and eventually decided on the words "or required in performance of" to clarify the IR&D definition. The explanation to the ASPR Committee stated:

> "It is the intent of this change to convey the concept that any work which must be accomplished in order to fulfull contractual requirements is a contract cost."

There was no mention of any intent to change the definition of IR&D as suggested by the Navy. Moreover, there was no indication that anyone interpreted the meaning of "sponsored" as narrowly as the Navy.

Apparently the ASPR Committee viewed the additional wording as a clarification because it did not designate the wording as a change, as it did for other revisions when the IR&D cost principles were published. If the ASPR Committe had intended such a major change in meaning as that suggested by the Navy, it would have noted that intent in its records.

OUR INTERPRETATION

The definition of IR&D in effect through 1971 was established in 1959 when ASPR was completely revised. We believe this definition, as clarified by the 1972 revision, excludes not only technical effort explicitly required by a research and development contract but also that effort

implied by the terms of--that is, "required in performance of"--a production contract. We do not mean that all technical effort should be disallowed simply because a buyer agrees to purchase a product if and when a seller successfully develops it. Rather, research and development ceases to be independent when the performer contracts to deliver a still-to-be-developed article to a purchaser's requirements.

Boeing's procedures support our view that technical effort should not be considered IR&D if a company has an order requiring, explicitly or implicitly, that such effort be performed before that order can be filled. Like the JT9D engine, the 747 airplane itself was not developed in 1966 when Boeing agreed to deliver 747s to Pan American World Airways. But, unlike Pratt & Whitney, Boeing did not charge airplane development costs to IR&D once orders for the airplane materialized. Instead, these costs were charged to a 747 product development account and were not allocated to the Government.

We believe that the important question is, what characteristics make research and development effort "independent" and thereby allowable as IR&D? Because ASPR defines IR&D as technical effort which is "not sponsored by a contract," the issue has centered on the meaning of the word "sponsored."

Sponsorship is clear when the Government or a commercial customer awards a research and development contract specifying the work to be done. Technical effort on such a contract is clearly not allowable as IR&D. Sponsorship also exists, in our opinion, in the case of a production contract that implicitly requires research and development to satisfy the requirements for production articles--such as the agreements between Boeing and Pratt & Whitney for JT9D engines. In either case, the factors which suggest sponsorship are a loss of independence by the performer of the research or financial support and assumption of risk by, or benefit to, the buyer of the production article.

Loss of independence

The agreements with Boeing had a determining influence over the JT9D development. Both parties knew that development was required before production engines could be

delivered. Pratt & Whitney was not free to discontinue the project, and its product had to conform to the detailed specifications contained in the agreement for production engines.

Boeing officials told us that Boeing was obligated to deliver airplanes to its customers and that Pratt & Whitney, in turn, was obligated to deliver engines to Boeing. If Pratt & Whitney did not deliver, the airlines would seek redress from Boeing. This demonstrates a loss of independence by Pratt & Whitney, since to discontinue development would give Boeing a basis for legal action.

Financial support

There can be little doubt that the agreements with Boeing and McDonnell Douglas greatly lessened Pratt & Whitney's financial risk in the JT9D development. Pratt & Whitney had firm orders for 1,140 JT9D engines totaling about $1 billion before the first model was fully developed in 1969.

Assumption of risk

In our opinion, Boeing assumed some risk on JT9D development when it agreed to deliver airplanes with these engines. Conversely, Pratt & Whitney, by entering into these agreements with Boeing, lessened the risk that it would have had, had it developed the engine solely on its own.

One might claim that Boeing, by subcontracting the engine to Pratt & Whitney, passed along its risk for engine development. However, if Pratt & Whitney had failed and had become insolvent, Boeing would have had to look to its own resources to meet its obligations to the airlines.

Benefits

The direct benefit of JT9D development to Pratt & Whitney customers is obvious. It allowed them to meet contractual obligations and earn revenues that otherwise might have gone to competitors.

ARMED SERVICES BOARD OF CONTRACT APPEALS DECISION

The Navy, in supporting its position on allowability of the JT9D development, cited a 1966 decision of the Armed Services Board of Contract Appeals.[1] The Navy concluded that the decision made the JT9D development clearly allowable as IR&D. We disagree.

In this case, a contractor had obtained partial financing of certain projects from private utility companies and associations of utility companies. The project costs in excess of this financing were included as IR&D, which an Air Force contracting officer had disallowed. The contractor appealed the Air Force's determination to the Board.

The Board explored the meaning of sponsored in the definition of IR&D at some length, stating:

> "* * * we must try to determine what that section of ASPR means. The words of the section [15-205.35(c)] themselves do not solve the problem, and, unfortunately, we have found, or been directed to, little else which does. * * * Some independent research on our part has not brought to light anything which would qualify as meaningful legislative history of section 15-205.35(c) of ASPR. * * *"
>
> * * * * *
>
> "At a minimum, the clause was intended to insure that a contractor performing research and development work would not be paid twice for its effort, i.e., once under a contract covering the work directly, and a second time, in part at least, by an overhead markup resulting from research and development costs applied to all of the Government contracts which the contractor had." (Underscoring supplied.)

In expanding on this, the Board interpreted sponsorship as being somewhere between any financial support and total financial support of a research project from outside sources.

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[1]ASBCA No. 10254, June 28, 1966.

The Board stated that sponsorship could turn on something not connected entirely or directly with money, such as, for whose purpose was the project undertaken, who controlled the project, or who would benefit from it. Thus, the Board defined sponsorship in much the same way that we do.

Although the Board ruled in favor of the contractor, it noted that it might have decided otherwise if the Government had presented its case differently. We believe that the Board's 1966 decision supplied some amplification of the definition of IR&D which the Navy should have considered in allowing the JT9D development as IR&D.

IMPACT OF JT9D DEVELOPMENT COSTS ON DOD CONTRACTS

The Navy used a different method of calculating the dollar effect of JT9D development on DOD contracts from that we used. The Navy contended that the annual IR&D ceilings were set at amounts lower than Pratt & Whitney proposed because of the commercial nature of the JT9D engine. Therefore, the Navy considered that DOD shared only the amount of JT9D development costs which remained after all IR&D costs above the annual negotiated ceilings had been attributed to JT9D development. In our calculation, we considered that DOD contracts absorbed JT9D development costs in the proportion of such costs to the total IR&D costs incurred each year.

By the Navy's method of calculation, DOD contracts absorbed about $48.9 million of JT9D development costs during 1968-72. We calculated the amount absorbed to be about $76.1 million for this period.

Our method is consistent with that used by United Aircraft to compute its share of JT9D development costs in annual reports to stockholders. This method is also consistent with Pratt & Whitney's annual agreements with the Navy for sharing IR&D costs. No proposed projects were specifically excluded or included in setting the amount to be allocated to all contracts proportionately. The negotiation files for the IR&D agreements for the years 1968-72 indicated an intent to share JT9D costs along with those of other IR&D projects.

The Navy considered all JT9D development costs for 1968-71 allowable under its interpretation of the pre-1972 ASPR definition. The Navy determined that all JT9D development effort charged to IR&D in 1972 was allowable because none of the work related to engines under contract. The Navy did not examine Pratt & Whitney's commercial contract but relied on a schedule of incurred research and development costs and oral statements by Pratt & Whitney officials.

The JT9D-15 engine, originally ordered in 1968, was certified by the Federal Aviation Administration in April 1972, and the first production engine was shipped in June 1972. Pratt & Whitney records show that $4.9 million for JT9D-15 development was charged to IR&D in 1972. It seems evident that some contractually required, and thus unallowable, development was charged to IR&D in 1972.

According to the contracting officer, Pratt & Whitney had requested a $10 million increase in the ceiling for 1973, but he was able to hold the line at the 1972 level because we had raised the issue of the JT9D being unallowable as IR&D. This resulted in a saving to DOD contracts of about $3.9 million.

The Navy apparently now considers that some of the costs of the 1973 IR&D program may be unallowable. The contracting officer indicates that some JT9D development was for engines for which Pratt & Whitney had commercial contracts.

AGENCY AND CONTRACTOR COMMENTS

We have already discussed the Navy and Pratt & Whitney positions on the allowability of JT9D development cost as IR&D. DOD also provided the Navy's rationale on there being no basis for a claim against Pratt & Whitney. (See app. I for complete DOD and Navy reply. See apps. II and III for Pratt & Whitney's responses.)

The Navy, in commenting on the possibility of obtaining a refund from Pratt & Whitney, stated that the Government probably would not be able to recover any amounts paid, even if they were now considered unallowable, because the Navy had agreed to accept these costs at the time. The Navy claimed its past actions have "estopped" the Government from attempting to recover unallowable costs paid. Pratt & Whitney takes the same position as the Navy.

CONCLUSIONS

The IR&D costs allocated to DOD contracts by Pratt & Whitney from 1966 through 1975 could include up to $87 million of JT9D development costs which, in our opinion, were incurred to meet the requirements of agreements with commercial airframe manufacturers and, therefore, should not have been allowed. We recognize, however, that the lack of clarity in ASPR, together with the Navy's actions, estops the Government from recovering costs for 1968-71. After the 1972 change, such costs are clearly unallowable under the ASPR definition of IR&D.

RECOMMENDATIONS

We recommend that the Secretary of Defense determine how much of the JT9D technical effort for 1972 and subsequent years is not allowable as IR&D because it was sponsored by, or required in performance of, contracts and obtain price adjustments where appropriate.

CHAPTER 3

OTHER QUESTIONABLE ALLOWANCES OF IR&D

Development programs other than the JT9D may also have been sponsored by, or required in the performance of, contracts and, therefore, should not have been allowed as IR&D.

STATIONARY POWERPLANTS

Pratt & Whitney's IR&D proposal for calendar year 1973 described a $4.2 million effort undertaken in 1972 to develop a production version of the FT4C-1 engine. This development was to have been completed in October 1972 when the first unit was scheduled for shipment. Pratt & Whitney does not normally build such engines for inventory. Therefore, we believe an order for this engine may have existed before its development. If so, the development was improperly included in IR&D.

Another project, the FT4C-3 engine, had projected spending of $1.7 million in 1972 and $3.2 million in 1973. This new model is designed to generate electrical power, with increased output and decreased fuel consumption. Pratt & Whitney's IR&D proposal stated that these improvements were required to meet production dates. Because Pratt & Whitney does not normally produce powerplants for inventory, we believe commercial contracts may also exist for this engine.

The proposal described another project, the FT50A-1 engine development, with estimated funding of $5.3 million in 1972 and $12 million in 1973. Since engine production was scheduled to start, we believe an order for this engine may have existed, making development as IR&D improper.

Pratt & Whitney said it had no orders for the FT50A-1 engine but did not comment on whether it had orders for the FT4C-1 or FT4C-3 engines. The Navy did not comment on these projects.

DEVELOPMENT OF THE JT8D-15

In 1969 Pratt & Whitney started developing an improved version of the JT8D engine, designated the JT8D-15. This engine, which is used in a number of aircraft including the Boeing 727, was to have increased thrust with no increase in weight. Development costs charged to IR&D were:

Year	Amount
	(millions)
1969	$0.6
1970	3.0
1971	0.3
	$3.9

The Federal Aviation Administration certified the JT8D-15 engine on April 7, 1971, and Pratt & Whitney shipped the first production model the next day. This almost simultaneous occurrence indicates that a contract for delivery of the engine probably existed before its development. If so, development should not have been IR&D.

Pratt & Whitney did not indicate whether they had contracts for the JT8D-15 engine, nor did the Navy comment on this project.

CONCLUSIONS

We believe that these projects may also have been sponsored by, or required in the performance of, contracts. We were unable to verify this because Pratt & Whitney refused us access to its commercial records. If commercial contracts existed for these engines, development costs incurred to meet contractual requirements should not have been allowed as IR&D. Costs incurred after the ASPR change are clearly unallowable.

RECOMMENDATIONS

We recommend that the Secretary of Defense determine that part of the technical effort for these projects which was performed in 1972 and later and which is not allowable because it was sponsored by, or required in the performance of, contracts and obtain price adjustments where appropriate.

CHAPTER 4

NEED TO IMPROVE REVIEWS OF IR&D PROGRAMS

DOD needs to improve its administration of IR&D to insure that proposed IR&D technical effort meets the ASPR definition.

To be recognized as IR&D and allocable to DOD contracts, proposed technical effort must meet two basic tests. First, it must meet the definition of IR&D. Second, it must meet a test of relevance.

Before 1971 the relevance test determined whether the IR&D technical effort related to a Government product line. Since January 1, 1971, the relevance test has determined whether the technical effort has a potential relationship to a military operation or function as required by section 203 of Public Law 91-441. DOD has procedures to test relevancy.

To determine whether the technical effort meets the IR&D definition, DOD has criteria on whether proposed IR&D is sponsored by, or required in performance of, DOD contracts. However, DOD does not determine whether a contractor's proposed IR&D program is sponsored by, or required in performance of, commercial contracts.

In January 1967 Pratt & Whitney proposed its first IR&D program (for 1968) of about $108.8 million, of which $50 million was for JT9D development. Although this program was the largest ever proposed to the Navy, the records of negotiation do not indicate that Government representatives considered whether the program met the definition of IR&D. The records do show that Government representatives were concerned about the impact such a program would have on DOD contract prices and that the JT9D was a commercial endeavor.

However, the technical review team leader observed, 2 weeks before the final agreement was negotiated in October 1967, that the JT9D development had only "a potential commercial application." But the JT9D had much more than a potential commercial application because Pratt & Whitney had firm orders for the engine from Boeing as disclosed in the

news media, corporate annual reports, and company newspapers.

Once the review team became aware that the development was potentially commercial, procedures should have been established to ascertain whether the commercial application actually occurred. However, there is no indication that the Navy or DOD ever followed up on this important fact. The records of negotiation for 1969-72 do not indicate that the Navy evaluated the development in terms of the ASPR definition of IR&D.

The Navy contracting officer relies primarily on the annual technical review of Pratt & Whitney's proposals by the DOD technical review team. The technical review team considers whether the effort proposed as IR&D is required by military contracts but not whether it is required by commercial contracts. These reviews are primarily concerned with whether the proposed projects have a potential military relationship.

In 1971 an Air Force official who attended an IR&D technical review at Pratt & Whitney noted that the Navy was handling IR&D differently than the Air Force. Accordingly, he wrote to the Navy in July 1971, stating:

> "* * * we question the fundamental merits of permitting the Contractor to charge JT9 development effort to the IR&D program. We feel that P&W has a contractual obligation to develop the JT9 engine for his commercial customers. Therefore, why should the IR&D program be required to augment this contractual obligation? * * *"

Copies of this letter were sent to several Navy officials, including the contracting officer at Pratt & Whitney. Later, the Air Force official wrote to an Air Force negotiator stating:

> "* * * ASPR 15-205.35(c) provides that IR&D is that research and development which is not sponsored by a contract, grant, or other arrangement. If this rule were applied to the P&WA IR&D program, that contractor could have run a demonstrator JT9 engine, but once they secured a commercial JT9D contract, the further development

> of the engine would have been supported outside the IR&D program as a private development program. * * *"

This issue warranted the full consideration of all parties involved but, on the basis of our discussions with Navy and Air Force representatives, we concluded no action was taken.

In March 1972 we discussed the revised ASPR definition of IR&D with the Navy contracting officer at Pratt & Whitney. This was about 3 months after the change in wording became effective but before the Navy executed the advance agreement for IR&D with Pratt & Whitney in April 1972.

The contracting officer said he knew the definition had been revised. Although he was chairman of a DOD subcommittee that evaluated the new IR&D cost principle which included the change in definition, he suggested that we talk to a DOD official on the rationale for the change. (See p. 9.)

Although our discussion should have alerted the contracting officer, we found no indication that he established this definition as an issue that should be resolved.

DOD PROCEDURES

A DOD official told us that the individual services are responsible for ensuring compliance with the definition of IR&D. DOD's Technical Evaluation Group, which establishes evaluation criteria, methodology and forms to be used by the military departments, issued the form "Independent Research and Development Project Technical Evaluation." All branches of DOD have been required to use this form since May 1972 for technical reviews of IR&D programs. One item on this form states:

> "If it is necessary to conduct a research and development task in order to fulfill the requirements of a contract, then the effort is not independent R&D and is considered to be in direct support of the contract whether or not it is specifically set forth in the contract work statement."

This criteria clearly prohibits all development by Pratt & Whitney required by contracts with Boeing or other

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customers. Although this form suggests that DOD has criteria for insuring compliance with the ASPR definition of IR&D, the Chairman of the Technical Evaluation Group has stated that the technical review team is not expected to review each IR&D project and that the team would refer to this description only if a contract requiring the proposed effort were known or suspected to exist.

The Defense Contract Audit Agency (DCAA) auditor-in-charge at Pratt & Whitney informed us that he had not extensively reviewed IR&D costs because the contractor had incurred large amounts above the negotiated ceilings. In 1972, at the request of the Navy plant representative, DCAA reviewed the IR&D program at Pratt & Whitney for 1971 and concluded that the costs were allowable and allocable in accordance with ASPR, section 15.

The audit program indicated that consideration was to have been given to whether these costs met the definition of IR&D. However, the extent to which it was actually considered was not indicated, except for a request that was made to the contractor for certain commercial records. According to DCAA, Pratt & Whitney did not respond to this request. DCAA said that it does not have access to the commercial records necessary to insure compliance with the ASPR definition of IR&D. We noted that the DCAA audit manual does not specifically provide for determining whether IR&D technical effort meets the ASPR definition.

CONCLUSIONS

DOD components have focused their review of IR&D on verifying that projects have a potential military relationship. They have not considered the equally relevant ASPR criterion that projects should not be required in performance of a commercial contract. The review teams felt that they would have had difficulty insuring compliance with this requirement without access to the contractor's commercial records.

We recognize the difficulty of verifying the propriety of IR&D charges when a contractor, such as Pratt & Whitney, is reluctant to permit Government representatives access to records of its commercial business. For this reason, we believe the Government should be provided sufficient access to these records to enable a determination that IR&D costs are

allowable. In its recent report, 5 of the 12 members of the Commission on Government Procurement supported this position.

This does not mean that the Government should always examine contractor's commercial records or that the authority should be without limitation. Instead, when analysis of available evidence--such as published annual reports, other public releases, and the planned IR&D program furnished to the Government--raises questions, the authority should be available to permit examination to the extent necessary to determine the propriety of the questionable IR&D charges.

AGENCY AND CONTRACTOR COMMENTS

DOD believes a change in procedures is unnecessary because the ASPR definition of IR&D effective since January 1972 clearly prohibits charging IR&D for work required to fulfill the requirements of a commercial contract. We believe the definition sets out criteria; but, to be fully effective, DOD must implement the requirements of the IR&D technical review form and prescribe that the definition of IR&D be considered by all parties responsible for reviewing IR&D programs--the technical review teams, DCAA, and the contracting officers.

DOD said that, because requiring access to records on commercial contracts raises some far-reaching issues, extensive review should be made before such a procedure is adopted, and statutory authority may be necessary. DOD will consider the recommendation in current reviews of the IR&D area.

Pratt & Whitney stated that, if our interpretation of the ASPR definition of IR&D is correct, access to commercial contracts is not required to determine whether a project is allowable. The only test to be applied is whether the contractor has accepted a single order for any item being developed on an IR&D project. Pratt & Whitney said GAO had demonstrated on the JT9D case that access to commercial contracts was not required for that determination.

However, in our opinion, audits of multimillion-dollar matters cannot be left to newspaper articles or project descriptions in IR&D brochures. Therefore we believe the Government should have access to contractor's commercial records.

The need for access is particularly evident for assessing the allowability of projects such as those discussed in chapter 3. The publicity given them was small in comparison to the JT9D program. A firm determination of their allowability would not be possible without access to the specific requirements of the commercial contracts.

RECOMMENDATIONS

We recommend that, to improve administration of IR&D, the Secretary of Defense

--provide specific guidance to Government review teams and DCAA to insure that technical effort allowed as IR&D is not sponsored by, or required in the performance of, commercial contracts and

--expedite action under consideration to change ASPR to require that IR&D advance agreements specifically authorize access to contractors' commercial records for determining that IR&D costs are allowable.

APPENDIX I

ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D.C. 20301

INSTALLATIONS AND LOGISTICS

21 NOV 1973

Mr. Harold Rubin
Deputy Director, Procurement
and Systems Acquisition Division
U.S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Rubin:

This is a follow-up of our letters of August 9, 1973 and October 11, 1973 concerning the General Accounting Office (GAO) draft report titled, "Need to Assure That DOD Does Not Absorb Costs of Commercial Development Work Through IR&D Allocations" (OSD Case #3646). GAO provides four recommendations; two designed to improve the administration of IR&D, and two directed at the specifics of the IR&D allowance provided by Navy to Pratt & Whitney during the period 1968 - 1972.

As to the first recommendation, GAO suggests a determination be made whether IR&D is sponsored or required in the performance of commercial contracts. The Armed Services Procurement Regulation (ASPR) was amended effective January 1, 1972 to exclude clearly from the definition of IR&D that technical effort which is not only "sponsored by" a commercial contract but also that technical effort which is "required in the performance of" a commercial contract. The allowance of IR&D for work required in order to fulfill the requirements of a commercial contract would not be permitted under this change. We believe this ASPR modification is consistent with the GAO recommendation.

The second recommendation, i.e., that the Department of Defense (DOD) should have access to contractor's commercial records to determine whether IR&D costs are allowable, raises some very far reaching issues. Extensive review of this matter must be made before any such recommendation could be adopted. It may be that statutory authority would prove to be necessary to effect such a recommendation, if it is otherwise appropriate. This matter will be considered along with many other matters under current review in the IR&D area.

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As to the recommendations addressing the question of recovery of IR&D payments from Pratt & Whitney, we have enclosed an extensive analysis prepared by the Navy on this matter. This analysis sets forth the rationale why there is no valid basis for a claim against Pratt & Whitney. Those comments in the enclosure concerned with the first two GAO recommendations for changes in DOD policy will be considered in our further study of this matter.

We appreciate the extension in time provided by GAO to make these comments. We trust you will find them responsive to your report recommendations.

Sincerely,

A. I. Mendolia

ARTHUR I. MENDOLIA
Assistant Secretary of Defense
(Installations & Logistics)

Enclosure
a/s

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NAVY COMMENTS

ON

GAO DRAFT REPORT OF 15 JUNE 1973

ON

NEED TO ASSURE THAT DOD DOES NOT

ABSORB COSTS OF COMMERCIAL

DEVELOPMENT WORK THROUGH IR&D ALLOCATIONS

(OSD Case #3646)

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18 October 1973

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I. GAO Findings and Recommendations

In a review of contractors' IR&D (Independent Research and Development) programs, GAO noted that Pratt & Whitney Aircraft Division, United Aircraft Corporation, had devoted over half of its IR&D efforts to developing various models of its JT9D engine for the Boeing 747 and McDonnell Douglas DC-10 aircraft. Because DOD contracts directly with Pratt & Whitney for research and development for military engines, GAO wanted to find out whether DOD should have absorbed a share of the JT9D portion of the IR&D costs.

GAO estimates that DOD may have paid as much as $76.1 million of JT9D engine development costs during 1968 through 1972 without determining that this technical effort was properly allowable as IR&D--i.e., not sponsored by or required in performance of a contract or grant. Pratt & Whitney officials contend that JT9D engine development is allowable as IR&D because Pratt & Whitney does not have commercial contracts specifically requiring research and development. GAO believes that technical effort should not be considered as IR&D if a company has an order requiring explicitly or implicitly, that research and development be performed before that order can be filled. Pratt & Whitney refused GAO access to its commercial contractual agreements for JT9D engines. Nevertheless, GAO states that there are strong indications that much of this development should not have been allowed as IR&D because the engines had not been developed when Pratt & Whitney contracted to deliver them to the Boeing Company and the McDonnell Douglas Corporation.

GAO bases its position on the definition of IR&D, as contained in the ASPR since 1968, maintaining that throughout this period, the JT9D effort was either "sponsored by" (in accordance with the pre-1972 ASPR language) or "required in performance of" (in accordance with the 1972 ASPR language) a contract, e.g., the Boeing-P&W contract. GAO finds no substantive difference in the definition of IR&D prior to 1972 and that contained in the ASPR after 1972, but states that the inclusion of the words "or required in performance of" did not change the meaning of ASPR. In this context, GAO states on page 13 of its draft report that, "the DOD official who originated this change stated that the additional words 'or required in performance', were not intended to broaden or change the definition of IR&D, but just to clarify it. He also stated that this requirement was intended to apply to commercial as well as DOD contracts." The reported statement of a "DOD official" is the sole bases stated in the GAO report for the conclusion that the pre-1972 language ("sponsored by") contemplates the P&W situation.

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To remedy the situation, GAO recommends revision of the regulations and assertion of a claim against P&W. Specifically, GAO recommends that DOD:

1. Improve its administration of IR&D by (a) determining that contract effort allowed as IR&D is not sponsored by or required in the performance of commercial contracts, and (b) revising the ASPR (Armed Services Procurement Regulation) to require that advance IR&D agreements contain specific authority for the Government to have sufficient access to a contractor's commercial records to determine that IR&D costs are allowable.

2. At Pratt & Whitney, (a) determine if any part of the technical effort is not allowable as IR&D because it was sponsored by or required in the performance of contracts; and (b) seek equitable price adjustments to the extent appropriate.

II. Navy Comments

A. INTRODUCTION

The Navy does not agree that there exists any basis for a claim against P&W, nor does it agree with GAO's recommended change in the administration of IR&D for the following reasons:

1. GAO's interpretation of the pre-1972 ASPR regulation (15-205.35) is incorrect. It does not contemplate the JT9D situation.

2. Even assuming GAO's interpretation of the regulation was correct, there would still not be a basis for a claim against P&W because:

a. The Government is "estopped" from now asserting a claim for such costs;

b. The Government has waived its right to recover such costs;

c. Many of the costs were included in fixed price type contracts which are not susceptible to cost disallowances;

d. The Government received consideration for accepting such costs and is now bound by its agreement to include such costs in IR&D allocations; and

e. P&W can assert a valid offset in the event the Government can support a case for recovery of JT9D R&D costs.

3. GAO's interpretation of the 1972 ASPR regulation is correct. Nevertheless, inclusion of the JT9D costs in the 1972 IR&D agreement was appropriate inasmuch as none of the IR&D tasks undertaken by P&W in 1972 related to FAA certified engines sold to commercial customers in that year. There were no commercial orders in existence in 1972 related to any IR&D tasks undertaken in that year. The 1972 IR&D tasks all related to improvements over and above and beyond anything called for in existing commercial orders. Such improvement tasks were determined by the Armed Services Research Specialists Committee to be of potential military relevancy and therefore appropriate for inclusion in the 1972 IR&D agreement.

4. Even assuming, as GAO maintains, that 1972 JT9D costs could not be included in IR&D, there would still not exist a basis for asserting a claim against P&W for 1972 IR&D costs for the reasons set forth in 2(a) through (e) above.

5. Adoption of GAO's proposal regarding the review of commercial contracts and records is impractical, would not serve a useful purpose and would unduly burden the military departments.

6. The Navy's current procedures for negotiation of IR&D advance agreements, which have a built-in mechanism for assuring an equitable distribution of costs relating to items having commercial application, should be continued. They are prudent and advantageous from a business and economic point of view. Since the Navy's approach might in the future, result in a situation which is not condoned under the literal terms of the current ASPR 15-205.35, appropriate change in the ASPR should be made (as recommended herein) or a blanket deviation should be granted the Navy for use of its approach to the negotiation of IR&D Advance Agreements.

B. DISCUSSION

1. The interpretation of the regulations

At issue in the subject case are two regulations, both of which establish a definition of IR&D. The later regulation (effective 1 January 1972) is merely an extension of the IR&D definition as contained in the ASPR since 1959. For 13 years, it was defined as work "not sponsored by a contract, grant or other arrangement." In 1972, one change was made to the regulation's definition of IR&D: that was to exclude work which was not only not "sponsored" under another contract, but also work which was not "required in the performance of" another contract. Both GAO and P&W maintain that the new definition did not in any manner affect the meaning of ASPR, although both parties construe the alleged consistent meaning in different ways. GAO construes it to always cover the JT9D effort while P&W construes it as having always excluded JT9D type work.

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Before analyzing the words of the regulation, to wit "sponsored by" and "required in performance of," it is appropriate to review certain rules of statutory construction which courts and boards have used in interpreting statutes and regulations. First, it is noted that there is a presumption in the law that every word, sentence or provision of a statute or regulation was intended for some useful purpose. It is presumed that when words are included in or added to a statute or regulation they are intended to have some force and effect and, as such, some meaning is to be given to each word. Conversely, there is a presumption that no superfluous words or provisions are included in statutes or regulations (See 82 CJS Sec. 316, and cases cited in footnotes 52 through 56). The general rule is that when new words are added to a statute or regulation, a new meaning is brought to that statute or regulation. It is never presumed that additional verbiage was intended to create redundancy: in effect, to say again, in other words, what had already been stated in the regulation. Along these lines there are numerous cases wherein the courts have held that, "where the words or provision of a statute differ from those of a previous statute on the same subject, they are presumably intended to have a different construction or meaning and to denote the intention to change the law." (Id. See cases cited in footnotes 61 and 62).

Another pertinent rule of statutory construction is that the meaning of a statute or regulation is to be ascertained primarily from the language used and not from extrinsic sources (See 82 CJS Sec. 322). Furthermore, in interpreting the words of a statute or regulation the courts have held that they should be interpreted according to their plain, obvious and reasonable meaning: it should not be presumed that a meaning other than ordinarily understood from the words was ever intended. (Id. See footnotes 53 through 60). Only when the words of a statute or regulation cannot be interpreted literally have the courts resorted to legislative intent as an aid to its interpretation. (Id. See footnotes 65 through 71)

Based on the rules of statutory construction, set forth above, in order to interpret the meaning of ASPR 15-205.35, we must begin with the assumption that the 1972 revised IR&D definition did, in fact, change the existing definition. The inclusion of the words "or required in the performance of," were intended to add a new category of work which would not be acceptable as a part of a contractor's IR&D program. Notwithstanding the statements of a "DOD official" to the contrary, the regulation cannot be read as creating redundancy. Moreover, it should be noted that nothing in the ASPR file supporting the revision would indicate that such was intended. In fact, nothing in the ASPR case files indicates what was contemplated by the inclusion of the words "or required in the performance of". Under such circumstances, it is unlikely that the general presumption of "no redundancy" could be overcome merely because of the statement of a "DOD official."

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Having established variances in the regulations, the next step is to interpret the words of the individual regulations in accordance with their ordinary and reasonable meaning in routine parlance. Under the first ASPR version of 15-205.35, in effect from 1959 to 1972, IR&D was that work which was not "sponsored by a contract, grant or other arrangement." The Second Unabridged edition of Webster's New International Dictionary, 1950, defines the word "sponsor", in its noun form as "one who binds himself to answer for anothers default" and in its verb form as, "to accept responsibility for". Applying the definition of "sponsor" to its context in the pre-1972 ASPR 15-205.35 provision, it can be said that IR&D is research and development work for which a company alone assumes responsibility and for which no other party has accepted responsibility in the event of failure.

The interpretation of ASPR, as just described, varies significantly from that espoused by GAO: it finds "sponsorship" whenever there exists a commercial contract for the subject matter of the development program. This interpretation, however, is not only inconsistent with the ASPR language, it is also likely to produce an anomalous situation. An extreme example can illustrate this. Assume a contractor undertakes a multi-million dollar development effort for which there is a determination of extensive potential military relationships (PMR) and for which potential projected sales show 90% sales to the Government. If, during the course of this independent development effort, the contractor accepts a contract from a commercial contractor for the sale of one item should it eventually be developed, under GAO's interpretation of ASPR, none of the development effort can be categorized as IR&D and it must be totally disallowed against all DOD contracts.

The meaning of the pre-1972 ASPR definition of IR&D was explored by the ASBCA in a case involving a cost disallowance taken under a General Dynamics - Air Force contract. The ruling in this case corroborates the explanation of the definition of IR&D, as detailed herein, and negates the explanation espoused by GAO. In Appeal of General Dynamics Corp., ASBCA No. 10254, 66-1 BCA 5680 (1966), an Air Force contracting officer disallowed certain IR&D costs attributable to projects which were partially financed by contributions from private utility companies or associations. In making the disallowance, the contracting officer specifically cited ASPR 15-205.35(c), the IR&D definition. The Government's position was that inasmuch as the specific development effort was not wholly funded with corporate funds, it could no longer be classified as "independent research and development." The Board saw the issue at hand as follows:

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> "What does the word 'sponsored' in the definition connote? The gravamen of the Government's argument apparently is that sponsorship is present if a contractor receives any financial support toward its research and development effort from outside sources. At the opposite end of the financial spectrum would be the position that a project is 'sponsored' only if it were paid for entirely by the outside source." (Id. at p. 26,501)

The Board indicated that the ASPR definition was not clear enough to compel either of the two extreme interpretations. Only one thing could be clearly construed from the definition. As the Board stated:

> "At a minimum, the clause was intended to insure that a contractor performing research and development work would not be paid twice for its effort, i.e., once under a contract covering the work directly, and a second time, in part at least, by an overhead markup resulting from research and development costs applied to all of the Government contracts which the contractor had." (Id.)

With regard to the General Dynamics situation, the Board ruled that the costs should be allowed even though they pertained to a project which was not wholly funded with company funds and which was also being done for the benefit of commercial customers who had agreements in existence which covered the subject matter of the development program. In this context, the Board stated:

> "What does the definition sentence intend to say about projects which are partly sponsored financially by this appellant and partly by other sources, which were the idea of the appellant but are of great interest to the utility companies and foundations which are participating financially? In this area where guidance to interpretation is lacking, we are impressed with one of the appellant's 'common-sense' arguments. It suggests that if it had carried on these research programs without any financial assistance from outside sources, there would apparently have been no question raised about the Government's accepting the costs under ASPR 15-205.35 as a proper component to reach overhead markups to apply as indirect costs to Government contracts. Appellant then suggests that it is anomalous indeed that after it successfully seeks outside assistance in financing its research programs, the effect of which is to reduce the total amount to be applied

against Government contracts, the Government refuses to recognize this reduced amount as properly includible in a pool to be allocated to Government contracts. The effect of this is to penalize the appellant for reducing the costs allocable to Government contracts. We would not be inclined to read subparagraph (c) to reach such a result unless its language clearly compels it. We do not think that such is the case. We do not think that the language of the subparagraph is clear enough, when applied to the facts of this case, to COMPEL any specific result." (Id.)

The outcome of the General Dynamics case would seem inevitable in the instant P&W case. Here, there is evidence of no financial support whatsoever from Boeing: merely a commitment to purchase engines if P&W succeeds in its development efforts. Boeing assumes no risk and exercises no control over the course of the JT9D development. In the event the JT9D effort turned out to be a failure, Boeing would not be responsible for any costs related to the JT9D development. Under these circumstances, the Board could hardly find that ASPR 15-205.35(c) compels a finding of Boeing "sponsorship" for the JT9D development program. Rather, under the pre-1972 ASPR, it seems clear that the JT9D work was not sponsored by anyone but P&W and, as such, the costs of that work should have been included in P&W's IR&D pool.

The 1972 definition of IR&D added the words "or required in performance of". In accordance with the rules of statutory construction it can be presumed that a new category of work was encompassed by the inclusion of these words which was previously not covered by the regulation. The dictionary defines the word "require" as, "to be necessary or requisite" for. In the context of the 1972 ASPR 15-205.35, this would mean that an effort cannot be classified as IR&D if it must be accomplished in order to fulfill an obligation assumed under another contract, grant or other arrangement. Even if the effort might not be encompassed within the express terms of another contract, if it is a prerequisite to accomplishment of the other contract, then it is "required in the performance" of that other contract and is unacceptable as IR&D.

In the instant case, it would appear that the JT9D development effort would have to be excluded as IR&D under the 1972 regulation. It is immaterial that development costs were not charged to the Boeing contract and that Boeing had no liability or responsibility in the event of an unsuccessful developmental effort. Under the 1972 regulation, regardless of these factors, if the work has to be accomplished in order to fulfill the terms of an existing contract, it cannot be IR&D. This literal interpretation of the words should prevail even though it would result in the anomalous situation, as illustrated above, of a single contract excluding a multi-million dollar development effort from being categorized as IR&D. The question is not whether

anyone else is responsible for the development, but whether the development is necessary to fulfill the terms of any other contract, even if the contract is for a limited number of items. Any other interpretation would not give new meaning to the ASPR and would be contrary to the ordinary meaning of its language.

2. The extent of costs paid out by DOD for the JT9D

In every year since P&W has had an IR&D program, it has exceeded the negotiated ceiling on IR&D costs by significant amounts. To a large extent, this is due to the fact that the negotiations recognized that the JT9D, although it did have PMR, nevertheless had a predominant commercial application. As such, in establishing IR&D ceilings, the Navy negotiator insisted upon a significant reduction in the total IR&D ceiling. From 1968 to 1972, P&W incurred IR&D costs which almost equated their original proposal for IR&D programs prior to the year. During these years, JT9D costs incurred were equivalent to the magnitude proposed in P&W's original proposals. Under these circumstances, there appears little question but that the significant reductions in the proposed ceilings were attributable to consideration of the commercial application of the JT9D engine. Although final ceilings were negotiated on a lump sum basis and individual elements were not broken out, the parties course of conduct indicates that the individual elements were major factors in determining the amount of IR&D costs which would be allowed, especially in the case of the JT9D.

In 1972, for example, total costs reimbursed by DOD to P&W for IR&D amounted to $24.5 million. Based on the course of conduct of the parties and the expressed intent of the Navy negotiator during the negotiations, it can be argued that the entire difference between P&W's proposed ceiling and the agreed upon ceiling is attributable to JT9D costs. On that basis, total JT9D costs incurred would first have to be reduced by the amount of the ceiling reduction before a determination could be made as to the portion reimbursed by DOD through IR&D allocations. Under this assumption, during 1972, vice the $10.9 million allocation of GAO, it can be argued that only $1.4 million was reimbursed to P&W for JT9D effort. This figure would be arrived at by reducing the total cost incurred for JT9D ($39.37 million) by the difference between the total IR&D costs incurred and the 1972 ceiling ($36 million), and applying the percentage of DOD business (42.2%) against the difference ($3.2 million). The result of this computation is $1.4 million.

To the extent that a claim can be maintained under the 1972 regulation for recovery of 1972 JT9D IR&D costs, it would appear that the claim would lie somewhere between a minimum of $1.4 million and a maximum of $10.9 (GAO's calculation). In view of the nature of the negotiations which resulted in substantial reductions in the ceiling, it is highly unlikely that anything near $10.9 million could be supported.

3. The interpretation of the ASPR principles and the parties course of conduct

In examining questions of cost allowability, the Board has often looked into the course of conduct between the contracting parties in order to determine whether a disallowance can be sustained. Even where the Board determines that a specific cost should not be allowed under the cost principles, it has often refused to enforce the principle where the parties' course of conduct was such as to lead the contractor to believe that his method of accounting and allocation was proper. In effect, the Board has found an "estoppel" barring the Government from asserting a cost disallowance.

In The Appeal of Peninsular Chemresearch Inc., ASBCA No. 14384, 71-2 BCA 9066 (1971), the Government attempted to disallow part of an overhead allocation on the grounds that the contractor had improperly included within the overhead pool the expenses of the commercial sales department. The Government contended that these expenses related entirely to the contractor's commercial products and, therefore, could not be included in the overhead pool. Under the contractor's normal accounting procedure, only a single overhead pool was maintained for allocation to both Government and commercial contracts. Noting the reliance the contractor had placed on this system when he entered the contract, the Board stated that retroactive adjustment was not proper when the Government had tacitly approved the system by not objecting at the outset. The Government was estopped from challenging such costs even though they might be found to be unallowable under a cost principle.

Either under a concept of "estoppel" or "waiver", the Board has, on numerous occasions, found that a retroactive price adjustment will not be sustained where the Government has approved the contractor's method of accounting and allocation. In the Peninsular Chemresearch case, supra, the Board thus said the following:

> "Retroactive adjustment of appellant's previous accounting system is not now in order. . . respondent has waived its defense of unallocability by its prior consistent acceptance of appellant's system." (Id. at 42055)

Similarly, in the Appeal of Wolf Research and Development Corp., ASBCA No. 10913, 68-2 BCA 7222 (1968), the Board stated:

> "If costs are not allowable under ASPR for a particular contract because their allocation to that contract is not in accordance with generally accepted accounting principles, they need not be reimbursed even though Government auditors failed to question such costs in prior years. The Government's failure to object to prior allocation practice may be persuasive evidence of its acceptability in a given case;

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> but if the practice is correctly determined to be unacceptable the previous failure to question it would not ordinarily bind the Government for future years." (Id. at 33,545)

Similarly, in the General Dynamics case, supra, where the Board interpreted the words "sponsored by", the Board also reflected upon the significance of the conduct of the parties prior to the disallowance. The Board thus stated:

> "Our conclusion above is strengthened by the actions of the parties themselves and their treatment of the same costs in preceding years. In the years prior to 1960 such costs. . . were apparently accepted by the Government. . . the events of 1960 are particularly significant because that was the first year's costs which were challenged. . . Initially the appellant submitted a brochure clearly identifying the research programs and disclosing the participation therein by outside financial sources. . . the contracting parties thus appear to have had no qualms about the propriety of recognizing the contractors costs above contributions on the later questioned projects. . . The fact that the costs were recognized gainsays the present argument that they are barred completely by the provisions of ASPR 15-205.35(c)." (Id. at. 26,502)

The above cited cases dealing with the doctrines of "estoppel" and "waiver" in cost disallowance situations, indicate that the Government would be hard pressed to demand a retroactive price adjustment from P&W in light of its conduct over the last five years. This is certainly true with regard to the costs between 1968 and 1972, where the parties course of conduct can be interpreted consistently with the regulations. However, it is equally true with regard to any claim for 1972 IR&D costs. Although the regulations indicate that as of 1 January 1972 the JT9D costs should have been disallowed as IR&D (since they were required "in performance of" a contract), it is unlikely that the Government could succeed in sustaining a disallowance where it knowingly agreed to the acceptance of such costs and where its conduct since the inception of the IR&D program at P&W was such as to lead P&W to believe that such costs were allowable and would continue to be so. The Government's acceptance of these costs was not unwitting in this instance, but it was done with full knowledge. Under such circumstances, the doctrines of "estoppel" and "waiver" could be relied upon by P&W.

4. The nature of the P&W contracts

In determining whether the Government might pursue a claim against P&W for recoupment of unallowable IR&D costs, attention must be given to the

nature of the contracts involved. Even if it could be established that unallowable costs were paid, recovery might still be barred if the contract type is such that it cannot be opened for a disallowance. In this context, it should be noted that most of the contracts executed with P&W since 1968 are of the fixed price type; the major ones being fixed price incentive type contracts. The Government has had relatively few cost type contracts with P&W.

With regard to fixed price type contracts, two propositions are significant: first, where you have a firm fixed price contract or a fixed price incentive contract which has been finally redetermined, a cost disallowance is barred since payments under these contracts are made on the basis of "price" rather than through the reimbursement of "cost", and second, even with respect to fixed price incentive contracts which have not been redetermined, a cost disallowance will not be sustained under the ASPR provision in existence prior to 1 July 1970.

The above principles were illustrated in the Appeal of G.C. Dewey Corporation, ASBCA No. 13221, 69-1 BCA 7732 (1969). The Dewey case involved a 1967 Marine Corps contract which was originally executed as a letter contract. In definitizing the letter contract, the parties included, as an element of the fixed price, the cost of deferred engineering and development. Under the ASPR section 15 cost principles, deferred engineering costs were clearly unallowable. Having negotiated a fixed price, the Marine Corps sent a business clearance to the Chief of Naval Material for review and approval. Exception was taken to the inclusion of costs for deferred engineering and development and as a result, the contracting officer went back to the contractor and attempted to exclude such costs. The contractor disagreed and an appeal followed. In determining that the cost should be allowed, notwithstanding the cost principle to the contrary, the Board reflected upon the nature of the contract and the status of the regulation. The Board thus stated:

> "The Board is in agreement that the [cost] provisions are not mandatory for a fixed price contract. . .In our view the only possible remaining reason for the refusal of the questioned cost would be that the contracting officer had acted beyond the scope of his actual authority. . .The Board recognizes that where regulations require pre/post business clearance for certain contracts by the Office of Naval Material, in appropriate circumstances, the most stringent cost provisions of section 15 might be applicable to definitization of a fixed price letter contract, but here, the terms of a letter contract had been arrived at through the free right to bargain between the Government and the appellant. In the instant contract, all the

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> facts were known by the Government prior to entering into the contract with the appellant. . . At the time of the letter contract capitalization was spread on the company's books for all to see and was fully covered in the request for clearance and in the negotiation for the letter contract. . . We conclude on the foregoing that while the contracting officer was obligated by ASPR and the Navy Procurement Directive to obtain a post clearance prior to arriving at a firm fixed price the matter of acceptance of the cost in question was no longer open to negotiation except as to amount." (Id. at. 35,921)

In Dewey, even though a contract on a firm fixed price basis had not yet been fully executed, the Board still found an "accord and satisfaction" regarding the acceptability of deferred engineering costs once the letter contract was issued and, as such, the Government could not challenge that cost at a later time. Citing the Luzon Stevedoring case, ASBCA No. 11650, 68-2 BCA 7193 and the R.W. Borrowdale case, ASBCA No. 11362, 69-1 BCA 7564, the Board reiterated its position that:

> "the ASPR cost principles were made a guide to contracting officers and were not incorporated by reference into fixed price contracts as a contractually binding [standard]. It follows that this standard cannot be imposed on the contractor by fiat of the contracting officer or on appeal by fiat of this board if to do so would result in other than an equitable adjustment. . ."

Only after 1 July 1970 did fixed price contracts call for the mandatory application of the cost principles. This resulted from the issuance of DPC 79 on 15 March 1970. Even with the application of the cost principles, however, the nature of the fixed price type contract was still, to a large extent, preserved: they did not carry with them the future possibility of cost disallowances as could result in cost type contracts. As was noted in the introduction to DPC 79:

> "particular attention is directed to paragraph 15-106 as revised which points out that the application of section 15 cost principles to fixed price contracts has not required the negotiation of individual elements of cost. The practice of negotiating an overall total price should be continued."

Once a fixed price is agreed to, it obtains a certain integrity and it is not subject to challenge. Taking into consideration the nature of P&W's contracts and the holdings of the Board in connection with fixed price type contracts, it can be concluded that even if the JT9D costs were unallowable under the cost principles, most of the costs which GAO maintains were improperly paid would still not be recoverable since they were paid out under fixed price type contracts executed prior to 1 July 1972 or included in firm fixed price or finally redetermined incentive type contracts executed after 1 July 1972. Even under GAO's interpretation of the regulations, a claim would only be viable in connection with cost contracts which have not been closed out or under open fixed price incentive contracts executed after 1 July 1972.

5. Consideration for Acceptance of IR&D JT9D Costs and P&W Offsets

An aspect of the P&W situation mitigating against any Navy claim for recoupment of IR&D costs concerns the parties dealings. Since 1968, in return for the Navy's agreeing to include a small portion of the JT9D costs in the IR&D ceiling, P&W has agreed not to defer any JT9D R&D costs to the Government in any future sales. This "no deferral" agreement represents legal consideration for the Navy's acceptance of the costs. To date, the Government has purchased three JT9D engines and there is reason to believe that there will be many more sales in the future. No deferred development and engineering costs were included in the price of the three engines. In the absence of the "no deferral" agreement, if P&W would include deferred R&D in the price of its JT9D engine, the price of the engine would increase substantially.

In light of the "no deferral" agreement, P&W can argue that the Government has given up its right to claim return of JT9D costs: it has bargained for and received consideration in return for its binding agreement to pay JT9D costs. And, since the Government has already taken advantage of the agreement in the purchase of the three JT9D engines, it can hardly disavow it at this time. At a minimum, if JT9D costs were disallowed, P&W would have a valid claim to assert as an "offset" against the Government. At this juncture, its offset would relate to the three engines thus far bought by the Government. In addition, however, it would open the door to the future payment of deferred R&D costs in any future sale of JT9D engines to the Government.

Attachment 1 covering P&W's estimated future military and other Government sales of the JT8, JT9 and FT9 engines project substantial Government sales of these aircraft engines. These projections have been reviewed and appear reasonable subject to the possibility that some of these requirements may be procured competitively among aircraft engine manufacturers. In the event that P&W were to defer such development costs, its recovery on such levels of potential sales would substantially exceed what the DOD has recognized in the negotiation of annual IR&D ceilings. Also, it must be anticipated that if the present IR&D approach covering development of more advanced aircraft

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engines is abandoned, P&W may be entitled to charge the DOD commercial prices for such advanced engine configurations. These prices would likely be higher than would otherwise be negotiated by the DOD.

6. The 1972 JT9D IR&D Costs

A review of P&W's IR&D program for calendar year 1972 indicates that none of the work relating to the JT9D engine, which was classified as IR&D, was done in connection with certified JT9D engines. Rather, all of this work was undertaken in order to develop advanced versions of the JT9D engine. Consistent with P&W's historic practice, it did not include in IR&D any effort relating to certified engines. Similarly, it has been determined that during 1972 P&W did not have in existence any contract or other agreement with commercial customers covering the future purchase of advanced model JT9D engines. During this year, P&W only had contracts with its commercial customers for the certified versions of the JT9D engine.

As recognized herein. the 1972 ASPR 15-205.35 precludes work from being classified as IR&D, if it must be accomplished in order to fulfill the obligations of an existing contract. In P&W's case, none of the 1972 JT9D development effort related to "contracted for" engines. On the contrary, it was confined only to advance engines for which no contracts existed. Moreover, all of this development work was found by the Armed Services Research Specialists Committee to have a potential military relationship and, as such, it was recommended for inclusion in the IR&D program. Under these circumstances, there is little doubt that the JT9D development effort was properly classified as IR&D. In fact, it would be contrary to the regulations to have excluded it from P&W's IR&D pool, since "allowability" is dictated when the work has PMR and is not required in performance of another contract.

7. The Impracticability of GAO's Recommended Change In the Regulations

In order to comply with the current ASPR 15-205.35 in its fullest sense, GAO recommends that DOD gain access to contractor's commercial contracts and records. The purpose for this presumably is so that DOD personnel can inspect such documents and assure themselves that no element of a proposed IR&D program is "required" as a prerequisite to fulfillment of an obligation undertaken in a commercial agreement.

The procedure recommended by GAO would be extremely burdensome to administer: it would require many additional manhours for auditors, lawyers, contract negotiators and technical personnel, with very little to be gained as a result. The intent of the ASPR regulations and DOD policy surrounding IR&D is to recognize costs incurred in performing an effort which has PMR, but only to the extent of its military application. DOD does not intend to sponsor or subsidize commercial work nor does it intend to allow contractors

to duplicate their recovery of development costs by permitting them to charge commercial customers and DOD for the same work. GAO's recommended approach to IR&D does not ensure the fulfillment of DOD's objectives which the current ASPR does not clearly enunciate. Even if DOD inspected all commercial records in extreme detail and ascertained that no agreements covered the proposed IR&D work, the work might still be directed primarily towards a commercial application. Yet it would be allowable because it had some PMR. Contractors could merely refuse to enter into binding commitments during the development stage of a product and thereby ensure the allowability of their IR&D costs.

The approach employed by the Navy to IR&D, on the other hand, is geared to the fulfillment of DOD's objectives. Under the Navy's practice, an assessment is made of the commercial application of the IR&D's effort. This assessment represents a major factor in determining the extent to which IR&D proposed costs will be recognized in establishing the IR&D ceiling regardless of whether there exists a commercial contract for the item. Even without such a contract, the costs will not be considered to the extent that they are being incurred for future commercial customers. This was the system which was successfully employed in P&W's case since 1968 and which resulted in the negotiation of ceiling limitations between 1968 through 1973 of $355 million although P&W proposed and will have spent approximately $550 million. And, of course, within the $355 million ceilings, DOD only reimbursed P&W for its allocable share. Also, if JT9D costs were excluded from IR&D, the Government would have to abandon its present "no deferral" arrangement in which case it would be charged for the development costs in the price of future sales. As indicated earlier, these charges would exceed the amounts recognized for the JT9D's development in IR&D ceilings.

8. The Navy's Recommendation for Revision Of The Regulations

In its report, GAO has highlighted one problem which clearly warrants action. It is evident that the current terms of ASPR 15-205.35 are not clearly understood by many and may not be adequate to fulfill DOD's objectives with regard to IR&D. The potential of commercial contracts arising as a result of IR&D projects is not unique to P&W, but exists with respect to all IR&D agreements. It is believed that this aspect has not been fully recognized in the present ASPR provision on IR&D and represents a further reason for clarification. It is a situation which is likely to result throughout DOD whenever IR&D work has both a military and commercial application.

In order to remedy this situation and ensure the proper treatment of IR&D by all segments of DOD, the Navy recommends revision of the regulations to provide that:

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a. IR&D costs be allowable only to the extent that they are incurred for projects having a PMR, though they also have commercial application (i.e. only an appropriate portion of the costs should be allowed commensurate with their PMR), and

b. contractors should be required to certify that costs incurred for IR&D projects are not and will not be charged, directly or indirectly to any other project, contract or effort.

APPENDIX II

President
Chief Executive Officer

United
Aircraft

July 13, 1973

Mr. Harold H. Rubin
Deputy Director (Technology Advancement)
United States General Accounting Office
Washington, D. C. 20548

Dear Mr. Rubin:

We appreciate the opportunity you have afforded us to comment on the Comptroller General's Draft Report on "Need to Assure that DOD Does Not Absorb Costs of Commercial Development Work Through IR&D Allocations."

The principal thrust of this report is that our Pratt & Whitney Aircraft Division (P&WA) charged portions of the cost of development of the JT9D engine to its IR&D program, in which costs the Government shares; that after P&WA had received orders from customers for engines such costs should not have been included in the IR&D program shared by the Government; that in the future the Government should exclude from approved IR&D programs work on products for which orders have been received; and that the Government should "seek equitable price adjustments to the extent appropriate." The report also considers in passing, the possibility that the practices complained of were followed by P&WA for products other than the JT9D. The report recommends that DOD be granted limited access to contractors' commercial contracts for the purpose of determining whether or not IR&D projects are required to fulfill the terms of those contracts.

It has not been P&WA's practice to contract for the development of commercial aircraft engines. When a future need for a new commercial aircraft and engine is recognized, P&WA works very closely with the airlines and with airframe companies to meet the future need with no contractual relationship with either the airlines or airframe companies. At the earliest practicable date, when an airplane specification can be written, the airplane is offered for sale. When an order for an airplane is received from an airline, the airframe manufacturer normally places a firm fixed price order with P&WA for engines for that airframe. There is, again, no contract between P&WA on the one hand, and either the airframe manufacturer or the airline on the other for the development of the engine.

Your draft report states, in pertinent part:

> "Until 1972, Section 15-205.35 of the ASPR stated, "a contractor's independent research and development is that research and development which is not sponsored by a contract, grant or other arrangement."

EAST HARTFORD CONNECTICUT 06108

APPENDIX II

UNITED AIRCRAFT CORPORATION

Mr. Harold H. Rubin
U. S. General Accounting Office

July 13, 1973
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We believe it is clear that a firm fixed price order for one, or indeed, for 100 engines cannot be said to be a contract, grant, or other arrangement, which sponsors the development program. It follows, therefore, that the wording set forth above would not rule out the inclusion of the JT9D effort in the IR&D program.

Your draft report goes on to say:

> "This section was amended effective January 1, 1972, and now reads, "A contractor's independent research and development effort (IR&D) is that technical effort which is not sponsored by, or required in performance of, a contract or grant*****'. The DOD official who originated this change stated that the additional words, 'or required in performance of' were not intended to broaden or change the definition of IR&D but just to clarify it....."

The quoted statement is in accord with the position the Government has consistently taken both in negotiations with P&WA, and in answer to P&WA's informal queries.

The draft report simply ignores this point. We believe it is clear that JT9D effort need not be excluded from the IR&D program in which the Government shares, and the quotations above reinforce that belief. The report gives no rationale for arriving at the opposite conclusion, that acceptance of one order (or any number of orders) for an item being developed on an IR&D project automatically disqualifies that project for inclusion in the IR&D program.

If the January 1, 1972 revision of ASPR 15-205.35 merely clarifies the pre-existing definition, without broadening or changing it, then it follows that the technical effort to be excluded from IR&D is that which is required by a contract which "sponsors" that effort. Sponsorship denotes one party's assumption of liability for the obligations of another, i.e., a surety relationship. We assume that your office is satisfied that our customers do not assume such a liability as to the development costs simply by placing production orders for commercial engines with us.

If we accept the GAO interpretation of ASPR then the GAO's recommendation that the ASPR be revised "....to require that advance IR&D agreements contain specific authority for the Government to have sufficient access to contractor's commercial records to determine that IR&D costs are allowable" seems without merit. If the GAO interpretation is correct, and we believe it is not, the only test to be applied is whether the contractor has accepted a single order for any item being developed on an IR&D project, and as the GAO has demonstrated in this case, access to commercial contracts is not required to make that determination.

Under our commercial contracts for the sale of JT9D engines our customers do not sponsor the development of the engine. We believe the intent of ASPR is clear that in these circumstances, the JT9D development program is, and has been, properly included in the IR&D program which is shared by the Government. It follows that

APPENDIX II

UNITED AIRCRAFT CORPORATION

retroactive price adjustments to permit the Government to recover amounts paid to P&WA pursuant to advance understandings properly entered into between P&WA and the Government, in accordance with applicable regulations, would be both inequitable and inappropriate.

The foregoing paragraphs deal with the principal thrust of the draft report.

[See GAO note.]

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UNITED AIRCRAFT CORPORATION

Mr. Harold H. Rubin
U. S. General Accounting Office

July 13, 1973
Page 4

[See GAO note.]

Again, may I state our appreciation at being afforded the opportunity to comment on the draft report. We trust that if the report is issued, this letter will also be published with it.

Sincerely,

Harry J. Gray
President

HJG:hsq

GAO note: Material eliminated relates to matters which were presented in the draft report but which have been revised or omitted from the final report.

APPENDIX III

United
Aircraft

President
Chief Executive Officer

August 6, 1973

Mr. Harold H. Rubin
Deputy Director (Technology Advancement)
United States General Accounting Office
Washington, D. C. 20548

Dear Mr. Rubin:

On July 13, 1973, I wrote you my comments on the Comptroller General's Draft Report on "Need to Assure that DOD Does Not Absorb Costs of Commercial Development Work Through IR&D Allocations."

In reading the Draft Report again, I could infer from it that the Government contracts for, and pays all the costs of, the development of every engine used by the military, and at the same time, through its IR&D support, pays a portion of the cost of development of engines which have purely commercial application. Because this inference is not consistent with the facts, and because I did not discuss this subject in my July 13, 1973 letter, I am writing this second letter to dispel any misunderstanding of this point.

The term "commercial engine" as it is used in my letter connotes an engine, the development of which was undertaken by Pratt & Whitney Aircraft on its own initiative, and to its own Specification, to meet what it believed to be a market requirement, as opposed to a "military engine" which is developed under contract with the Government to the Government's specification, to meet the Government's requirements.

A "commercial engine" is offered to all potential customers, Government as well as commercial, on the same terms and conditions and at the same price. "Commercial engines" have, in fact, been purchased in significant quantities by the Government.

The development of the JT8D engine, for example, was initiated by P&WA in March 1960. P&WA has had no contracts either Government or commercial, for the development of the engine. The first production engine was delivered in 1962. Since that time and through 1974, P&WA will have delivered 109 JT8D engines to the Government for use in the AF C9A, the Navy C9B, the AF T43 Navigational Trainer and the FAA's Boeing 727 airplane.

Other P&WA "commercial engines" purchased by the Government include the JT3D, the JT12, and the JT9D.

EAST HARTFORD, CONNECTICUT 06108

APPENDIX III

UNITED AIRCRAFT CORPORATION

Mr. Harold H. Rubin
U. S. General Accounting Office

August 6, 1973
Page 2

I trust that this information dispels any remaining doubts as to the equity of the present system of allocating the costs of developing engines. If the Comptroller General's report is published, I should appreciate your publishing this letter, as well as my letter of July 13, 1973, with it.

Sincerely,

Harry J. Gray
President

HJG:jp

APPENDIX IV

PRINCIPAL OFFICIALS OF THE DEPARTMENT OF DEFENSE AND THE DEPARTMENT OF THE NAVY RESPONSIBLE FOR ADMINISTERING ACTIVITIES DISCUSSED IN THIS REPORT

	Tenure of office	
	From	To
DEPARTMENT OF DEFENSE		
SECRETARY OF DEFENSE:		
James R. Schlesinger	July 1973	Present
Elliot L. Richardson	Jan. 1973	May 1973
Melvin R. Laird	Jan. 1969	Jan. 1973
Clark M. Clifford	Mar. 1968	Jan. 1969
Robert S. McNamara	Jan. 1961	Feb. 1968
DEPUTY SECRETARY OF DEFENSE:		
William P. Clements, Jr.	Jan. 1973	Present
Kenneth Rush	Feb. 1972	Jan. 1973
Vacant	Jan. 1972	Feb. 1972
David Packard	Jan. 1969	Dec. 1971
Paul H. Nitze	July 1967	Jan. 1969
Cyrus R. Vance	Jan. 1964	June 1967
DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING:		
Malcolm R. Currie	June 1973	Present
Dr. John S. Foster, Jr.	Oct. 1965	June 1973
Dr. Harold Brown	May 1961	Sept. 1965
ASSISTANT SECRETARY OF DEFENSE (INSTALLATIONS AND LOGISTICS):		
Arthur I. Mendolia	June 1973	Present
Barry J. Shillito	Jan. 1969	Feb. 1973
Thomas D. Morris	Sept. 1967	Jan. 1969
Paul R. Ignatius	Dec. 1964	Aug. 1967

APPENDIX IV

	Tenure of office	
	From	To
DEPARTMENT OF THE NAVY		
SECRETARY OF THE NAVY:		
J. William Middendorf II	June 1974	Present
John W. Warner	May 1972	May 1974
John H. Chafee	Jan. 1969	May 1972
Paul R. Ignatius	Sept. 1967	Jan. 1969
Charles F. Baird (acting)	Aug. 1967	Sept. 1967
Robert H. Baldwin (acting)	July 1967	Aug. 1967
Paul H. Nitze	Nov. 1963	June 1967
CHIEF OF NAVAL MATERIAL:		
Adm. Isaac C. Kidd, Jr.	Dec. 1971	Present
Adm. Jackson D. Arnold	July 1970	Dec. 1971
Adm. Ignatius J. Gallantin	May 1965	June 1970

Senator McINTYRE. We will call as our next and last witness of the day Mr. Kenneth L. Woodfin, assistant administrator for procurement, National Aeronautics and Space Administration.

I want to welcome you here this afternoon, Mr. Woodfin.

Senator PROXMIRE. I would just like to say to the Comptroller General, Mr. Staats, that I think your testimony has been of a very, very high order. I know it has been an extremely difficult 5 years for you working on this program. And I appreciate very much the extraordinary efforts that have gone into your studies here.

Mr. STAATS. It is a very complicated area.

Senator PROXMIRE. I know it is.

Mr. STAATS. Thank you very much.

Senator McINTYRE. Thank you.

Mr. Woodfin, I want you to have ample opportunity to testify in any way you want, and to tell us how you feel about this issue. But I notice that your statement runs almost 15 pages. So if you can encapsulate it and reduce the time on this statement, we will appreciate it, and it will give us some time for questions. Go right ahead and where you can cut it down, do so.

Senator PROXMIRE. I second that view.

Senator McINTYRE. Your statement in its entirety will appear in the record. *

STATEMENT OF KENNETH L. WOODFIN, ASSISTANT ADMINISTRATOR FOR PROCUREMENT, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, ACCOMPANIED BY JOSEPH GARCIA, DIRECTOR OF PRICING

Mr. WOODFIN. Thank you, Senator.

I am pleased at the opportunity to testify today on this subject, because I think NASA's views are somewhat like Defense's, but in some cases somewhat different.

And I have with me this afternoon Mr. Joe Garcia of my staff, who is a little more familiar with some of the details than I am, so we will rely on him occasionally.

The central purpose and primary goal of I.R. & D. is to acquire the technological skills and capabilities which a company believes will be needed to compete effectively for new business. As long as competition remains the cornerstone of Federal procurement policy, we believe there is absolutely nothing that the Government should do to change materially the independent character of this activity in terms of its technological content and scope. Independence of thought and action are essential ingredients of the competitive process and I.R. & D. and B. & P. are but manifestations of this independence. In a sense, I.R. & D. and B. & P. is the price the Government must pay, as a consumer of goods and services, for maintaining and operating a competitive system of awarding contracts.

Beyond that, we believe that research and development performed under I.R. & D. has been a major contributing factor in reducing technological uncertainty and providing a reserve of talent and expertise needed to conduct this agency's sophisticated aeronautics and space programs.

We believe that the independent character of this activity is a prime motivator of new ideas and new technology which support and drive the NASA mission.

*See prepared statement of Mr. Woodfin, p. 241.

We are not all that certain what causes innovative research, but we suspect that the spur of competition and the dynamics of business survival are as good incentives for conducting innovative research as we are likely to find.

We realize, of course, that the quality of competition and the market and contractual restraints in the defense and aerospace business, generally, are quite different from those typically found in the commercial environment. For NASA, it's largely a world of intense initial competition followed by cost reimbursement contracts, with administrative controls and motivational features designed to provide the needed visibility and to encourage efficient contract performance. Under these conditions we would be the first to admit that there is a need for Government control over I.R. & D. and B. & P. activity, but it is our basic belief that this control should be as compatible as possible with the essential independent character of this activity.

It is NASA policy and procedure to allow, as an indirect charge to NASA contracts, reasonable costs of I.R. & D. and B. & P. activity undertaken by NASA contractors. NASA does not have an agency relevancy rule, nor do we demand or acquire, as a matter of course, royalty-free licenses on patents and unlimited-use rights on data stemming from I.R. & D. and B. & P. activity.

For NASA's major contractors, determinations of reasonableness of the level of I.R. & D. and B. & P. expenditures are made, in cooperation with the DOD, through the annual negotiation of advance agreements which define the extent of Government financial support.

NASA participates in the technical review and negotiation process on a selective basis, the criteria being a combination of technical interest and financial involvement. However, it has been NASA policy to accept as our own all DOD executed advance agreements on I.R. & D. and B. & P.

Turning now to I.R. & D. issues, we would like to express our position on four topics, and they are: (i) the general nature of Government controls that should be imposed; (ii) the question of benefits received from I.R. & D. (iii) the merits of relevancy as a condition of cost allowability; and (v), the need for patents and data rights resulting from I.R. & D. and B. & P. activity.

With regard to controls, the problem with I.R. & D. is that we are caught between two seemingly different, almost inconsistent concepts.

One is the need for Government visibility and control, in a largely cost-oriented field of contracting, to insure that contract costs are spent wisely and efficiently. The other is the concept of independence embodied in I.R. & D., which is rooted in and driven by our competitive system of awarding contracts. Confronted with these two somewhat alien concepts, it would seem that our objective should be to develop a framework of controls that will protect the Government's interests without doing great harm to the essential independent character of I.R. & D. activity.

We believe that the present DOD/NASA approach, less the requirement for military relevancy, represents the best method of combining the features of Government control and contractor independence in the conduct and management of I.R. & D. activity.

While the present DOD/NASA approach can surely be refined and sharpened to more nearly achieve that fine balance between controls and independence, we know of no other approach that can.

The question of benefits received from I.R. & D. is a recurring issue. The role of I.R. & D. in advancing technology and the benefits received therefrom is indeed difficult to measure. The problem here lies in the trial and error nature of the activity, the natural time lag between I.R. & D. and practical application and the synergistic flow and movement of knowledge, all of which makes I.R. & D. technological benefits and rewards difficult to identify and track and more difficult to prove.

Like the GAO, we are unable to demonstrate clearly that the measurable benefits of I.R. & D. are worth the cost. However, we would like to provide for the record a series of examples of I.R. & D. projects that have resulted in significant benefits to NASA.

The question of relevancy has been debated for at least 10 years. As we said before, NASA has no relevancy rule, but we have observed closely the policies and practices of the DOD in implementing the military relevancy requirement of section 203 of Public Law 91–441. Our basic concern with an agency relevancy requirement is that we think it could create some undesirable technological distortions.

If current allocation practices are to apply, an agency-by-agency relevancy requirement would seem to imply that the Government is intent on having the technical content and makeup of I.R. & D. and B. & P. always to be in perfect harmony with the current mix of customers. Frankly, we see no good purpose being served in having technological needs being shaped and dictated by something as random and irrelevant as current mix of customers.

Who among the current mix of customers is going to absorb the costs of research in urban mass transit and energy technology if the company has no contracts from agencies having direct and relevant interest?

As you know, the priorities and technological needs of the country are constantly changing. How easily and quickly these priorities and needs are met will depend in part on industry's capability to respond.

Relevancy, in our opinion, would work as a disincentive to change for its main thrust and message is to maintain a technological status quo.

In our opinion, a Governmentwide policy and procedure will prove unworkable if it is combined with an agency-by-agency relevancy requirement. This opinion is based on our experience with the military relevancy rule.

NASA policy and procedure on I.R. & D. is closely alined and attuned to the policy and procedure followed by the DOD. Generally, this single face-to-industry arrangement has worked well for NASA. This is not to say, however, that the military relevancy rule has not been the source of some conflict and suspicion.

We do know that there are I.R. & D. projects of interest and value to NASA which are being declared nonrelevant by DOD, and we find ourselves in the somewhat untenable position of being a party to an agreement which specifically identifies projects of interest to this agency that are deemed nonrelevant by DOD. Fortunately, NASA and DOD interests coincide in many areas.

But we surmise that this same community of interest does not exist, either for DOD or NASA, with other Government agencies. To conclude, we believe that an agency-by-agency relevancy requirement would provoke a form of technological parochialism that would be

difficult to control, and therefore, be a divisive force in establishing and maintaining a Government-wide policy and procedure.

Our last topic deals with patents and data rights. The issue here is whether the Government should seek royalty-free licenses on patents and unlimited use rights on data resulting from company I.R. & D. programs in those instances where the Government has made substantial contributions in underwriting the costs of these programs. Involved are questions of equity and motivation that run to the very core of the I.R. & D. problem.

On the one hand, it appears eminently reasonable that the Government should acquire property rights to inventions and data stemming from I.R. & D. programs substantially supported by the Government. Yet, if the Government is to take a company's best ideas and disseminate them to whomever the Government chooses, it is likely we will destroy any incentive the company may have to conduct innovative research, to invest company money and apply the best talent in the hope that somewhere down the line there will be a payoff for the company in the form of sales and profits. It seems clear that if we move too far in the direction of patents and data rights, we may undermine the very purpose for which I.R. & D. is undertaken.

Having said what we believe about I.R. & D., how we operate and the position we take on certain issues, we would now like to offer some suggestions for improving the administration of I.R. & D. and B. & P. activity.

First, I would like to discuss cost sharing.

Recognizing the potential commercial benefits, in terms of competition and patents, which can result from I.R. & D. and B. & P. allowances, it only seems appropriate that we should reopen an old area of contention—cost sharing. A case can be made, we believe, for requiring contractors to share in the cost of I.R. & D. and B. & P. from the first dollar.

If required, the minimum contractor share should be stipulated in law, with a lesser share, or no sharing at all, required of smaller contractors. The argument is made that a form of cost sharing is taking place under the existing system.

We believe, however, that this is a consequence of the adversary nature of the negotiation and, at times, the audit process. In no case is cost sharing guaranteed under the present system; thus, it is not equitable in that some companies do not share at all.

We believe that a concept of cost sharing by major contractors could provide further realism to the present discretionary moneys contractors allocate for I.R. & D. and B. & P. In any event, we believe that the benefits and equities of cost sharing needs to be further explored in developing final legislation on this matter.

The next point I would like to discuss is interchangeability; that is, between I.R. & D. and B. & P.

We would also like to suggest that the Government revert to a system of negotiating separate ceilings for I.R. & D. and B. & P. with no option for the interchange of I.R. & D. and B. & P. costs within the combined ceilings.

We understand and fully appreciate the difficulties involved in policing the proper classification and recording of these costs, but this is not reason enough, in our opinion, for canceling out and obscuring the relative value of I.R. & D. and B. & P. I.R. & D. has far more

intrinsic technological value than B. & P., and that value should be properly recognized and supported. If accounting practices and auditing procedures are inadequate to distinguish between the two costs, then improvements should be undertaken by precontractual resolution of the accounting problems involved.

Mr. Chairman, this concludes my abbreviated statement. In closing, I would like to say that it is our hope, and I'm sure it is equally shared by all concerned, that this matter be finally resolved as a result of these hearings. My colleague and I will be glad to discuss any aspect of my statement, if you wish.

[The prepared statement follows:]

PREPARED STATEMENT OF KENNETH L. WOODFIN

I am pleased to have the opportunity to appear before your subcommittees to discuss IR&D. During the course of the next 15 minutes or so, I would like to express NASA's views and perceptions of IR&D, describe our policy, the way we operate and the position we take on certain IR&D issues, and finally, to offer some suggestions for improving the administration of IR&D and B&P activity.

VIEWS AND PERCEPTIONS

We suspect that something closely akin to IR&D has been going on in this country since the turn of the century, perhaps even before that. Outside the Government, IR&D is part of what is commonly known as industrial research, and no one seriously questions the propriety of industrial concerns engaging in this kind of activity, or the propriety of consumers paying for the cost of this research in the products and services they buy. To be sure, there are significant differences in the quality of market restraints between defense and aerospace companies and industrial concerns producing goods and services for the civilian economy. We submit, however, that there are no fundamental differences in the purpose for which these costs are incurred or who ultimately pays the bill.

The central purpose and primary goal of IR&D is to acquire the technological skills and capabilities which a company believes will be needed to compete effectively for new business. As long as competition remains the cornerstone of federal procurement policy, we believe there is absolutely nothing that the Government should do to change materially the independent character of this activity in terms of its technological content and scope. Independence of thought and action are essential ingredients of the competitive process and IR&D and B&P are but manifestations of this independence. In a sense, IR&D and B&P is the price the Government must pay, as a consumer of goods and services, for maintaining and operating a competitive system of awarding contracts.

Beyond that, we believe that research and development performed under IR&D has been a major contributing factor in reducing technological uncertainty and providing a reserve of talent and expertise needed to conduct this agency's sophisticated aeronautics and space programs. We believe that the independent character of this activity is a prime motivator of new ideas and new technology which support and drive the NASA mission. We are not all that certain what causes innovative research, but we suspect that the spur of competition and the dynamics of business survival are as good incentives for conducting innovative research as we are likely to find.

We realize, of course, that the quality of competition and the market and contractual restraints in the defense and aerospace business, generally, are quite different from those typically found in the commercial environment. For NASA, it's largely a world of intense initial competition followed by cost reimbursement contracts, with administrative controls and motivational features designed to provide the needed visibility and to encourage efficient contract performance. Under these conditions we would be the first to admit that there is a need for Government control over IR&D and B&P activity, but is it our basic belief that this control should be as compatible as possible with the essential independent character of this activity.

NASA POLICY

Because of these views and perceptions, it is NASA policy and procedure to allow, as an indirect charge to NASA contracts, reasonable costs of IR&D and B&P activity undertaken by NASA contractors. NASA does not have an agency relevancy rule, nor do we demand or acquire, as a matter of course, royalty-free licenses on patents and unlimited-use rights on data stemming from IR&D and B&P activity.

NASA PRACTICES

For NASA's major contractors, determinations of reasonableness of the level of IR&D and B&P expenditures are made, in cooperation with the Department of Defense, through the annual negotiation of advance agreements which define the extent of Government financial support. Under this procedure, each major contractor is required to submit, in advance of negotiations, a technical plan which describes in reasonable detail the IR&D projects the company intends to pursue and reports progress and status of on-going work.

These technical plans are reviewed by research specialists within the DOD and NASA to determine the technical quality of each company's program and to provide a medium of technical interchange between Government and industry. The results of these technical reviews are consolidated into a single rating which is transmitted to the Government negotiating team for consideration, together with other relevant information, in setting an appropriate level of Government financial support.

NASA participates in the technical review and negotiation process on a selective basis, the criteria being a combination of technical interest and financial involvement. However, it has been NASA policy to accept as our own all DOD executed advance agreements on IR&D and B&P. For small contractors, NASA has generally agreed to accept the formula results applied by the DOD as a basis of determining reasonableness of these costs.

ISSUES

Turning now to IR&D issues, we would like to express our position on four topics, some of which were treated rather inconclusively in the GAO report of June 5, 1975 to your Subcommittees. They are: (i) the general nature of Government *controls* that should be imposed; (ii) the question of *benefits received* from IR&D (ii) the merits of *relevancy* as a condition of cost allowability; and (iv), the need for *patents and data* rights resulting from IR&D and B&P activity.

CONTROLS

With regard to controls, the GAO report describes a number of different alternatives to the present DOD NASA approach, ranging from virtually no controls at all to an elaborate system of line item control and direct contracting. In our opinion, each alternative fails, in diverse ways, to recognize and accommodate certain basic properties of the IR&D problem.

The problem with IR&D is that we are caught between two seemingly different, almost inconsistent concepts. One is the need for Government visibility and control, in a largely cost oriented field of contracting, to insure that contract costs are spent wisely and efficiently. The other is the concept of independence embodied in IR&D, which is rooted in and driven by our competitive system of awarding contracts. Confronted with these two somewhat alien concepts, it would seem that our objective should be to develop a framework of controls that will protect the Government's interests without doing great harm to the essential independent character of IR&D activity.

We believe that the present DOD/NASA approach, less the requirement for military relevancy, represents the best method of combining the features of Government control and contractor independence in the conduct and management of IR&D activity. Under this approach contractors are relatively free in selecting the projects and opportunities they wish to pursue, and free to modify or stop work on planned projects and start new investigations. The constraint is on total dollars and not the directions taken in research and development. While the present DOD/NASA approach can surely be refined and sharpened to more nearly achieve that fine balance between controls and independence, we know of no other approach that can.

BENEFITS RECEIVED

The question of benefits received from IR&D is a recurring issue and we will attempt to address it as forthrightly and intelligently as possible.

To start, it is almost a truism that the value and benefits of research and development, either directed or of the independent variety, are difficult if not impossible to measure. While we certainly have no quarrel with those who say that IR&D is in the Nation's best interest to promote competition, advance technology and foster economic growth, we do not believe that these assertions are readily susceptible to audit verification. As we have said before, we see a definite link between IR&D and competition. We think that the link is real and essential. If meaningful competition has value, so does IR&D.

The role of IR&D is advancing technology and the benefits received therefrom is indeed difficult to measure. The problem here lies in the trial and error nature of the activity, the natural time-lag between IR&D and practical application and the synergistic flow and movement of knowledge, all of which makes IR&D technological benefits and rewards difficult to identify and track and more difficult to prove.

Like the GAO, we are unable to demonstrate clearly that the measurable benefits of IR&D are worth the cost. However, we would like to provide for the record a series of examples of IR&D projects that have resulted in significant benefits to NASA.* We recognize that there is a danger that these examples will be interpreted as the only good received from IR&D, hardly justifying the total cost of the program. To this, we would only say that the principal value of IR&D is in the reduction of technological uncertainty, and in this regard, the so-called losers may be just as valuable and important as those projects which show a tangible and measurable benefit.

RELEVANCY

The question of relevancy has been debated for at least 10 years. As we said before, NASA has no relevancy rule, but we have observed closely the policies and practices of the DOD in implementing the military relevancy requirement of Section 203 of Public Law 91–441. Our basic concern with an agency relevancy requirement is that we think it could create some undesirable technological distortions.

Currently, IR&D and B&P expenditures are generally treated as period costs allocated across the full spectrum of the contractor's business during the period. If current allocation practices are to apply, an agency-by-agency relevancy requirement would seem to imply that the Government is intent on having the technical content and makeup of IR&D and B&P always to be in perfect harmony with the current mix of customers. Frankly, we see no good purpose being served in having technological needs being shaped and dictated by something as random and irrelevant as current mix of customers.

Assuming there is a relationship between current IR&D and future sales, an agency-by-agency relevancy requirement would also seem to imply that the Government is interested in having contractors locked into a present mix of business mold. Again we ask, what great good is being served in having companies limit the scope of their research to areas of relevant interest to current customers? Who among the current mix of customers is going to absorb the costs of research in urban mass transit and energy technology if the company has no contracts from agencies having direct and relevant interest?

As you know, the priorities and technological needs of the country are constantly changing. How easily and quickly these priorities and needs are met will depend in part on industry's capability to respond. Relevancy, in our opinion, would work as a disincentive to change for its main thrust and message is to maintain a technological status quo.

The Commission on Government Procurement said that IR&D was in the Nation's best interest, but only, apparently, if it was relevant to an agency function or operation. The Commission also expressed an urgent need for a Government-wide policy and procedure on IR&D. In our opinion, a Government-wide policy and procedure will prove unworkable if it is combined with an agency-by-agency relevancy requirement. This opinion is based on our experience with the military relevancy rule.

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* See IR&D benefits to NASA, p. 251.

NASA policy and procedure on IR&D is closely aligned and attuned to the policy and procedure followed by the DOD. Generally, this single face to industry arrangement has worked well for NASA. This is not to say, however, that the military relevancy rule has not been the source of some conflict and suspicion. While there reportedly are no documented cases where the military relevancy rule has resulted in DOD paying less than its allocable share of IR&D and B&P costs, there are at least two significant unknowns concerning possible detrimental aspects of the relevancy rule to this agency. First, we don't know to what extent contractors are being influenced by the relevancy rule in structuring their IR&D programs in order to avoid a DOD relevancy disallowance. Second, we do not know the extent to which relevancy determinations are impacting the technical review process and, in turn, negotiated ceilings.

We do know that there are IR&D projects of interest and value to NASA which are being declared nonrelevant by DOD, and we find ourselves in the somewhat untenable position of being a party to an agreement which specifically identifies projects of interest to this agency that are deemed nonrelevant by DOD. Fortunately, NASA and DOD interests coincide in many areas, but we surmise that this same community of interest does not exist, either for DOD or NASA, with other Government agencies. To conclude, we believe that an agency-by-agency relevancy requirement would provoke a form of technological parochialism that would be difficult to control, and therefore, be a divisive force in establishing and maintaining a Government-wide policy and procedure.

PATENTS AND DATA RIGHTS

Our last topic deals with patents and data rights. The issue here is whether the Government should seek royalty-free licenses on patents and unlimited-use rights on data resulting from company IR&D programs in those instances where the Government has made substantial contributions in underwriting the costs of these programs. Involved are questions of equity and motivation that run to the very core of the IR&D problem.

On the one hand, it appears eminently reasonable that the Government should acquire property rights to inventions and data stemming from IR&D programs substantially supported by the Government. Yet, if the Government is to take a company's best ideas and disseminate them to whomever the Government chooses, it is likely we will destroy any incentive the company may have to conduct innovative research, to invest company money and apply the best talent in the hope that somewhere down the line there will be a pay-off for the company in the form of sales and profits. It seems clear that if we move too far in the direction of patents and data rights we may undermine the very purpose for which IR&D is undertaken.

One other thought is pertinent. It has been our experience that the problem of obtaining patents and data rights for pruposes of recompetition can be largely overcome in most instances by simply doing a good job of advance procurement planning. We find patents and data rights to be a non-issue if at the time of the initial competitive buy, appropriate contractural arrangements are made to obtain a suitable reprocurement data package, complete with royalty-free licences and unlimited-use rights to the data.

IMPROVEMENTS

Having said what we believe about IR&D, how we operate and the position we take on certain issues, we would now like to offer some suggestions for improving the administration of IR&D and B&P activity.

COST SHARING

Recognizing the potential commercial benefits, in terms of competition and patents, which can result from IR&D and B&P allowances, it only seems appropriate that we should reopen an old area of contention—cost sharing. A case can be made, we believe, for requiring contractors to share in the cost of IR&D and B&P from the first dollar. If required, the minimum contractor share should be stipulated in law, with a lesser share, or no sharing at all, required of smaller contractors.

The argument is made that a form of cost sharing is taking place under the existing system. We believe, however, that this is a consequence of the adversary nature of the negotiation and, at times, the audit process. In no case is cost sharing

guaranteed under the present system; thus, it is not equitable in that some companies do not share at all.

We believe that a concept of cost sharing by major contractors could provide further realism to the present discretionary monies contractors allocate for IR&D and B&P. In any event, we believe that the benefits and equities of cost sharing needs to be further explored in developing final legislation on this matter.

INTERCHANGEABILITY

We would also like to suggest that the Government revert to a system of negotiating separate ceilings for IR&D and B&P with no option for the interchange of IR&D and B&P costs within the combined ceilings. We understand and fully appreciate the difficulties involved in policing the proper classification and recording of these costs, but this is not reason enough, in our opinion, for canceling out and obscuring the relative value of IR&D and B&P. IR&D has far more intrinsic technological value than B&P, and that value should be properly recognized and supported. If accounting practices and auditing procedures are inadequate to distinguish between the two costs, then improvements should be undertaken by pre-contractual resolution of the accounting problems involved.

Mr. Chairman, this concludes my prepared statement. In closing, I would like to say that it is our hope, and I'm sure it is equally shared by all concerned, that this matter be finally resolved as a result of these hearings. My colleague and I will be glad to discuss any aspect of my statement, if you wish.

Senator McINTYRE. Mr. Staats was very clear in his support of line item funding for I.R. & D., making it subject to the normal budgetary process. What are your views on this subject?

Mr. WOODFIN. Line item funding creates one particular basic distortion. The word "independent" must be brought into the subject again, because if the Government direct research, which is probably influenced strongly by the Government's budget process, the Government is going to tend to manage, control, and categorize it to a great extent, and then justify it in the Government's own view of what might be appropriate as opposed to the contractor's views of what might be bought in an innovative I.R. & D. approach. I think direct line item budgeting would result in another highly general and highly nonspecific entry and one that is very hard to justify in terms of 1-year programs.

I think I.R. & D. programs are sometimes very difficult to bring off in a year, and they are very difficult to justify in a meaningful way for a program that does not have a very high success potential, and maybe the Government needs to know about the failures as much as the successes. I think the tendency in direct line item budgeting is to budget only for those things you think will be successful, in order to get a product, or a result that you want, and inevitably the Government side will drive the program to a very extreme extent.

Senator McINTYRE. You state your belief that research and development performed under I.R. & D. has been a major contributing factor in reducing technological uncertainty and providing a reserve of talent and expertise needed to conduct NASA's programs. Can you give any specific examples now to prove your point, and put the balance in the record?

Mr. WOODFIN. I will not try to elaborate too much, Senator.

I think in several areas of metallurgy, fuel cells, and others, NASA feels, and is ready to present supporting data, that there have been some I.R. & D. programs which have been basically beneficial to the space program. There also have been some research programs in the aeronautical area that are basically of value to NASA. Remember, NASA pays a smaller percentage of the cost of I.R. &.D. in relation to DOD and we are getting rewards and benefits from that percentage.

Senator McINTYRE. Can you say that the situation would have been any different if industry had been required to pay for a larger share of I.R. & D. than they actually have spent?

Mr. WOODFIN. That again is the subject of cost sharing, or some type of an agreed allocation between the parties. I think industry would certainly believe that they were being penalized for being defense contractors if they were not allowed the same type of research as an indirect expense that they might expect to receive from commercial customers.

In other words, I am thinking of a joint cost center where a contract is working on I.R. & D. having potential military and commercial benefits. I believe some form of sharing, as I indicated in my statement, would bring a little more reality to the situation. It seems to me that a contractor that is going to put up his own money would be a bit more persuaded that the program have potential sales benefits and therefore be more realistic about that program than he would be otherwise.

Senator McINTYRE. Why don't you over in NASA have an agency relevancy rule like DOD, considering that you indicate your satisfaction with the other DOD R. & D. practices.

Mr. WOODFIN. We consider that to tie ourselves completely to an agency rule would probably be narrowminded on our part, and very difficult to implement in terms of a Government-wide policy. I have a hard time understanding how we can negotiate a single rate for the allocation of I.R. & D. costs to all Government contracts when, at the same time, each of perhaps several agencies are making determinations of relevancy as a condition of allowability of I.R. & D. cost to their contracts. In other words, said by Mr. Staats, and I agree, that one rate is certainly desirable, and one Government face to industry is desirable. And hopefully there will be a self-control in this thing if we can arrive at a reasonable overall ceiling number. The number up to now, on a total basis, has been somewhere in the range of about 3 to 5 percent of DOD and NASA sales. That doesn't seem like an outlandish number in terms of the relationships obtaining in some cases for commercial I.R. & D. The key is an agreement on a set of overall programs necessary to maintain a good technological base, and a strong and viable competitor. Even if the company is working for Defense and not for NASA, if he maintains some of the same skills, wouldn't NASA be shortsighted to cut that company off as a potential NASA contractor by not allowing the I.R. & D. necessary to keep him a viable competitor?

I guess overall we are trying to keep him as a viable competitor, and that is my basis for my disagreement with an agency relevancy requirement.

Senator McINTYRE. Why don't you demand or acquire, as a matter of course, royalty free licenses on patents and unlimited-use rights on data stemming from I.R. & D. and B. & P. activity?

Mr. WOODFIN. Frankly, this has not been a big problem in NASA, because we haven't done much in the way of repeat production buying.

I guess the Space Shuttle is the first time we have seen anything in the way of a production buy.

NASA historically buys such rights and data as they need in the initial contract phase. And, generally we haven't needed a reprocurement package.

I also believe there is a tremendously complex problem of how you determine the extent of Government patent rights, whether 25 percent, 50 percent, or 75 percent, depending on how much you participate in the cost of I.R. & D. in the period involved. I think this is a complex issue. Further, I think a good program of advance procurement planning usually protects the Government in terms of buying the proper rights and data as they go by getting an agreement in the initial competitive atmosphere of what data rights the Government needs for further manufacture.

If the Government waits for several years to make this determination and go back, then you get into these hassels with the manufacturers, did you or did you not invent this under I.R. & D. I guess I would lean to some type of a royalty-free right to use, if we had been a substantial I.R. & D. contributor to the data rights involved. I don't think we have had to face it much, but I would come down on that side of the argument saying, look, if I contributed substantially to the I.R. & D. expense of that particular invention, and I want to use it later, I think it would be sort of a double-dip for industry to come back to me and charge me for those patent and data rights. So I guess I would come down on the side that the Government should have such rights where we have been substantial I.R. & D. contributors.

Senator McIntyre. Concerning patents and data rights, you say that if the Government takes a company's best ideas and disseminates them, the company's incentive to conduct innovative research will be destroyed. But isn't the company which unearths a new approach in the best position to compete for continuation of this approach by virtue of the experience it has gained, primarily at Government expense?

Isn't this argument against acquiring patent rights, where the Government bears the majority of the expense, more an emotional issue than an actual problem?

Mr. Woodfin. It seems to be a question of whether or not a company can properly incentivize its inventors to do all this innovative research, without providing some patent protection. Whether or not this is a fact, I don't think anybody has proved, or can prove, probably. And it is a very hard thing to get your hand on, what actually causes innovation and what causes invention. And my view is that it is a very difficult thing to say yes or no on. I can believe that a company that invents the product does have some natural advantage in future competition for that product because of its inside knowledge of how to make it. I do believe that the question really is one of individual innovation as opposed to company innovation. In other words, if the individuals involved will invent better in this patent protected atmosphere, that is really one of the sole criteria for the whole idea of I.R. & D., to try and incentivize an individual.

Senator McIntyre. Senator Proxmire.

Senator Proxmire. Mr. Woodfin, I am, as you might imagine, quite distressed with your position in your statement. I am sure that is no surprise to you.

I find your reference, for example, on page 2, where you say—and I will read a sentence or two that you have here—"As long as competition remains the cornerstone of Federal procurement policy, we believe there is absolutely nothing that the Government should do to

change materially the independent character of this activity in terms of its technological content and scope. Independence of thought and action are essential ingredients of the competitive process and I.R. & D. and B. & P. are but manifestations of this independence."

Where is there independence in this program? The Comptroller General made a study of four typical contracts and he found that only 1 percent—let me put it this way—of the four firms, only one of them had as much as 11 percent in new concepts which would require any independence.

One firm had 1 percent, and the other firms had none. The other two categories were improving the existing product. And that certainly isn't something that requires independence. The existing product, which presumably the Government wants improved, responding to established customer directives, was for one firm 75 percent, and for another, 64 percent, and another, 99 percent, and another 100 percent.

In other words, they were responding to what the Government wanted them to do, no independence there at all. So isn't this really a nice rhetoric? And we all believe in our free enterprise competitive system, but it doesn't have much to do with this program, does it?

Mr. WOODFIN. If I recall the statistics on this I think the breakdown was about 5 percent basic research, something like 30 percent in applied research, about 50 in development, and about 15 percent in studies, based on an Air Force study I saw on the subject of what industry does with I.R. & D. money.

Senator PROXMIRE. You are justifying the whole program, it seems to me, when you are talking about independence on this 5 percent. Why not just have that 5 percent and then let the other come into a situation where we have control and knowledge and information and understanding about it?

Mr. WOODFIN. I think my problem with the control and knowledge and the understanding part is that Government directed R. & D. is all a onesided approach.

I can believe that some things that were developed under the NASA program have been outgrowths of I.R. & D. Even if the actual number of new inventions has been relatively small, they have been helpful. And it is questionable whether we would have had them at all without I.R. & D. There have been some actual inventions and some applied research in various areas of metallurgy and some other technological fields that we think were really helpful.

Senator PROXMIRE. It seems to me that you are making an argument for spending funds without accountability.

Mr. WOODFIN. I don't think it is without accountability.

Senator PROXMIRE. Nobody can tell us who got the money, or at least they won't tell us who got the money, they won't tell us what the money went for.

Mr. WOODFIN. All I know is that our participation in advance agreements and so forth, is published in an agency document which lists all the contractors and the amounts of money spent and received for I.R. & D.

Senator PROXMIRE. Are the contractors named in that document?

Mr. WOODFIN. Yes. However, it carries the "official use only" classification.

Senator PROXMIRE. And it is not classified, so it is not public, so there is no basis for a public debate or discussion or disagreement on it?

Mr. WOODFIN. No. I am not aware of the publication policy aspect concerning the document. I listened to the GAO discourse a few minutes ago about the possibility of company confidentiality, and I was puzzled myself, and I really haven't come to a conclusion on that.

I am sure that confidentiality must be the justification for why it is not published, in that it would appear to give one contractor knowledge of the size of the other's particular research areas, and so forth.

Senator PROXMIRE. They are using public funds, and why shouldn't the people who pay for it know about it?

It is not your money or my money, it belongs to the public.

Mr. WOODFIN. Senator, I would have no basic problem in publishing what the Government does in the I.R. & D. area.

Senator PROXMIRE. You put great stress on this relevancy rule and I am glad you do, because, I think you are a very intelligent and eloquent man, and you have had a lot of experience in procurement, and we should have a good argument on the side of this relevancy rule.

Your agency does not have a relevancy rule, you say?

Mr. WOODFIN. No, sir.

Senator PROXMIRE. This suggests that we appropriate $80 million that you spent in a year, $90 million that you spent in another year, that you spent on anything, nothing to do with space, that might not relate to anything in the world, that is very hard for me to understand and justify. As I understand, the National Science Foundation also comes into the Appropriations subcommittee of which I am chairman, and I can understand why they should have a great sweep, because they do have the responsibility for science, wherever it reaches. But the space program is the space program. We don't appropriate money for space in order for it to go into transportation, or for transportation so it goes into space. It seems to me we ought to know that the money that we are appropriating for the space program is for the space program, and not for something that is wholly unrelated to it or irrelevant to it.

Mr. WOODFIN. The relationship, as you can imagine, between our program and the defense program correlates to a very high percentage.

In other words, we have had limited problems with Defense not allowing something that NASA thought was relevant. But we have had virtually no problems with Defense allowing things NASA didn't think were largely relevant, keeping in mind that most of the NASA I.R. & D. dollars are in the aerospace industry, and most of our coalescence here is between ourselves and the Air Force. And the Air Force programs are sufficiently close to ours in most aspects of astronautics and also in aeronautics, so that we haven't had that much divergence of views. It is where the Air Force has seen fit, and was mentioned, I think, by Mr. Staats, in some of the areas of space science that the relevancy disallowances were made by Defense, to not allow some I.R. & D. type programs which we thought were very relevant to NASA.

Senator PROXMIRE. You see, we don't have any real control over the budget. That is our responsibility as Senators, and the responsibility of people in the House, too, to control the budget and direct our expenditures on some kind of priority basis. If we are going to

appropriate funds for space, and instead they go for defense, or appropriate funds for defense and they go for space or transportation or something else, then it seems to me that we don't really know what we are doing, we don't have any real ability to decide what our priorities should be.

The lack of relevancy rule troubles me very greatly for that reason.

Mr. WOODFIN. Perhaps the basic issue is whether or not we allow indirect expenses of this type on production type work in both NASA and Defense as a normal cost of doing business with contractors, and if not, then it may tend to create sort of arsenal-type companies that inevitably are going to operate somewhat differently in doing business with us, as differentiated from their commercial work, I should think. And in a captive Defense sales division I would have no trouble. But in joint divisions where we are doing both commercial and military work, then I think you would create some dichotomies where no I.R. & D. is allowed for defense work and only industrial research is allowed.

Senator PROXMIRE. Why don't you, under these circumstances, create an elite, exclusive group and get money from the Federal Government to do research anywhere they wish? If you are not going to have a relevancy rule, it seems to me that we ought to have a program that doesn't exclude these firms that do not contract with NASA or any other agency that does not have a relevancy rule. I think we should have everybody come in it. I think it is unfair to firms who may not be in the space business, but may have refined research capabilities. Why shouldn't they be able to get in on this program?

What I am saying is that there ought to be a program across the board, maybe some kind of a tax incentive program, or maybe some kind of a research grant program, but a program that enables all firms to come in and know that it is available, and know how they can qualify, and know that they can do it, rather than confine it to a few firms that contract with the space program.

Mr. WOODFIN. Right now I would have to say we are just trying to maintain a generally related technological industry capability.

Senator PROXMIRE. If you are, then this ought to be related. Maybe relevant is too limited a term. But it seems to me that gives you quite a bit of leeway.

Mr. WOODFIN. Right now I think we feel that the moneys that we have jointly agreed to with Defense have been sufficiently related to our program that we are not worried about specific relevancy in the NASA program.

Senator PROXMIRE. On page 8 you say: "We would like to provide for the record a series of examples of I.R. & D. projects which have resulted in significant benefits to NASA." I haven't seen that list. Is that list available anywhere?*

Mr. WOODFIN. No, sir, I don't think such a list has been provided before. We are prepared to submit such a list for the record. I have it here.

Senator PROXMIRE. It looks pretty imposing.

Mr. WOODFIN. It is an attempt on our part to present some of the relevant programs in these Defense and NASA contractor I.R. & D.

(See I R&D benefits to NASA, p. 251.)

programs that resulted in some technology that we could use. We tried to track it as best we could.

The problem often is that we do not have, in all cases, specific dollars associated with each example.

Senator PROXMIRE. That was my point. Is there any way at all that we can determine how much we have to pay to get these various benefits?

Mr. WOODFIN. It is virtually impossible to present a direct dollar correlation to all contractor developments.

Mr. GARCIA. Some of the projects do have I.R. & D. dollars related to them.

Senator PROXMIRE. Will you identify yourself for the record?

Mr. GARCIA. Joseph Garcia, Director of Pricing.

I say some of the projects do have the amount of I.R. & D. dollars that were spent in performing those projects, and in some cases we have been able to quantify the savings resulting from these projects.

Senator PROXMIRE. Are those unclassified?

Mr. GARCIA. Yes, sir.

Senator PROXMIRE. And do you have a summary anywhere? Because it looks like something we would like very much to dig into, we would like to dig into the detail as much as we can.

But it would be helpful if there were a summary indicating what the project was, and what it achieved.

Mr. GARCIA. Yes.

There are three parts in this package, and each part has a summary and a list.

Will you include that material in the record, the summary?

[The information follows:]

IR&D BENEFITS TO NASA

The attached is a narrative description of a series of 29 specific examples of IR&D judged as having resulted in strong benefit to NASA. Examples are summarized and arranged in the following categories:

Table I—Aeronautics.
Table II—Unmanned Space.
Table III—Manned Space.
Table IV—Applications.

TABLE I.—I.R. & D. STRONG BENEFITS TO NASA, AERONAUTICS

Title of benefit	Focal point center	Contractor	Programs benefited
Cooling technology and turbine development.	LeRC	GE, Aircraft Engine Group	NASA core turbine aerodynamic evaluation program.
Variable pitch/thrust reversing fan	LeRC	do	QCSEE.
Axial swirler combustor	LeRC	do	Clean combustor program.
Fan noise reduction program	LeRC	P. & W. Aircraft	JT-8D refan engine.
Inlet/engine compatibility criteria	LaRC	LTV Aerospace	General benefit future advanced aircraft.
Dynamics and aeroelasticity	JSC	Grumman Aerospace	General aerodynamics flutter analysis.

COOLING TECHNOLOGY AND TURBINE AERO IMPROVEMENT (GENERAL ELECTRIC AIRCRAFT ENGINE GROUP)

The objective of this IR&D program is to continually increase turbine inlet temperature capability while maintaining low levels of cooling flows to provide advantageous engine performance cycles. The results from this continuing program benefited the NASA Core Turbine Aerodynamics Evaluation Program contracted with General Electric for $1,480,500.

This $2,225,000 IR&D program provided NASA with the confidence to proceed with the advanced core turbine contract program with reduced risk at least a year sooner than if the IR&D work had not been conducted.

VARIABLE PITCH/THRUST REVERSING FAN (GENERAL ELECTRIC—AIRCRAFT ENGINE GROUP)

This IR&D program was designed to investigate aerodynamic, mechanical and acoustic characteristics of a variable pitch fan. The results from this program benefited the recently initiated NASA Quiet, Clean Short-haul Experimental Program (QCSEE) with General Electric for $30,388,000. The variable pitch fan is one of the highest risk elements in the QCSEE program because of the relatively small amount of demonstrated experience in the area. This $1,266,000 IR&D program significantly reduces QCSEE program risks and increases confidence for a successful NASA program.

AXIAL SWIRLER COMBUSTOR (GENERAL ELECTRIC—AIRCRAFT ENGINE GROUP)

The objective of this program was to achieve smokeless combustion for large turbofan engines. The technology from this program resulted in the development of an axial swirler combustor that has been incorporated in the General Electric CF6 engines used in DC–10 aircraft. The favorable low smoke level from this combustor concept was a starting point for one of the concepts incorporated in the NASA Experimental Clean Combustor program with General Electric for $1,119,300. The objective of the NASA Experimental Clean Combustor program is to demonstrate an experimental combustor in a modern high pressure ratio turbofan engine that would meet the 1979 emission levels proposed by EPA.

This $2,600,000 IR&D program helped to reduce the Clean Combustor program risks. However, the savings to NASA in terms of time and resources is very difficult to estimate at this time.

FAN NOISE REDUCTION PROGRAM (PRATT AND WHITNEY AIRCRAFT)

The objective of this program is to develop the technology for low noise high performance single stage fans for P&W commercial engines. A part of the IR&D work conducted from 1969 through 1972, at an approximate cost of $17,000,000, resulted in technology used in the JT8D refan engine.

This IR&D program significantly reduced the NASA JT8D Refan program risks. Withhout this IR&D effort, the NASA program would have required lengthy and costly fan research programs prior to the engine design. Initial results from the JT8D Refan program showed that performance was as predicted, proving the value of the previous IR&D work.

INLET/ENGINE COMPATIBILITY CRITERIA (LTV AEROSPACE CORPORATION)

This program, initiated in 1969 has the objective of providing a technique for measurement and analysis of steady state and transient flow characteristics of both aircraft inlets and engine compressors so that compatibility and design tradeoffs can be accomplished by element testing prior to final design of either component.

Specific savings in time and money cannot be estimated but if the theory and techniques initiated by LTV in this $677,000 I&RD program and subsequently demonstrated in NASA contracted work are successful, substantial savings would be possible in the development of future advanced aircraft and missiles.

DYNAMICS AND AEROELASTICITY (GRUMMAN CORPORATION)

IR&D work performed by Grumman since 1971 at a cost of $24,000 led to the development of a computer program for performing subsonic flutter analyses of multiple interfering surfaces and bodies which are so prevalent in the Space Shuttle configuration. Some of the significant time-saving features of the program are: automatic definition of the geometry for aerodynamic idealization: interpolation schemes to determine additional point values between known point values; provision to save the data for easy modification and for calculation of additional cases; and graphical display of output data for ease in understanding and design decision making.

These features have already saved $30K in computer time and over 6,000 manhours (equivalent to about $120K) on three Langley contracts. In addition,

the program has saved $60K in computer time and 12,000 manhours (about $240K) on a recently completed space shuttle flutter analysis under contract to Rockwell. Thus, the initial $24K IR&D investment has already saved about $450K on NASA programs.

TABLE II.—I.R. & D. STRONG BENEFITS TO NASA, UNMANNED SPACE

Title of benefit	Focal point center	Contractor	Programs benefited
Heat shield research and development.	LaRC	Martin-Marietta, Denver Division	Viking; Prime; Titan III-C; X-15; NASA PAET.
Microelectronics development	LaRC	do	Viking.
Long life propellant hardware	LaRC	do	Do.
Synchronous communication satellite.	GSFC	Hughes Aircraft Space and Communications Group.	SYNCOM 1, 2, 3; ATS 1, 3, 4, 5; SMS 1, 2. Commercial: INTELSAT I, II, III, IV.
Spaceborne optical sensors	GSFC	do	ATS-1, 3; VISSR for SMS; MSS for ERTS.
Remote multiplexer and decoder	GSFC	do	OSO.
Energy sources	GSFC	do	Long duration space missions.
Despin bearing and slip ring technology.	GSFC	do	Commercial: INTELSAT; COMSAT.
Radiometer-scatterometer	GSFC	GE, Space Division	S-193 for EREP; AAFE RADSCAT; SEASET.
Earth resources image analysis	GSFC	do	ERTS; General image analysis.
Very high resolution radiometer for ITOS.	GSFC	RCA, Government and Commercial Systems.	TIROS D, F; ITOS D, E, F, G.

HEAT SHIELD RESEARCH AND DEVELOPMENT (MARTIN MARIETTA CORPORATION—DENVER)

From 1962 through 1968, the Martin Marietta Corporation used some $550,000 of IR&D funds in studying the chemistry of ablative processes and on the development and evaluation of ablative materials. The results of this research led directly to new silicone elastomeric ablators and to their modifications into super-light weight ablative compositions with densities less than 240 Kg/m^3. High thermal efficiency and RF transparent ablators were developed from these very lightweight materials. Modest government contract funds were used only to characterize the materials. The IR&D saved at least a comparable amount in government contract funds and even more important provided a technology base in ablatives which met the needs of advanced missions without a long development time after a given mission was programmed. Examples of the use of this technology are:

a. The super-lightweight ablators reduced the weight of the Viking heat shield by some 30%, and this weight saving was applied to the science payload of the mission;

b. Elastomeric silicone ablators were used on the Air Force PRIME (Precision Recovery Involving Maneuvering Entry) program;

c. Sprayable ablative materials were flown on the X-15 and on the Titan III C Universal Payload Fairing;

d. Silicone ablators, both medium and lightweight, were used on the NASA PAET (Planetary Atmosphere Experiment Test).

MICROELECTRONICS DEVELOPMENT (MARTIN MARIETTA CORPORATION—DENVER DIVISION)

The objective of this IR&D effort was to develop the capability and the associated facility for the design and fabrication of flight quality microelectronics circuits—both thick film and thin film hybrid circuits.

The use of the new technology has been extremely beneficial to both the NASA Skylab and Viking programs. A total of 500 electro-shock protection preamplifiers and differential amplifiers were built for the Skylab Program. Because of the very specialized nature of the circuits and the critical schedule requirements obtaining comparable support from a subcontractor would have been extremely difficult. The Viking Program has been supplied with some 3000 hybrid diode arrays and relay drivers for use in electronic assemblies fabricated by Martin—Denver.

In addition, the Martin Marietta—Denver microelectronics capability prevented major schedule slippage in the Viking landing schedule when original

hybrid circuit suppliers were unable to meet schedule and quality commitments to Martin—Denver subcontractors.

Since Viking is a Mars mission it must meet a particular launch date and can not tolerate a schedule slippage which would result in delaying the mission till the next launch window 25 months later. Although it is not possible to provide a definitive value for program cost avoidance, it is most likely that the IR&D program costs of approximately $450K represented a very cost-effective investment.

LONG LIFE PROPELLANT HARDWARE (MARTIN MARIETTA)

One of the major concerns of the Viking Mars Lander project was the problem of landing site alteration caused by the lander rocket engine exhaust plume impinging on the Martian soil. The lander engine utilizes monopropellant hydrazine as its fuel and to help solve the impingement problem it was found desirable to use hydrazine free from organic impuntus. Available methods for producing purified hydrazine were very expensive—$400 per pound with a factor of 10 less impuntus. With expenditures of $50,000 IR&D funds, Martin-Marietta developed a purifaction method scaled to pilot planet operation capable of producing hydrazine with organic impurities reduced by a factor of 100 at a cost of $20 per pound. For the 30,000 pounds of hydrazine required this represents a cost of $600,000 instead of $12,000,000. The prohibitive cost of $400 per pound would force the use of undesirable Mil Std. hydrazine.

In addition the high purity hydrazine has been utilized to increase satellite lifetime both through improved propulsion system component compatability and by reducing exterior satellite contamination.

SYNCHRONOUS COMMUNICATIONS SATELLITES (HUGHES AIRCRAFT CO.)

The program described incorporated during the period 1951–1961 an effort funded at an approximate cost of $1,500,000, which was responsible for most of the basic concepts for orbital injection and control, stabilization, and key technology supporting the concepts used in all experimental and operational synchronous satellites. NASA missions making use of these concepts have been Syncom 1, 2 and 3 and ATS 1, 3, 4 and 5. They are also used in SMS 1 and 2. They have been used in the Intelsat I, II, III and IV series of commercial satellites.

This IR&D program significantly decreased NASA's communication satellite program risks. Its existence provided a basis for quick convergence on the optimum approach for operational satellite systems with a minimum of flight experimentation. Without the existence of this IR&D, it is very likely that extensive flight experimentation for comparison of several different orbital systems would have been required before selection of an optimum system. Cost, delay, and lost commercial revenues would all have been large.

SPACEBORNE OPTICAL SENSORS (HUGHES AIRCRAFT, SPACE AND COMMUNICATIONS GROUP)

The objective of this program was to develop an optical system that would provide good quality pictures of the Earth's cloud cover from a spinning satellite in synchronous orbit. A multicolor spin-scan cloud camera was designed and fabricated based on an IR&D expenditure of $386K in the period 1965–1970. The camera is currently used on ATS–3 and provides the picture data for producing color pictures of the full Earth's disc at the rate of one picture every 24 minutes compared to 24 hours for other meteorological satellites.

REMOTE MULTIPLEXER AND DECODER (HUGHES AIRCRAFT, SPACE AND COMMUNICATIONS GROUP)

The objectives of this effort were to obtain 1) improvements in flexibility and versatility of telemetry and command subsystems compared to present systems 2) reductions in weight and volume by using large-scale integrated microcircuits and 3) improvements in reliability. Using 200K of IR and D in the years 1970 and 71, a remote multiplexer and decoder were designed and fabricated for ultimate use on OSO. Benefits include a factor of 8 reduction in power consumption, a factor of 4 reduction in parts count, a factor of 2 reduction in weight and cost and a 50% reduction in failure rate.

ENERGY SOURCES (HUGHES AIRCRAFT)

For missions lasting longer than a few weeks, spacecraft electric power is almost invariably derived from the sun and stored in electrochemical batteries for initial, peak, and dark-time uses (launch, maneuvering, eclipse). Whereas semiconductor and electrochemical manufacturers, as well as Comsat, have been improving devices, i.e., solar and galvanic cells, resp., aerospace contractors have engineered arrays and batteries.

Design of cases and choice of materials, e.g., have resulted in compact, lightweight batteries. Analysis of performance data and post-mortems of laboratory cells led to models for predicting life and reliability as well as to extending battery life. Assembling solar cell arrays has been partially automated at Hughes by making multiple solder connections. Welding methods are being substituted, as they become reliable, for improved array performance under adverse conditions, such as irradiation and temperature extremes.

Importance of the battery work lies in obtaining longer life and higher reliability, enabling missions to be undertaken that would otherwise be impossible. The partial automation of array assembly has helped to cut their costs.

DESPIN BEARING AND SLIP RING TECHNOLOGY (HUGHES AIRCRAFT COMPANY)

Since 1966 $422,000 of IR&D funds has been used to develop the technology of long-lived bearings and electrical slip rings for orbiting spacecraft. The requirement for such technology arises from the need for many experiments and antennas to operate on a steady platform, even though the spacecraft itself spins on its axis to maintain a stable attitude and a uniform temperature.

Developing and evaluating these components in advance of specific mission requirements saves up to several years in leadtime. The new technology has also gradually increased subsystem lifetime from three to ten years. This has contributed to the decrease in communications satellite costs from $16,200 per circuit per year (INTELSAT I) to $200 per circuit per year (COMSAT Domestic).

RADIOMETER—SCATTEROMETER (GENERAL ELECTRIC SPACE DIVISION)

The objective of this program is to establish the technical feasibility of a combined millimeter microwave radiometer—scatterometer for earth surface characteristic measurements.

This IR&D effort has directly benefited S-193 for EREP and the AAFE Radscat development. It will also provide benefit to the instrument completion for SEASAT. The S-193 was a major and very challenging microwave development which would have suffered without the IR&D effort.

EARTH RESOURCES IMAGE ANALYSIS (GENERAL ELECTRIC SPACE DIVISION)

The objective of this program is to determine how a user captures the true value of ERTS imagery.

This IR&D effort resulted in an analysis to digital classifier for MSS data which is presently being delivered to the Canadian Government. It is called the *GE/IMAGE System.* It is a demonstrated, important step in making data analysis more efficient and in advancing development toward the all digital system. Many Contractors are working in this area. GE has produced a system now, that works.

VERY HIGH RESOLUTION RADIOMETER (VHRR) FOR ITOS (RCA—GOVERNMENT AND COMMERCIAL SYSTEMS)

The objective of this effort was to develop improved radiometers for space. By 1969, a dual channel scanning radiometer which employed a passive (radiative) 100°K cooler with HgCdTe detectors for use in the IR channel had been demonstrated with an approximate expenditure of $200K of IR&D funding.

This instrument later served, with relatively minor modifications for the engineering model for the Very High Resolution Radiometers aboard Tiros D and F spacecraft. These instruments mark the first completely successful use of passive coolers in space to achieve detector temperatures as low as 100°K.

Substitution of this instrument for those previously intended for use on the Tiros spacecraft resulted in all estimated savings (for the D, E, F, and G spacecraft) in excess of $1M, in addition to a reduction of two-thirds in power requirements, and approximately one half in weight and volume.

TABLE III.—I.R. & D. STRONG BENEFITS TO NASA, MANNED SPACE

Title of benefit	Focal Point center	Contractor	Program benefited
Reusable space transportation system	JSC	Rockwell International	Shuttle.
Reusable surface insulation	JSC	Lockheed Missiles & Space Co	Do.
Fuel cell development	JSC	P.&W. Aircraft	Do.
H_2O_2 fuel cells	LeRC	do	Do.
Microelectronics development	LaRC	Martin-Marietta, Denver Division	Skylab.
Attached manipulator arms systems	JSC	do	Shuttle; TUG.
High temperature composite materials	LaRC	LTV Aerospace	Shuttle.
Lunar orbiter program	MSFC	Boeing Co	Apollo.
Color TV for Apollo	GSFC	RCA, Government and Commercial Systems.	Apollo 15, 16, 17.
Rocket plume simulator	JSC	Grumman Aerospace	Apollo; Hydrogen fueled aircraft.

REUSABLE SPACE TRANSPORTATION SYSTEM (ROCKWELL INTERNATIONAL)

The objective of this program was to investigate and resolve technical issues involved in designing a transportation system that would be cost effective and provide practicality in accessing the near-earth space. From 1968 to 1972 the IR&D expenditure for studies related directly to the Shuttle Booster or Orbiter was approximately $19.0M of which $14.8M was reimbursed.

The effort covered technical issues involved in designing the Shuttle vehicle and the mission and system analyses needed for setting design requirements. As a result significant technological advancement occurred and approximately two years were saved: one year in shortening the preliminary analysis period and one year in the technological team readiness.

This IR&D program was instrumental in establishing the feasibility of the Space Shuttle concept and the awarding of the first phase of the procurement contract.

REUSABLE SURFACE INSULATION (LOCKHEED MISSILE AND SPACE COMPANY, INC.)

The goal of this series of IR&D programs starting in 1962 was to develop a lightweight, highly insulative, reusable insulation material capable of being applied to the exterior of spacecraft. The purpose of the insulation is to protect the spacecraft and its occupants from the exterior aerodynamic shear and acoustic forces and the extremely high temperatures experienced during reentry into the atmosphere Approximately $1.8M of IR&D funds were expended from 1962 to 1973.

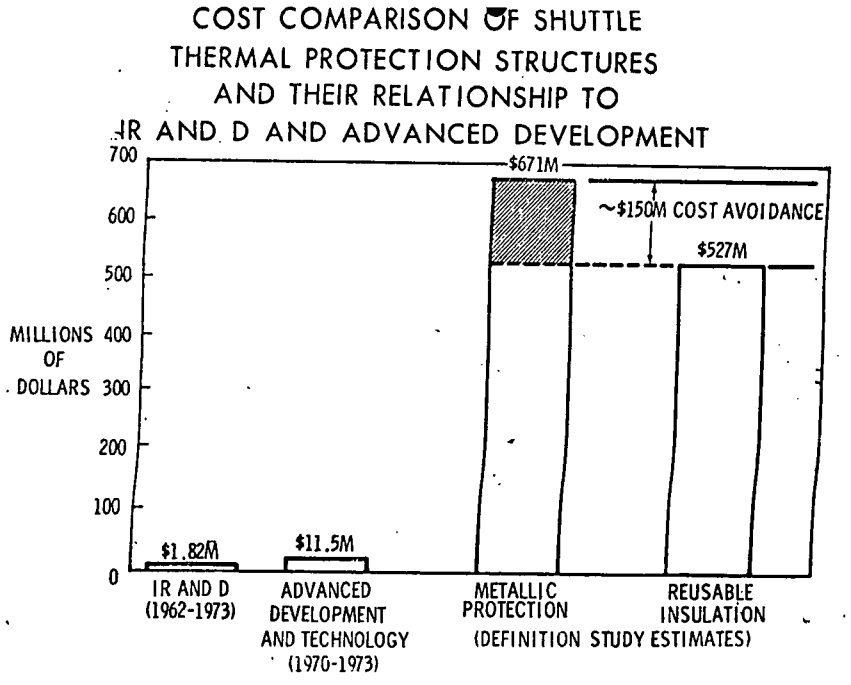
The state-of-the-art in 1970 was more mature in metallics for this purpose; however, distinct advantages could be seen in using other materials being tested in IRAD programs. In 1970 NASA undertook a major technology development in thermal protection structures using inputs from IR&D results. From 1970 to 1973 NASA invested approximately $11.5M.

As a result of the joint IR&D and NASA Advanced Development effort, the RSI technology base was broadened and provided direction for design/development decisions. RSI was baselined in the Shuttle which resulted in—

Reduced systems complexity
- No high temperature fasteners
- One material 650° to 2500°F
- Comparatively insensitive to aeroelastic and acoustic environments
- Simple bonded surface interface

Reduced program risk
Reduced cost
Reduced weight

A cost comparison of Shuttle thermal protection structures and their relationship to IR&D and Advanced Development activity is shown in the attached sketch. By using RSI, thus eliminating the need for a titanium primary structure required with metallic protection, a cost avoidance of approximately $150M was experienced.

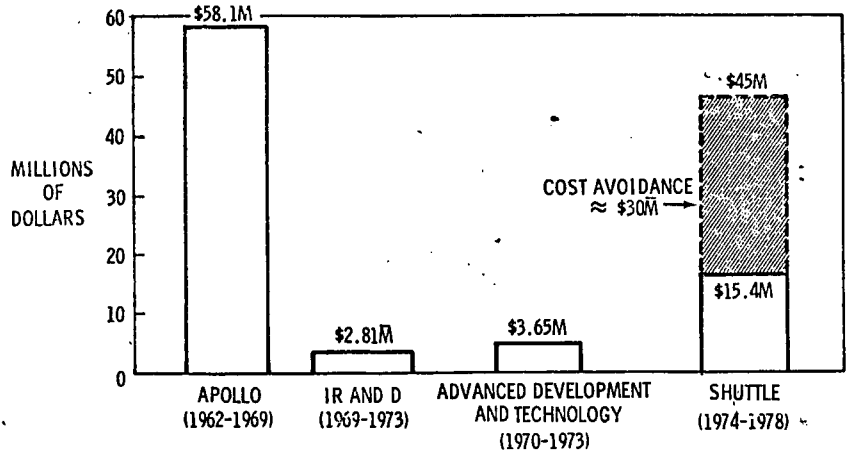


FUEL CELL DEVELOPMENT (PRATT & WHITNEY)

Prior to the initiation of NASA's Apollo fuel cell development in 1962, only a limited amount of fuel cell laboratory work had been done. As a consequence the Apollo fuel cell development program was quite expensive ($58.1M) but did result in an acceptable and efficient unit. Subsequent work done within the IR&D program and the NASA Advanced Development technology programs was directed toward improved reliability, lighter weight, longer life, and lower cost. The IR&D expenditure from 1969 to 1973 was approximately $2.8M. The NASA Advanced Development and Technology effort was $3.65M.

This early development effort permitted concentrated study and correction of potential problems without the pressures of program schedules and cost escalations. As a result acceptable tests have been conducted on a prototype fuel cell that meets the desired objectives and has been baselined in the Shuttle. The relationship of Apollo and Shuttle fuel cell costs to IR&D and Advanced Development expenditures is shown in the attached chart with an estimated cost avoidance of $30M over the 1974 to 1978 time period.

APOLLO AND SHUTTLE FUEL CELL COSTS AND THEIR RELATIONSHIP TO IR AND D AND ADVANCED DEVELOPMENT



H_2–O_2 FUEL CELLS (P&W AIRCRAFT)

At the beginning of NASA's manned space program, it had been decided that fuel cells were the power plants best suited for missions lasting more than about 2 days and not exceeding about 2 months. As mission planning progressed, it became apparent that re-usable fuel cells would have the same important advantages—low cost and weight, independence from the sun, no docking problems—for repeat missions of up to 2–3 months. Hence a long-lived system was desired. Work sponsored by the Air Force and by NASA at Allis-Chalmers had shown the low-temperature, asbestos-matrix fuel cell to be superior to other systems then available.

The re-usable fuel-cell system is lighter in weight than any other power plant for suttle-type missions. It responds instantly to changes in power demand. Reactants are the same as those used in the main engines· byproduct is water, which can be used for human consumption, spacecraft cooling, etc.

The low-temperature, asbestos-matrix module as engineered by Pratt & Whitney Aircraft has given reliable performance for several thousand hours. This system can be considered to be THE space fuel-cell system for the future, being not only suitable for scaling to fulfill different uses but also susceptible to further growth as catalytic and engineering advances are made. It is believed that, once this power plant is space qualified, it will remain the system of choice for shuttle and, eventually, tug in the foreseeable future.

MICROELECTRONICS DEVELOPMENT (MARTIN MARIETTA CORPORATION—DENVER DIVISION)

The objective of this IR&D effort was to develop the capability and the associated facility for the design and fabrication of flight quality microelectronics circuits—both thick film and thin film hybrid circuits.

The use of the new technology has been extremely beneficial to both the NASA Skylab and Viking programs. A total of 500 electroshock protection preamplifiers and differential amplifiers were built for the Skylab Program. Because of the very specialized nature of the circuits and the critical schedule requirements obtaining comparable support from a subcontractor would have been extremely difficult. The Viking Program has been supplied with some 3000 hybrid diode arrays and relay drivers for use in electronic assemblies fabricated by Martin-Denver.

In addition, the Martin Marietta-Denver microelectronics capability prevented major schedule slippage in the Viking landing schedule when original hybrid

circuit suppliers were unable to meet schedule and quality commitments to Martin-Denver subcontractors.

Since Viking is a Mars mission it must meet a particular launch date and can not tolerate a schedule slippage which would result in delaying the mission till the next launch window 25 months later. Although it is not possible to provide a definitive value for program cost avoidance, it is most likely that the IR&D program costs of approximately $450K represented a very cost-effective investment.

ATTACHED MANIPULATOR ARMS SYSTEM (MARTIN MARIETTA CORPORATION)

Early studies for Shuttle and Tug showed the requirements for handling large payloads in space and for performing in-orbit satellite servicing. The objective of this IR&D effort was the development of remote manipulator arms. Approximately $555K was expended from 1971 to 1973.

IR&D tasks were undertaken to study such problems as visual systems, control system feedback with time delay, real-time axis transformation computations for remote operations and proper operator force feedback. Configurations of manipulators that could be used on Shuttle were studied and the feasibility of each examined.

As a result of this IR&D effort and NASA initiated contractual efforts a manipulator was baselined in the Shuttle requirements in a timely manner.

HIGH TEMPERATURE COMPOSITE MATERIALS (LTV AEROSPACE CORPORATION)

LTV has, since 1971, investigated with $217,000 IR&D funds the feasibility of using reinforced carbon composites to provide a reusable thermal portection system (TPS) for manned lifting reentry vehicles. Based on this work Rockwell International recently awarded a $22.6M contract for the Space Shuttle Leading Edge Structural Subsystem. No reusable TPS was previously available for the wing leading edge, which is subjected to one of the most extreme thermal environments on the Space Shuttle. Approximately $1M per flight will be saved by using carbon-carbon, which has 100-mission life, rather than a single mission ablator. Turnaround time will meet requirements because there will be no need to replace the leading edge TPS after each flight. Reliability will be improved because carbon-carbon retains its aerodynamic shape better than an ablative material.

LUNAR ORBITER PROGRAM (BOEING COMPANY)

The objective of this IR&D program was to confirm the feasibility of photographic survey of the lunar surface and provide resources to the lunar orbiter sophisticated space camera technology. This effort was commenced in 1962 and extended through 1967 with an expenditure of approximately $1.3M.

The following significant technological advances were obtained through this early IR&D study—

1. Statistical analysis of existing photographs provided a means of defining the requirement for the landing field in terms of depth of crater and slope.
2. Photometric studies defined the photographic properties of a body with unknown reflection characteristics.
3. Infrared studies provided the basis for determining whether reflection characteristics change as a function of frequency.
4. A preliminary estimate of the lunar gravitational field was developed.
5. A computer program was written to develop orbit determinations.

COLOR TV CAMERA FOR APOLLO 15, 16, AND 17 MISSIONS (RCA—GOVERNMENT AND COMMERCIAL SYSTEMS)

Under I.R. & D. funding, a predecessor version of the Color TV Camera had been developed and demonstrated to NASA in early 1970 which was very close in design to the camera later used on Apollo.

The basic design used in the prototype was later applied to the design and development of the Ground Television Command Assembly developed for NASA for use on the Apollo 15, 16 and 17 Mission. The availability of this camera greatly enhanced the scientific data return from these lunar missions in that the scientists on the ground were able to assist the astronauts in determining which rock samples to collect and the appropriate quantity to return.

As a result of the early I.R. & D. development, at an approximate cost of $400K, RCA was able to design, manufacture, test, and qualify flight model

TV cameras within 10 months of the contract award. This short turnaround time could not have been duplicated without the previous I.R. & D. effort. Without this short development schedule the scientific benefits (which can be estimated in the many millions of dollars, based on the overall Apollo program cost) would not have been possible.

ROCKET PLUME SIMULATION (GRUMAN)

Independent research at Gruman resulted in low cost, highly accurate techniques for simulating and evaluating properties of rocket exhaust plumes under space vacuum conditions, in lieu of very costly testing of full scale rocket engines. This approach was used extensively on the Lunar Module ascent and descent engines, and the reaction control system of the Lunar Module and the Apollo Command and Service Modules. The technique was instrumental in the successful design and development of the thermal protection systems for these lunar mission modules.

Further independent research work on the technique led to its application to hydrogen fueled rocket engines such as the space shuttle for determining the exhaust plume structure and impingement heating resulting from either a single engine or a three-engine cluster. The technique is currently being considered by the Langley Research Center for the study of supersonic combustion ramjets ntegrated in the fuselage of a hydrogen-fueled aircraft.

TABLE IV.—I.R. & D. STRONG BENEFITS TO NASA, APPLICATIONS

Title of benefit	Focal point center	Contractor	Program benefited
Thermal analysis of utility subsystems for MIUS.	JSC	UAC, Hamilton Standard	NASA: MIUS, computer modeling for systems analyses; MIST, laboratory facility. Other Government agency: HUD.
Anerobic fermentation	JSC	do	NASA: MIUS, advanced concepts. Other government agencies: USDA; EPA.

THERMAL ANALYSIS OF UTILITY SUBSYSTEMS FOR MIUS (UAC—HAMILTON STANDARD CO.)

The objective of this IR&D effort is to provide a computerized thermal analysis of various configurations of an integrated utility system in direct support of the NASA program Modular Integrated Utility System (MIUS). Approximately $20K was expended. The purpose of the MIUS program is to develop a self-contained, integrated utility system which minimizes the consumption and environmental impacts of providing required utility services to a concentrated segment of the population (apartment complex, etc.).

This IR&D effort has had a substantial benefit to NASA. The Computer Modeling is directly applicable to the systems analysis type problems encountered on the baseline program in support of HUD. The background work has prepared the contractor to be responsive to the needs of NASA in designing and implementing the MIST Laboratory facility.

ANEROBIC FERMENTATION (UAC—HAMILTON STANDARD CO.)

The objective of this program is to establish the technical feasibility of processing feedlot wastes by an efficiency process, "an Anerobic Fermentation."

This IR&D effort has resulted in Laboratory tests which have operated reliably. The process has generated a fuel gas containing 52% methane. Both USDA and EPA have future programs planned to utilize this process. Future benefits will be in clean fuels production from solid waste to be applied in an urban environment. It will have direct applications to an advanced MIUS concept. This IR&D has advanced the technology in solid waste to a usable resource.

Senator McINTYRE. Mr. Woodfin, you state it has been NASA policy to accept all DOD executed advance agreements on I.R. & D. and B. & P., and the DOD formula results applied to small contractors. Are you entirely satisfied with this arrangement?

Mr. WOODFIN. I indicated that we had some arguments on relevancy. Other than that, I think on balance we have been reasonably satisfied with the approach. Our people have been involved in the technical reviews and advance agreements. To clarify we are involved with Defense on what the technical programs are in the advance agreements. And I think that policy of access to technical programs has given us more confidence.

As for small businesses, the formula approach is about as good a one as I can envision. I think that provision for small business problem may be a problem with line item budgeting. In other words, it is one thing to talk about setting up independent research program budgets for major contractors and trying to budget on a line item basis but I find it difficult to budget similarly for I.R. & D. by small contractors.

Senator MCINTYRE. You state you believe that the present DOD/NASA approach, less the military relevancy requirement, represents the best method of combining the features of Government control and contractor independence in the conduct and management of I.R. & D. activity, and that this approach can surely be refined and sharpened to more nearly achieve that fine balance between controls and independence. What specific ideas do you have for refining and sharpening the DOD/NASA approach?

Mr. WOODFIN. I mentioned a couple of them at the end of my statement. I think one of the problems that I have seen for some time is, there is almost an adversary relationship that exists in the matter of relevancy, and there are also some problems over the allowability of some of the programs in the audit phase. And there are even questions as to whether the program was in fact performed as stated at the beginning of the year, some of the contracting agencies get into "reopeners" on that sort of thing.

It seems to me that we should have some degree of cost sharing between the parties, and perhaps an overall agreement as to a ceiling on the amount of money for each contractor's program. We also need a unified single face to industry negotiating approach, because I don't think you can have many different negotiations with industry on this subject. I think there has to be a lead agency for these negotiations. And then with cost sharing, I think there would be a fairly reasonable basis for assuming that they are not going to spend their money as imprudently as they might spend government money.

Senator MCINTYRE. NASA payments to contractors for I.R. & D. and B. & P. have declined from $107 million in 1968 to a low of $85 million in 1973 consistent with the decline in sales to NASA. Is it this declining trend which leads you to support the present DOD/NASA approach?

Mr. WOODFIN. Our I.R. & D. participation is definitely sales-related. As a percentage of sales we are actually somewhat higher than the Defense percentage. But that happens because our slice of overall defense industry, aerospace, is also the slice of Defense business which gets the largest part of I.R. & D.

All I can say is that based on our review of the program, technically, and talking to the NASA technical customers, they seem to be reasonably satisfied with the kind of research that the contractors are working on, at least they support the maintenance of a technical capability, and certainly a competitive base.

It is still very important to us to maintain this competition in these various areas of related technology so that we can get a fair degree of competition in our business.

Senator McINTYRE. If you were correct in your statement that relevancy encourages maintaining technical status quo, would you say that this is the experience you have had with the military relevancy rule? What proof do you have?

Mr. WOODFIN. Yes, I think it would do that. That is the inevitable result because if Defense has a relevancy rule, the contractor inevitably is going to present a program that will surely meet the relevancy requirement of the Defense Department. And while he might want to innovate out into some other areas, I think he would tend to be subject to that relevancy constriction. And it so happens that as long as NASA and Defense's ideas coalesce, we don't have any great trouble with that approach. But I would be more concerned about other civilian agencies who didn't have the near coalescence of technical needs in the relevancy area.

So it seems to me that there is a need for an agreed overall Government research needs program, and perhaps an overall limit of some kind in negotiated I.R. & D. agreements with these contractors. Then let them innovate and invent.

Senator McINTYRE. You also state you don't know to what extent contractors are being influenced by the relevancy rule in restructuring their I.R. & D. programs to avoid a DOD relevancy disallowance. How do you square this with the GAO statement on page 36 of their June 5, 1975, report that DOD's mission is so broad that almost all efforts can be shown to have potential military relevancy?

Mr. WOODFIN. Senator, I can only tell you it wasn't broad enough to carry some of the space items that NASA would like to have had.

Senator McINTYRE. It didn't cover what?

Mr. WOODFIN. Some of the aspects of the space program.

Mr. GARCIA. May I respond to that, too?

I think what the GAO said was that there were no disallowances as a result of relevancy. But I think they also indicated in another place in their report that as much as 8 percent of the program that they looked at was determined to be nonrelevant.

Senator McINTYRE. You state that a case can be made for requiring cost sharing by contractors from the first dollar.

Can you elaborate on this and also explain what change this could make in the character and annual dollar level of NASA's I.R. & D. and B. & P. programs?

Would you furnish that for the record, please?

Mr. WOODFIN. Yes, sir.

[The information follows:]

Basically, we see the use of cost sharing as a means of incentivizing the efficient expenditure of IR&D funds. The working assumption is that IR&D and B&P activity would tend to become more efficient and productive if contractors have a stake in financing the cost of the effort. We have conceded that there is a form of cost sharing taking place under the current system in that some companies consistently expend beyond negotiated ceilings. We have stated, however, that cost sharing under the present system is not guaranteed and it is not equitable because some companies do not share at all, preferring instead to spend only up to the negotiated ceilings. All things being equal, the use of cost sharing from the first dollar would reduce IR&D allocations to NASA contracts.

Senator McINTYRE. How would a minimum contractor share be determined for stipulation in law?

Mr. WOODFIN. I would think you would have to be on a percentage basis, Senator. I don't know any other way that is reasonable. It could be determined as any other allowability of cost issue. By determining a pro rata amount that they would pay.

Senator McINTYRE. In the interest of uniformity and to enable NASA to continue to use DOD to help administer the I.R. & D. and B. & P. program, are you prepared to accept whatever legislative changes the Congress may make in the DOD program?

Mr. WOODFIN. No, sir. I think we naturally have a little NASA self-interest and bias in what we would do in that event.

Senator McINTYRE. Senator Proxmire.

Senator PROXMIRE. Mr. Woodfin, do you believe that the Appropriations Committee should be denied the opportunity to scrutinize and oversee NASA's I.R. & D. program?

Mr. WOODFIN. No, sir.

Senator PROXMIRE. What is our chance to do it?

When we don't have a separate line item and we aren't told where the money goes, and we don't have any basis of evaluating it, and don't know what the benefits are, how in the world can we responsibly discharge our duty?

Mr. WOODFIN. I think it is NASA's responsibility to present the basis of the present programs in any detail desired and certainly the content of the technical programs as evaluated. And in terms of this overall $900 million that I mentioned, we are only a fraction of it, as you know.

Senator PROXMIRE. I am only interested for now in the $80 million, of course, that is before my subcommittee.

Mr. WOODFIN. I think we could project for you an estimated I.R. & D. number. It would be difficult for us to pin down the exact nature of research that is going to take place with that $80 million next year, but I guess we would prorate the research into planned areas of investigation.

Senator PROXMIRE. You see, it is very difficult for us to know whether money is spent wisely, whether we should reduce it, whether we should increase it, or whether we should have a high priority or low priority. And we don't have a breakdown of how much is spent, by each contractor, and we don't know what program it is directed toward. And we know nothing about specific projects. We are just working in the dark.

And as I say, I have been chairman of this subcommittee for 3 years now, and it has never been discussed, debated, or elucidated by the head of NASA when he has come before the committee. And there has never been a mention in his report. And because there is no line item, they feel they are not going to come in on it. And they are right.

Mr. WOODFIN. It is treated as an integral part of the overall NASA funding.

Senator PROXMIRE. Wouldn't the Congress be better served and the public be better served if for those reasons we had this line item?

You argue that it would destroy your independence. And yet when I pressed you on the content of this I.R. & D., you didn't

dispute the fact that only a tiny proportion of this is for new concepts, that the rest of it is for working on improving present weapons and responding to what the contractor, in this case NASA, wants.

Mr. WOODFIN. It is not clear to me that the same amount of research would be authorized or done under a direct line item basis. I think that is the crux of the argument.

As to whether that type of research would be——

Senator PROXMIRE. You might have more. If you could make a case, I am sure that you would have some real enthusiasm in the Congress, if you can make a case that we are getting something out of this, and it is worthwhile. There is an overwhelming belief in science and in technology and a recognition that you cannot have a space program, heaven knows, without having an improvement, a constant improvement in research and technology.

If you can make a case you can get more money for it. But no case is made. We aren't performing our function, I am not blaming you, because we have the authority and power, and it is up to us if we want to pass a law and make you give us this. But we want to know exactly what we are doing when we do that. And it seems to us that the case is very strong for doing exactly that. It is almost like people who say they have jurisdiction in a certain area, but they don't want to know about it, because if they know about it, they might have to take some responsibility. I think we have an absolute duty to find out and assume that responsibility. We are given the authority, as you know, as Senators are, and Congressmen, too, of course, to have all kinds of classified information, top secret information. And I cannot understand why we should not systematically and regularly be given this information. We would be able to discharge our part of the responsibility for spending public money is we had that, and we cannot do it without it.

Let me proceed.

In your statement you refer to the spur of competition, the dynamics of business survival, as good incentives for conducting innovative research. How do you reconcile that observation with the fact that the bulk of I.R. & D. goes to a select and relatively small group of large contractors? In fact, doesn't I.R. & D. tend to reinforce the concentration within the defense industry and the space industry?

Mr. WOODFIN. Perhaps it is obvious that the contractors who have the production business are getting the indirect allocation of I.R. & D. for further research, and it tends to permit them——

Senator PROXMIRE. Doesn't that contradict your assertion that it promotes competition?

Mr. WOODFIN. At least between these companies we have some competition. I would hate for competition to be reduced to the point where we only have one of them in some of these areas. We need competition even between the large defense contractors, I think.

Senator PROXMIRE. I see.

So that on that level it promotes competition?

Mr. WOODFIN. Yes, sir.

Senator PROXMIRE. And you would concede that as far as the great universe of firms that are left out——

Mr. WOODFIN. No, sir. I think there are considerable I.R. & D. benefits in the subcontracting area, too.

Senator PROXMIRE. Do you have any hard evidence that you can give us, any examples, that I.R. & D. has promoted competition, any evidence of that?

Mr. WOODFIN. That is a subject in which we have not had any specific research. I think it is a question of maintenance of an industry base out there.

Senator PROXMIRE. Then what is the basis for your assertion if you haven't done any research on it?

Mr. WOODFIN. What I am saying is that if you don't provide a viable basis of making profits and covering costs, and hopefully differentiating one contractor's products from another's, how can a contractor hope to innovate, differentiate and compete? I think it is basic to the whole competitive process that contractors must get full recovery of cost, including the development of new products. And a Defense contractor is like any other contractor in the need for differentiation and development of new products. With I.R. & D. we have a viable competitive base. Without it, we can only guess at the outcome.

Senator PROXMIRE. You may be right and you may be wrong. The facts would indicate whether you are right or wrong. And we don't have the facts.

Mr. WOODFIN. No specific statistics or studies.

We haven't looked at I.R. & D.—as the basic determinant for Defense and NASA competition.

Senator PROXMIRE. The hour is late, and I don't want to detain any of you much longer. But I would appreciate it if you could for the record give us an indication of how you might do it, and where you might do it, and how much it would take to give us this kind of information.

What percentage of NASA's contracts are advertised in competitive bidding, roughly?

Mr. WOODFIN. It is very small. I would have to check very quickly, because we are talking about advertising.

Senator PROXMIRE. Yes, sir.

Mr. WOODFIN. Let me provide it for the record. It is a very small number.

[The information follows:]

NASA awards to business firms in fiscal year 1974 totaled $2,119 million. Of this amount $1,395 million or 66% represented obligations to contracts awarded on the basis of competition. Of the competitive awards, only $45 million or 3.2% were advertised procurements.

Senator PROXMIRE. That is what I am getting at. I realize that there are different kinds of competition, you can have competition without price competition, for that matter, and you can have competition with only two firms with a negotiated contract.

But there is some evidence of the kind of competition most persons and many members of Congress feel is the desirable thing.

One final question, Mr. Woodfin. You recently retired from the Navy, I understand, where you had a distinguished career in the field of procurement. I would like you to speak as a former Naval officer, how much value you placed on I.R. & D. when you were in the Navy?

Did the Navy ever attempt to measure the costs and the benefits, and were the costs worth the benefits, in your opinion?

Mr. WOODFIN. I think the Navy ought to answer that, Senator. But I will chance an opinion that I think the Navy probably would take a view somewhat similar to the other Defense services on I.R. & D.

Senator PROXMIRE. I ask your view, not the Navy's view. You are an expert, you are a former naval officer, and you can speak as a former officer.

Mr. WOODFIN. I guess I would have to take a neutral view of what I thought of it in the Navy. I know that there are parts of the Navy who, for good reasons, would prefer a direct R. & D. program. On balance, I thought there were some good aspects and some abuses that came out of it. The Navy's insufficient participation in the technical review process is the most apparent deficiency in the I.R. & D.

Senator PROXMIRE. If you had your choice to make, would you put your dollars in straight R. & D., or would you put them in this category of I.R. & D. and B. & P.?

Mr. WOODFIN. I would put the money in indirect cost for I.R. & D., the way it is being done now, because I don't think the Government has the breadth of knowledge or the particular management program direction capability to carry off a multitude of general R. & D. programs that would be required in a direct approach.

Senator PROXMIRE. I am sorry if my question was not clear. If you could decide as a naval officer whether the Navy should put its dollars on the basis of your years of experience as a procurement official, where would you put it, in I.R. & D. or direct R. & D.?

Mr. WOODFIN. I would put it in I.R. & D. Anything that is wrong with the Navy's system can be improved.

Senator PROXMIRE. In spite of the fact that you told us that you thought there were abuses in the program?

Mr. WOODFIN. Yes; but on balance, I don't think the abuses are outweighed by the benefits of maintaining a viable competitive industry.

Senator PROXMIRE. That sounds like the case for direct R. & D. isn't very strong.

QUESTIONS FROM SENATOR MCINTYRE

(Questions submitted by Senator McIntyre. Answers supplied by NASA.)

Question. You state that you are not all that certain what causes innovative research, but you suspect that the spur of competition and the dynamics of business survival are as good incentives for conducting innovative research as you are likely to find. Why aren't you more certain that the simple objectives of profit and survival substantially, if not entirely, account for industries' motivation?

Answer. Our uncertainty is due to the lack of certain knowledge on what actually motivates defense and aerospace companies and the people who populate and work those companies. Profit optimization and business survival are certainly key elements, perhaps even overriding factors, but we question whether everything that a company does or fails to do can be explained by this traditional view of business motivation. The enhansement of corporate image and reputation, a sense of social consciousness and just a plain desire to achieve technological growth and advancement may also play a part in the total scheme of things.

Question. Your statement on page 4 states that contractors' technical plans are reviewed by research specialists within DOD and NASA. Will you explain the nature and extent of such reviews? Do you feel they are necessary and valuable?

Answer. The technical review process consists of the evaluation of contractors' annual IR&D Technical Plans and the conduct of periodic on-site surveys. In NASA, we evaluate the Technical Plans of approximately 20 contractors comprising about 29 profit centers, and we participate in about six to eight on-site surveys a year. We consider the technical review process important for two reasons.

First, it provides a valuable input to the negotiation function in terms of the technical quality of the contractor's program. Second, it establishes a communication link and a medium of exchange of information between company researchers and NASA scientists and engineers.

Question. You say your basic concern with an agency relevancy requirement is that it could create some undesirable technical distortions. Why is your situation any different than that of DOD where the relevancy requirement is successfully being used?

Answer. We do not maintain that an agency relevancy requirement is impossible to implement. Our point is that an agency-by-agency relevancy requirement could produce some undesirable technological distortions in the kind of IR&D conducted. To elaborate, under present allocation and recovery procedures, IR&D relevancy disallowances are triggered, generally, by ratios of current mix of customers. For example, if a current customer has 40% of the business in the accounting period, an agency relevancy requirement would mean that at least 40% of the IR&D performed must be relevant to that customer's needs. Since IR&D is targeted to reach tomorrow's customers—to respond to future technological needs and challenges—the use of ratios of current mix of customers as a condition of allowability could influence and distort the kind of IR&D that a company might otherwise choose to undertake. It's as if accounting and allocation practices were dictating technological choices and opportunities, and this is what we find undesirable about an agency relevancy requirement. Also, don't assume for a moment that customer mix does not change. To cite a few examples: In 1966/1967, NASA was about 50% of Grumman's business; today, we are less than 4%. At one time, NASA was nearly 80% of the business at IBM's Federal Systems Division; our share of the business today is under 20%. At Martin-Marietta's Denver Division, we went from virtually zero to a high of 70% in 1973.

Question. What efforts have been made to ascertain the extent to which you say relevancy determinations are impacting the technical review process and, in turn, negotiated ceilings?

Answer. We have not made any special studies of the matter. It just seems reasonable to conclude that if an agency is required to perform a project-by-project test of relevancy, the results of such a review are going to be reflected in the overall technical rating assigned to the company, and this, in turn, is going to impact the negotiated ceiling.

Question. You state that there are IR&D projects of interest and value to NASA which are being declared nonrelevant by DOD. Will you identify these projects and explain why NASA has accepted this determination?

Answer. Set forth below is a partial list of IR&D projects of interest to NASA which the DOD has declared nonrelevant to a military function or operation. These examples were extracted from advance agreements with four major NASA contractors. NASA did not contest these determinations because we had no grounds for stating that these projects were in fact relevant to a military function or operation.

A. McDonnell Douglas:
   1. Life Support Systems Test.
   2. Perturbation Theory and Space Mission Planning.
   3. Advance Transportation Concepts.
   4. Aircraft Interior Passenger Service Equipment.
   5. Advance Avionics Subsystems.

B. General Dynamics:
   1. Space Bioexperiment Support and Transfer Equipment.
   2. Manned Space Laboratory Advanced Techniques.
   3. Physics of the Earth and Its Environment.
   4. Earth Observation System Requirements.
   5. Zero-g Materials Experiments and Processes.

C. Martin Marietta:
   1. Advanced Navigation and Mission Analysis Techniques.
   2. Semi-Autonomous Control for Planetary Exploration Vehicle.
   3. Payload Design and Operations Effectiveness for Astronomy.
   4. Electro-Optical Technology for Guidance and Control.
   5. Diffraction Limited Optics Integration and Instrumentation.

D. Rockwell International:
1. Lithium Sulfur Battery.
2. Zinc-Nickel Oxide Batteries.
3. Solar Heating and Cooling Systems.
4. Solar Thermal Power Systems.
5. Energy Conversion and Storage.

Question. You state, in conclusion, that you believe an agency-by-agency relevancy requirement would be a divisive force in establishing and maintaining a Government-wide policy and procedure. Is this consistent with the GAO statement on page 37 of their June 5, 1975 report that DOD and NASA believe the requirement should be broadened to relevancy to the Government's interest?

Answer. Yes, we think it's consistent. NASA has no objection to a Government-wide relevancy test. It should be pointed out, however, that the Government's technological interests are so broad and varied that it is highly unlikely that many projects will be ruled nonrelevant.

Question. You suggest that separate ceilings be established for IR&D and B&P without any interchange. You recognize the difficulties involved in policing the classification of those costs, but suggest that pre-contractual arrangements could be made to overcome the accounting problems involved. Would you elaborate on this matter, explaining how it would be possible to assure that contractors do not misclassify projects to increase their acceptability.

Answer. In our opinion, the problem could be helped immeasurably by the issuance of a cost accounting standard by the Cost Accounting Standards Board which would (i) provide a more finite definition of the two costs, (ii) establish requirements for their proper classification and recording, and (iii) insure the maintenances of appropriate accounting records to permit meaningful and effective administration by the Government.

Senator McIntyre. Thank you, Mr. Woodfin, and thank you, Mr. Garcia, for your able testimony this afternoon.

We will now recess this committee until 10 a.m., September 24.

[Whereupon, at 5:20 p.m., the committee recessed, to reconvene at 10 a.m., Wednesday, September 24, 1975.]

INDEPENDENT RESEARCH AND DEVELOPMENT

WEDNESDAY, SEPTEMBER 24, 1975

U.S. SENATE, SUBCOMMITTEE ON RESEARCH AND DEVELOPMENT OF THE SENATE ARMED SERVICES COMMITTEE, AND THE SUBCOMMITTEE ON PRIORITIES AND ECONOMY IN GOVERNMENT OF THE JOINT ECONOMIC COMMITTEE,

Washington, D.C.

The subcommittee met, pursuant to notice, at 9:10 a.m. in room 1114, Everett M. Dirksen Senate Office Building, Hon. Thomas J. McIntyre (chairman).

Present: Senators McIntyre (presiding), Culver, and Proxmire.

Also present: Hyman Fine, professional staff member, Senate Armed Services Committee; and Richard F. Kaufman, general counsel, Joint Economic Committee.

Senator MCINTYRE. The committees will come to order.

This morning we will continue our joint hearings on Independent Research and Development. We are pleased to welcome Dr. Malcolm R. Currie, Director of Defense Research and Engineering, who will be supported by Dr. Dale R. Babione, Deputy to the Assistant Secretary of Defense for Installations and Logistics, responsible for procurement, and other supporting witnesses.

DOD will be followed by the Energy Research and Development Administration, represented by Mr. Raymond G. Romatowski, Assistant Administrator for Administration.

We will conclude today's proceeding with testimony by Dr. Kenneth Oshman in behalf of the Western Electronics Manufacturing Association known as WEMA.

I will yield now to my good friend, Senator Proxmire.

Senator PROXMIRE. I have had a chance to read your thoughtful and forceful statement. I must say I find a few points on which I disagree.

The major aspects of this program are size, and the fact that Congress has no control. As presently structured, the major characteristics of the I.R. & D. program are its size, the secrecy that surrounds it, and the fact that Congress has virtually no control over it.

In last week's testimony Comptroller General Elmer Staats said that I.R. & D. partakes of a grant for research and development.

Of course, the Comptroller General is correct.

As presently structured the approx mately $1 billion spent annually for I.R. & D. is a grant in the sense that we give grants to foreign countries for economic assistance. It can also be considered a subsidy.

The fact that the Pentagon and NASA follows a policy of not acquiring patent and data rights in the results of I.R. & D. adds to the giveaway nature of this program.

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The identity of the recipients or the beneficiaries of I.R. & D. grants and the amounts each receives is kept secret.

Most of the funds spent on I.R. & D. are contained in a report filed annually with the Congress. But there is no line item in the budget for I.R. & D. As a result no committee of Congress authorizes I.R. & D., and no committee of Congress appropriates funds for I.R. & D.

The secrecy and lack of congressional control over I.R. & D. violate the fundamental principles of Government accountability.

Taxpayer money is being spent in a way that allows no opportunity for the taxpayers' representatives to determine how much, if any, of that money ought to be spent.

The contractors seem to be saying to the Government, "Pay us $1 billion a year and don't ask any questions." The Pentagon has embraced this view and advocates it to Congress. NASA has been following the Pentagon for years, and now ERDA seems also willing to tag along.

But I do not believe that Congress can continue to allow this bill on dollar program to remain uncontrolled and unaccountable.

Last week the Comptroller General recommended that I.R. & D. be made a line item in the budget. That seems to me to be a step in the right direction.

STATEMENT OF DR. MALCOLM R. CURRIE, DIRECTOR, DEFENSE RESEARCH AND ENGINEERING, ACCOMPANIED BY DALE BABIONE, DEPUTY TO THE ASSISTANT SECRETARY OF DEFENSE FOR INSTALLATIONS AND LOGISTICS; CHARLES E. DEARDORFF, PROCUREMENT ANALYST, DOD; AND JAMES W. ROACH, ASSISTANT DIRECTOR FOR ENGINEERING POLICY, DOD

Dr. CURRIE. In addition to Mr. Babione, on my left I have Mr. James W. Roach, Assistant Director for Engineering Policy, and Mr. Charles Deardorff, a procurement analyst in the Office of Assistant Secretary for Installation and Logistics.

Senator MCINTYRE. I hope you won't have to read your statement, Dr. Currie. Without objection it will be included in the record in full at this point.

Dr. CURRIE. Thank you, Mr. Chairman.

(The prepared statement follows:)

PREPARED STATEMENT OF DR. MALCOLM R. CURRIE

Senator McIntyre, Senator Proxmire and members of the subcommittees: I welcome this opportunity to present the views of the Department of Defense on the critically important subject of Independent Research and Development (IR&D) and Bidding and Proposal Effort (B&P).

These views are influenced by the varied personal perspectives gained in long association with the management of IR&D and B&P or its equivalent in the defense industry, in commercial industry and in government.

These views are also strongly influenced by my current responsibilities to the Congress and to the Nation which include

assuring that we maintain the quality and level of defense-related technology which will insure our national security for the future, and

efficiently acquiring needed defense systems capabilities at minimum overall cost to the government.

I am pleased that the recent GAO study ("Contractors' Independent Research and Development Program—Issues and Alternatives", June 5, 1975) strongly endorses the concept of IR&D/B&P and generally supports the manner in which it is administered by the Department of Defense. This two year comprehensive effort by the GAO complements similar efforts by the Commission Government Procurement, by the Inter-Agency Task Group on IR&D, and by a distinguished group of government and academic leaders under the auspices of the Defense Science Board. These recent studies have all examined the policies and procedures for IR&D as evolved over almost two decades of experience in DoD and NASA and have examined the value of IR&D from different experiences and points of view. All of them provide endorsement for the concept of IR&D/B&P and generally for the policies and procedures currently used in its implementation.

In this statement I will discuss briefly the value and significance of IR&D/B&P and its management by the Department of Defense. I will then discuss the more important issues including those raised by the GAO and will, finally, offer suggestions for enhancing the benefit of this resource to the government. With this statement I will offer the following documents for the record:

1. Defense Science Board Report on IR&D.
2. Interagency Steering Group Report on Proposed Executive Branch Position on IR&D.
3. DoD Directive 5100.66 Regarding IR&D Policy and Procedures.
4. Roster of DoD IR&D Policy Council.
5. Roster of IR&D Technical Evaluation Group/Central Office Negotiators.
6. ASPR Paragraphs 15–205.3 B&P and 15–205.35 IR&D.
7. DoD Guidance on Preparation of Technical Plans for IR&D.
8. DoD Guidance on Relevancy Determination.
9. DoD Guidance on Negotiation of IR&D Advance Agreements.
10. DoD Guidance on IR&D Data Bank.
11. DoD IR&D Technical Evaluation Forms.
12. Roster of DoD/NASA Laboratory Focal Points for IR&D Evaluation.
13. Listing of Laboratories Used in IR&D Technical Evaluation.
14. Listing of Service Assignment for Evaluation/Negotiation of Companies Recovering Over $2M.
15. Ten Year Summary of IR&D/B&P Data.

Fundamental Nature and Value of IR&D and B&P

IR&D is often referred to as a "program" with the implication that the "IR&D Program", like contract program effort, is just another mechanism for achieving particular pre-conceived end-item results. Although it is true that IR&D does achive results of immense value to our Nation's base of technology and innovative capability, the concept of it as a "program" is far too narrow and misses completely its more fundamental significance.

Our military security—indeed, our broad economic security—depends in large measure both on a wide base of advanced technology and also on the efficiency with which this technology is translated into end-item capabilities which are superior in performance and cost to those of our competitors. The competitive forces in our free enterprise system have been fundamental to our productivity and standard of living, to our ability to compete successfully in the world marketplace, and to the attainment of a defense capability which must be based increasingly on technological quality and efficient production rather than sheer brute-force quantity at any cost. Competition has been our national tradition and our strength. This fundamental dependence on competition has been recognized explicitly—it is our conscious national policy that the Department of Defense should rely primarily on competition to select sources for developing and producing its military hardware and services.

This policy has a price. The price includes assuring the continued existence of sufficient number of organizations qualified to meet our needs so that a truly competitive environment can exist. This involves—as it does in commercial business—the cost of maintaining, in an organization, a level of innovative technology within that organization's fields of business interest so that it can compete effectively. It also involves the costs of the competition itself. Similar costs are borne by the Government in preparing for and conducting the competitions.

The reason we are willing to pay this price for our policy of competition is that we believe the returns to our Nation are immensely greater than the investment it involves. We are able to achieve a highly productive flow of new and innovative technology and an overall efficiency in its application and production unparalleled anywhere.

At a time when our defense RDT&E effort and overall investment in force modernization has been reduced constantly year by year and is now about half of that of the Soviet Union, we have been able to maintain a competitive technology and military posture *only* because of the productivity of our system which is rooted in this competitive process.

IR&D, and the *independent* aspect of its management by industry, therefore takes on an importance of underlying significance. It is, in fact, absolutely fundamental to a competitive industrial capability which is the high-payoff cornerstone of our economic system. This is the reason IR&D/B&P is referred to as "a necessary cost of doing business" and is logically an overhead expense.

And, although we expend considerable effort each year in reviewing IR&D for its "relevancy" and for its "reasonableness in overall level" and although we institute many efforts to couple it closely to Defense needs as we perceive them, undue governmental control of IR&D in a direction to reduce its *independence* would, in my view, destroy the fundamental policy and thesis from which it has been derived.

Now, if the basic tenets underlying our policy of competition, and therefore, underlying the IR&D process, are valid, it follows that IR&D should be extraordinarily productive. I assert that it is. In my judgment, the IR&D effort, administered essentially as it is at present, is an absolutely *indispensable element* in our ability to maintain a broad national base of superiod technology and military capability. Its benefits pervasively affect the quality and poductivity of the entire Defense RDT & E effort and therefore exert enormous leverage on the totality of the Defense weapons acquisition process.

Why is IR&D/B&P so productive? It is aligned with the basic competitive and motivational forces of a free enterprise economy. It Involves the prime attention of the most creative technical and management people in thousands of companies—all independently determining through this competitive process their degree of success and their economic future. It therefore multiplies manyfold the capabilities of the relatively much fewer governmental personnel, no matter how competent and creative those personnel might be. Its characteristics are—understandably—innovation, high productivity and efficiency in the evolution of technology. It reinforces all other parts of the Nation's technological effort in a direction to lower the cost and improve the quality. It is a prime mover of inestimable value.

All of the above is why a simple listing of specific examples of IR&D such as an idea for a high energy laser, a basic concept for nanosecond computers, a key development for aircraft propulsion, an imaging infra-red missile seeker, digital radar signal processing, etc., although impressive, is finite and wholly inadequate to express the larger benefit and impact of IR&D. This is why the benefits of IR&D are not amenable to simple cost-effectiveness analyses and why, as reported in the GAO study, one-dimensional auditing efforts *per se* have been difficult and inconclusive. Mr. Staats observed in his testimony of 17 September, 1975, evaluation of R&D is an exercise in technical judgment. This is well appreciated by managers of research and development and is often of concern to financial managers.

The Department of Defense has recently issued a policy statement regarding the value of and the rationale for the allowance of IR&D/B&P expenses. The statement is contained in DoD Directive 5100.66, "Establishment of Policy for, and Technical Evaluation of, Independent Research and Development Programs." I quote the passages of interest from that directive.

"IR&D/B&P is recognized by the DoD as a necessary cost of doing business particularly in high technology environment. Through support, consistent with the cost principles, established in ASPR of contractors' IR&D/B&P programs, DoD seeks to:

1. Assure that creation of an environment which encourages development of innovative concepts for Defense systems and equipment which complement and broaden the spectrum of concepts developed internally to DoD.
2. Develop technical competence in two or more contractors who can then respond competitively to any one requirement DoD seeks from Industry.
3. Contribute as appropriate to the economic stability on its contractors by allowing each contractor the technical latitude to develop a broad base of technical products."

Management of IR&D by DoD

The Directive described in the preceding paragraph also establishes the basic framework for the management by DoD of the IR&D/B&P Program. The Directive establishes the top policy body for IR&D, that is, the DoD IR&D

Policy Council which I chair. Its members include my Principal Deputy, the Assistant Secretaries of Defense for Comptroller and I&L and the Assistant Secretaries of R&D and I&L for each Military Service. This policy body meets regularly and examines the various issues arising from the policy and implementation of IR&D.

The Directive also establishes an IR&D Technical Evaluation Group as the working body for the Policy Council. The Evaluation Group is chaired by a member of my staff and has as its members the Departmental IR&D managers. As members of the Technical Evaluation Group the IR&D managers serve as a staff body for proposing policy positions relative to any aspect of IR&D and as a development body for procedures necessary to the technical administration of the contractors' IR&D Program. As Departmental IR&D managers, they manage the technical evaluation of the contractors' programs assigned to their Service.

The Departmental IR&D managers exercise their managerial functions through a network of focal points in each DoD laboratory and technical organization. These focal points have the responsibility to identify and task individual evaluators for the technical plan evaluations and for the on-site reviews. The evaluation results flow from the individual evaluators back through the focal points within each organization to the Departmental IR&D managers and the Technical Evaluation Group.

The last element in the management of the IR&D Program is the negotiation of the ceilings for recovery of IR&D/B&P. Each Military Service has established a central office or IR&D negotiations within its materiel command. These negotiators, using the technical evaluation results for the current year along with several other factors such as historical IR&D levels, current sales levels, etc., negotiate a ceiling for IR&D/B&P considered reasonable for each contractor for a given fiscal year.

The critics of the evaluation process have stated that many times the evaluators have not been well qualified. I take issue with this position. Each of our Military Services have gone to great lengths to try to use the best qualified professionals for evaluation considering the many demands placed on the services of such men. When one considers the vast range of technical disciplines represented by the IR&D of the many contractors of the Department, one can't help being impressed at the excellence of the job being done to evaluate IR&D projects whose technical writeup occupy the equivalent of four large four-shelf bookcases.

Issues concerning IR&D

While we have a primary concurrence with the report of GAO relative to the value, the need and the rationale for support of IR&D there are some residual issues. I will discuss these issues and seek specific Congressional re-affirmation of the positions which have guided the successful implementation of IR&D by the Department of Defense. These issues are:

1. Statutory declaration of IR&D policy.
2. Degree of control and appropriate amount of support.
3. Rights to data and patents resulting from IR&D.
4. Access to commercial records of a contractor for IR&D audit allowance.
5. The focus of relevance of IR&D.
6. Uniform treatment of IR&D/B&P government-wide.
7. Visibility of IR&D.

1. STATUTORY DECLARATION OF IR&D POLICY

The GAO recommended that the Congress clarify the policy for IR&D support by establishing guidelines which set forth the purposes for supporting IR&D, the appropriate amount of support and the degree of control which should be exercised over the program. DoD concurs in possible statutory language setting forth the purposes for which the Government supports IR&D costs and suggests consideration be given to the policy statement of DoD Directive 5100.66 or to the first two points of the Commission on Government Procurement Recommendation B-10 namely:

> Recognizing IR&D and B&P expenditures as being in the Nation's best interests to promote competition, advance technology, and foster economic growth.
>
> Establishing a policy recognizing IR&D and B&P efforts as necessary costs of doing business.

However, we do *not* believe that statutory guidelines are appropriate which attempt to set forth either fixed amounts of financial support or the degree of control to be exercised by the Government over contractor programs. These are considered executive management decisions for which flexibility of action must be retained in order to adapt to the many differences among contractors in product areas, sales levels and trends, the level of cost consciousness induced by contract mix, technology quotient in each industrial segment, etc. This issue is fundamental and its resolution will have far-reaching implications.

2. DEGREE OF CONTROL

It has been suggested that IR&D be based on budget *line item* funding and therefore that it involve *contracts* or *grants* in its administration. The reasons given for these proposals are "better controllability" and "better accountability" and that the Government need then "buy only what it needs."

These proposals overlook the fundamental nature and significance of IR&D and would subvert the primary purpose for which it is intended. IR&D must be understood and accepted not as something which is purchased but as something which, as discussed earlier, is fundamental to doing business in the competitive environment on which our system is founded. It is a cost of operating an enterprise just as are employee health benefits and retirement plans.

I have watched IR&D evolve for about 20 years and feel that the government has gone as far as reasonable or desirable or economically sensible in the control and accountability of the process. Control is currently exercised to the degree necessary to protect the government. Further controls as have been proposed would, in effect, change our basic national policy. Transforming IR&D into something akin to directed research and development puts the government potentially in the position of deciding and controlling the future of individual organizations making up the industrial base. At a time when the great strength of our system is individual action and competition, any move toward increased governmental bureaucratic control and potential stifling of competition must be viewed as a giant step backward—it has not worked successfully elsewhere. Most studies recommend less direct control rather than more and we concur with these recommendations.

Beyond these basic reasons for rejecting the concept of line item funding and the concomitant directed control of IR&D there are several other important considerations.

Line item funding would cost the Government much more for the same overall effort. For example, in FY 1974, $1.053B of independent effort was reviewed and judged to be relevant to DoD. Of this, the DoD share was $457M. We thus reaped the benefit of $596M of technical effort which we reviewed and influenced but which was absorbed elsewhere. This benefit would tend to be lost in directed procurement because industry would no longer have the same competitive incentive to invest other resources in projects of interest to the Government. This would inevitably result in the weakening of the Nation's technical base.

Secondly, the administrative costs of managing a budget line item allocation and direction of IR&D would be excessive. Either IR&D contracts or grants to thousands of small companies would have to be administered at great cost to government and industry or, in the absence of this uniform treatment, these small companies would fall behind and become less cost competitive with the larger companies in which "IR&D" support was provided by contract rather than by overhead recovery. In any case, the number of companies with the technical capability to compete would diminish because those not granted funds would fall behind.

The detailed administration of this scheme would also involve major efforts of key technical manpower in the DoD laboratories and would further divert the energies of this important resource. The quality and level of the in-house technical effort would be reduced significantly at a time when we are striving to build up the quality and vitality of DoD laboratories.

In summary, we believe that increased direct control of IR&D implied by line item budgeting and by contract or grant administration would tend to destroy the fabric of the present highly competitive system—forces would be set into play which would decrease the quality of the technical effort as well as its magnitude. Our already shrinking technical base would suffer with nothing meaningful gained. I believe these risks to be unacceptable.

3. PATENT AND DATA RIGHTS

As a recommendation in its recent report, the GAO recommends that legislation provide for including in advance agreements patent and technical data provisions granting the Government royalty-free licenses and data rights, based on a scale of the agency's cost participation in IR&D recovery. The Department of Defense continues to support its long standig position of not acquiring patent and data rights in the results of IR&D. There are several reasons for our position which are both philosophical and practical. The Assistant Secretary of Defense for Installation and Logistics, stated many of both the philosophical and practical reasons in a 1964 letter to Senator McClellan. I would like to quote several of the pertinent passages from that letter.

"The Government does not stand in any special relationship as a customer, and it, like other customers, should pay its share of the cost of operating an industrial firm which includes IRD program costs. It therefore, as any other customer, does not seek or expect patent rights when the price it pays for commercial products includes costs of IRD programs. Nor does the Department see any rational basis for applying more stringent rules, such as requiring patent rights if it supports IRD programs, simply because the contractor happens to have sales predominantly to the Government; provided the IRD expense is allocated to all customers on a fair and reasonable basis. We recognize, however, that in these instances there is greater than normal need to provide assurance that the expenditures are reasonable, i.e., no larger than would be spent by a prudent management in a commercially oriented business."

"We believe that the position recommended in the report is contrary to the best interests of the Government because it would inevitably result in discouraging businessmen from using their engineering talent and other resources for the development of products designed to meet the needs of the Government.—The policy expressed in the report would effectively smother this incentive as far as defense contractors are concerned by making it clear in advance that rights in data resulting from a company's independent research and development efforts would have to be turned over to the Government."

"If companies that develop new products for Government use at their own risk and initiative may thus be denied the rewards normally afforded successful risk takers under our economic system, they will obviously have little motivation to continue to expend money, talent and other resources on the development of Government-oriented items. This would be a serious loss."

The statement just quoted is as true today as it was 11 years ago.

There are several other practical reasons why the GAO recommendation should not be accepted. The administration of such a policy would be quite difficult to carry out. For example, at what point would the Government have funded sufficient of the IR&D program to demand rights? Would the Government receive full rights for funding a portion of an IR&D program, though that portion may be no greater than 50%? Is it equitable to demand rights greater than those demanded by other customers of a contractor particularly when, in many cases, the other customers are the vehicles for a substantial amount of recovery yet do not ask for similar rights? Consider also that data and patent rights from only those contractors negotiating advance agreements would be available as a result of the GAO recommendation yet similar data of the great bulk of contractors, though their IR&D programs may be small, would not be available. Still another problem concerns the rights to items or processes developed at private expense where the source of funds was profit rather than the contractor's overhead.

The difficulty of establishing an equitable position capable of being administered on this issue coupled with the lack in the past of any significant difficulty by DOD in acquiring the rights to use needed IR&D results suggests strongly that acquiring the rights to use IR&D data and patents, when needed, is not a major issue.

4. ACCESS TO COMMERCIAL RECORDS

In its 5 June report, the GAO also recommended that the Government have access to a contractor's commercial records when needed to determine that costs are allowable. The DOD has been studying this area and has been considering the advisability of requiring contractors with advance agreements to certify that IR&D programs do not include costs required in the performance of contracts. We believe it feasible to use such a certification signed by the contractor at the time negotiations are completed for the advance agreement.

5. FOCUS OF RELEVANCE OF IR&D

The Department of Defense has been conducting determinations of the relevancy of contractors' IR&D projects to the DOD missions for the past few years in response to the requirements of Section 203 of Public Law 91–441. Our experience with this activity indicates our implementation of the relevancy requirement has caused no great problem and that the nonrelevancy of IR&D projects to the DOD has averaged about 8% of the total number of IR&D projects proposed for execution. It should be pointed out that few if any IR&D projects are actually disallowed since nearly every contractor has sufficient business with other than DOD to recover the costs of nonrelevant projects in such business. It should also be pointed out that if a uniform Government-wide application of IR&D policy and procedures is instituted and the Government is to present a single face to Industry, then a broader range of technological interests than DOD must be considered relevant. This range of interests is broad enough as to make the significant administrative chore of reviewing each and every IR&D project of every contractor of every Federal agency highly questionable as a cost effective endeavor.

6. GOVERNMENT-WIDE TREATMENT OF IR&D/B&P

The Department of Defense supports the concept of a uniform Government-wide treatment of IR&D/B&P and suggests that the development of such uniformity should be the responsibility of the Office of Federal Procurement Policy. IR&D is essential for any agency which needs a base of technically competent and competitive contractors. Equitability demands that the treatment of IR&D by these several agencies should be consistent from agency to agency and from contractor to contractor. In conjunction with the idea of uniform Government treatment, the DoD also supports the concept of presenting a single face to Industry; that is, a single advanced agreement, joint technical review, and a single overhead rate. We believe that the lead agency approach based on the predominant contracting agency would work well as it has between DoD and NASA in the past few years. We, however, disagree with the GAO in having this "single face" approach implemented by legislative action. A legislative policy statement establishing the purposes of IR&D support and recognizing IR&D/B&P as necessary cost of doing business would be useful. However, attempting to implement a specific approach to uniformity via legislation does not fully recognize the dynamics of the situation and would be inappropriate and unduly constraining. Again, the Office of Federal Procurement Policy offers an excellent vehicle for achieving these objectives.

8. VISIBILITY OF IR&D

Another issue has been the question of the visibility of the individual IR&D allowance to each contractor and the technical results of that allowance. The Department of Defense reports annually to the Congress on the amount of IR&D incurred by each contractor in each of the contractor's divisions and subsidiaries, the amount of IR&D incurred that was considered reasonable for a prudent contractor to spend in the same circumstances and lastly the amount of IR&D to be recovered in DoD contracts. This report is submitted on the 15th of March to the Speaker of the House and to the President of the Senate. The report is available to every Senator and Representative but must, of course, be treated as proprietary since it contains information concerning each contractor's total program funded by his profit and by his other customers as well as by the Department of Defense.

The technical results of the effort funded by the IR&D allowance is summarized each year in the contractor's technical plan for IR&D. This plan, submitted during the first quarter of the contractor's fiscal year, contains statements of the objectives of each IR&D project as well as the approach being considered in achieving these objectives and the progress made in the last period. These plans are widely distributed throughout DoD and NASA laboratories both for evaluation and for study. The detailed technical report of the effort when completed is available upon request by a DoD or NASA professional. Again, these reports are handled as proprietary since they represent a contractor's best efforts to be competitive in his field of endeavor.

To enhance the dissemination of the IR&D technical information to all interested professionals within DoD, we have established a *data bank* concerning IR&D which contains summary information on each IR&D project underway or completed by each contractor. The GAO has helped DoD in this development.

The information is catalogued in a number of different ways permitting searches to to be made in a variety of manners such as key words, performing organizations, etc. This data bank can be read out at some 50 secure, remote terminals located at key points in our technical organizations. The data can also be provided on written or telephone request from those professionals who do not have ready access to a remote terminal.

All of these mechanisms, in addition to the periodic in-plant reviews and the manyfold technical interchanges between industry and government via direct visits, technical conferences and symposia provide relatively high visibility of the IR&D results of major DoD/NASA contractors by those in Government who require this information.

Suggestions for Management of IR&D

Let me now turn to our suggestions for improving the management of IR&D. Several of our suggestions have already been identified in the prior paragraphs of this statement. However, I will summarize for the sake of completeness.

We recommend a Congressional declaration of policy concerning IR&D. The declaration should contain a statement similar to that contained in DoD Directive 5100.66 mentioned earlier in my testimony. With this declaration of policy and the charter of the Office of Federal Procurement Policy, the need for the current Section 203 of Public Law 91–441 no longer would exist.

We further recommend that the Office of Federal Procurement Policy be charged with the responsibility for developing, coordinating, issuing and auditing the implementation of an OMB Circular establishing a uniform and consistent treatment of IR&D/B&P across the Federal Government. The treatment would generally follow the recommendations of Dissent Position 1 of the Commission on Government Procurement with the access to commercial records satisfied by the certificate approach and the rights to needed IR&D data and patents satisfied by contractual means rather than wholesale assumption of rights to all data and patents whether needed or not. The OFPP treatment should establish uniform criteria for determining a reasonable level of IR&D/B&P for each contractor, the relevancy of the effort and the rules for allocability.

Concluding Remark

I would like to reiterate that the IR&D effort comprises a fundamentally important and pervasive part of the U.S. technical base. We as a Nation cannot afford experiments and changes in policy which would alter its essential characteristics.

The notion that IR&D is a subsidy or a giveaway is erroneous. On the contrary, it actually represents a great bargain to the Government. In 1974 on the average, 92% of all IR&D projects were directly relevant to DOD interests while, on the average, DOD paid only 39% of the cost of the IR&D effort incurred. For this discounted payment, the Government is able to maintain the most advanced technology and innovative systems in the world.

One real difference between us and the Soviet Union is the quality of independent competitive initiative in the development of our technology. This is why we're ahead, why our competition spends almost twice as much to catch up.

It would be ironic indeed if we failed to appreciate and support the strengths of our system and if we were to move towards increased monolithic control at a time when the rest of the world and the Soviet Union itself are trying hard to emulate us.

Dr. CURRIE. Senator Proxmire and Senator McIntyre, I appreciate the opportunity to appear here this morning because this is an exceedingly important subject for our Nation and one that is clearly not well understood, namely, independent research and development.

I do have a prepared statement. It states the views of the Department of Defense and my own personal views. I would like to introduce this into the record along with a number of documents that I have which explain procedurally how the accountability, the relevance, the assignment of reasonable value, and so on, is administered by the Department of Defense.

I will introduce these into the record.

Senator MCINTYRE. Are these documents referred to in your statement?

Dr. CURRIE. Yes, sir.

Senator MCINTYRE. They will be incorporated in the hearing record. [See p. 323.]

Dr. CURRIE. Thank you.

To cover a couple of main points, I would like to make a few statements. One of these points has to do with the nature and the significance of I.R. & D. and the bidding and proposal effort and the other point bears on one of the number of issues of concern to these committees; namely, that of the degree of control of I.R. & D. by the Government.

First, let me say by way of introduction that my views are influenced very strongly by my two principal responsibilities to Congress and to the Nation. These responsibilities are first assuring that this Nation has a quality and level of defense related technology that will guarantee our security in the future.

The second principle of responsibility is to efficiently acquire those defense systems capabilities that are needed. Speaking of my two main objectives—namely, assuring the level of our technology base for the country and acquiring the systems capability needed by the Defense Department at minimum cost to the taxpayer—every energy I have and every loyalty I have is directed solely to those two objectives. My comments will be in that perspective.

The I.R. & D. effort is often referred to as a program. It is called the I.R. & D. program and, by implication, this would suggest that it is just another mechanism such as the contracted, directed, R. & D. program for attaining preconceived end-item capabilities for the Government, for the Defense Department.

Now it is true that flowing from I.R. & D. is an immense stream of innovative technology and innovative capability nationwide.

But I think to view I.R. & D. in this narrow sense as a program misses its more fundamental significance to the Government and to our whole society.

In the broad—our military security and our economic security—and we all agree to this—depends upon a very broad base of advanced technology and furthermore on the efficiency with which this technology is transferred into usable end items that are superior in performance and lower in cost than those of our competitors.

This applies right across the board. Now the competitive forces in our free enterprise system have been absolutely essential, traditionally, to our ability to create this base of technology and competitive posture worldwide in whatever sphere.

It has been fundamental for our productivity, our standard of living. It has been fundamental to our ability to compete worldwide in the world markets. It is not less fundamental insofar as we can use these forces to create a defense capability that must increasingly, in this world environment, in this very rapidly changing era of technology, depend on quality and depend on efficiency rather than procurement of numbers at any cost by brute force.

We clearly can't be in that position.

Now this fundamental net of competition has been consciously recognized in this country. It is a conscious part of our national policy in the executive and legislative branches to maintain a base of competition in industry and to procure our hardware and our services insofar as we can from competitive sources.

In order, therefore, to pursue this policy, we must maintain in industry and in organizations the level of competitive technology, innovative ideas, management innovations which provide a competitive climate and which permit us to compete.

We also must bear, as we all know, the costs of the competition ourselves. Industry bears the cost for competition. The Government bears the cost for competition in soliciting multisources and in issuing RFP's and in the extensive evaluations that take place.

These all involve costs and we as a nation are willing to pay these costs because we believe in the aggregate that the return from this investment, the return from those costs are 100-fold greater than the investment itself.

It is the thing that drives the quality and level of our technology position. At a time when our investment in force modernization—and I am speaking from a Defense Department point of view—it is the quality that permits us to be competitive in the world competitive environment.

Now I.R. & D. and the independent aspects of it——

Senator McINTYRE. Why is it necessary for us to pay for the competition? What is the practical reason that we have to pay for the competition between X, Y, and Z firms all bidding for a particular aircraft or weapons system?

Dr. CURRIE. It is a truism that every effort desired of an industrial firm by its customers must be paid for in some manner by those customers or the firm will not be able to stay in business. In Government contracting, the manner of payment for these efforts must be allowed as direct or indirect costs and not considered as claims on the profit allowed the business. Profit is that payment made to the owners of the business. Profit should not be considered a kitty to be used to cover disallowances of costs normal to any business.

Senator McINTYRE. Let me see if I can make myself clear. This is a very complicated subject. But if X, Y, and Z firms, all aircraft manufacturers, are asked to come up with a design for something, they have to expend their money, do they not?

Don't they have to put $100,000 into submitting a proposal to you in order to try to win that competition?

Dr. CURRIE. That is correct.

Senator McINTYRE. Do we reimburse those that lose?

Dr. CURRIE. Yes; to the extent that we are a customer and to the extent that we allow these costs, they are reimbursed. This is exactly the same as in commercial business. As you know I spent a number of years in strictly commercial business and in preparing proposals and going down one avenue or another, I think that we were lucky if we became a winner in one of five competitions.

Another company would say 1 in 10 or 20.

Senator PROXMIRE. Give an example of how losers get reimbursed in private enterprise?

Dr. CURRIE. Everybody has to undergo the costs of marketing, of submitting a bid or proposal. They have to incur the costs of demonstrating feasibility or perhaps developing a complete product to enter into the marketplace.

These are charged off as costs of doing business.

Senator PROXMIRE. How did Ford get reimbursed for the Edsel?

Dr. CURRIE. The initial costs of the Edsel were probably expensed in the year in which incurred until the amount of expense amounted to more than could be absorbed in the prices of the then current products. At that time, the development expenses of the Edsel were likely capitalized for later recovery in the price of each Edsel. Then when the Edsel didn't sell well, the costs of development had to be written off; that is, taken directly out of the owners' equity.

Senator PROXMIRE. Sure; but it came out of their equity. They were not reimbursed by some customer who said we are going to give you extra money.

Dr. CURRIE. Such costs were reimbursed by a customer to the extent that they were charged into the price of then current products, and further, to the extent that Edsels were sold.

It is typical in a commercial high-technology business to spend between 6 and 12 percent of sales on research and development; much more than in marketing. The price industry seeks to charge is such that all of these costs are recovered if possible in the price of its products.

Senator PROXMIRE. Is that how Studebaker and the majority of automobile companies we had 40 or 50 years ago went broke?

Dr. CURRIE. Companies go broke because they incur these costs and then are unable to recover them through their sales. Such nonrecovery causes an unacceptable loss of equity resulting in bankruptcy. So if sales drop too much and a company has incurred heavy I.R. & D., then it is likely out of business.

Senator PROXMIRE. What is the difference? Here you don't.

Dr. CURRIE. But they do and because we demand a high degree of competition. The situation in the Defense Department is that at the inception of every program, we encourage as much competition as possible, Senator Proxmire, and on a very pervasive basis, not only on a prime contract basis but on the second- and third-tier subcontract basis.

The Commission on Government Procurement made a series of recommendations, C–1 through C–12, and running through these was the need for competition at every level.

Senator MCINTYRE. Can a small firm undertake to compete today without the assurance that they are going to be made whole if they lose on a bid?

If we did not have this sort of an I.R. & D., many of our small firms would be dropping out of the technology base that we have; is that correct?

Dr. CURRIE. That is correct. Further, I think a step toward monolithic control of I.R. & D. by the Government would work manifestly to the disadvantage of the smaller firms.

Senator PROXMIRE. Would the Senator yield on that? My staff did calculations on I.R. & D. spending and found that the top five recipients got 30 percent of the Pentagon's I.R. & D. funds for 1974. The top 25 contractors got 66 percent. It seems to me that far from giving small firms an opportunity to grow and compete, this is precisely the opposite.

It is the big firms that get the lion's share of the funds.

Dr. CURRIE. Defense firms regardless of size participate in I.R. & D./B. & P. in the same manner as do commercial firms—to the extent that they are successful and their level of sales permits. The Senator is quoting from the figures on only the firms with advance agreements.

We do not, because of the overwhelming numbers of companies keep records of the I.R. & D./B. & P. recovery of the thousands of small firms.

These same statistics, if we pursue them further, would show that, for example, in the 90 largest firms on which we report to Congress—for the price of $457 million we reap the benefits of directly defense—relevant I.R. & D. in the amount of over $1 billion.

We pay about 39 percent of the work from which we benefit.

Senator PROXMIRE. The fact is it is the big firms that get the overwhelming majority of the money. Isn't it true that the present policy insures that that will continue?

Dr. CURRIE. In our economic system, the successful companies can use their success to improve their ability to compete in the marketplace. So it is in the defense marketplace, the same large firms do most of the business.

Senator PROXMIRE. You have a circular situation here. Sure they do most of the business.

Dr. CURRIE. Various ones of these firms lose out technologically in certain areas. Their sales decline and you will find that their I.R. & D. goes down. Other companies come up. It is a dynamic process.

Senator PROXMIRE. Over the years, I don't see much of a change there compared to the change we have had in the real dynamic part of our free enterprise system.

Dr. CURRIE. I.R. & D. comes to the fundamental tenets of our system. It is the result of a National policy. We spend a lot of time each year, as you know, in determining questions of relevancy, of reasonableness, of coupling this effort into the needs of the Defense Department.

Any marked change in its control would be, in my view, a fundamental change of national policies.

If these subjects are correct, it necessarily follows that I.R. & D. must be an extraordinarily productive process.

The value of I.R. & D. must be extremely great. I would like to assert that in my best judgment from a management point of view and a technical point of view, it is.

Senator PROXMIRE. What appalls me is if the results of I.R. & D. are so great, why all the secrecy? Why don't we know who gets it, what they do with it, what the results are, so we can determine if it is not great or is great?

You get $1 billion a year. You don't tell us where it goes. Until a few years ago, nobody in Congress knew it was going on, although it had been going on for 4 or 5 years in 1969 when we discovered it.

Dr. CURRIE. Fundamentally, through I.R. & D./B. & P. we are reimbursing a firm for the costs of maintaining a competitive posture which we demand. The requirements of a firm to maintain competitiveness is obviously an individual thing and equally obvious highly confidential to that firm. We in Government do not require public disclosure of many of the other activities within a firm so why should we demand public disclosure of this activity. I.R. & D./B. & P. at about + percent is not one of the largest overhead items. Within G. & A. alone, which amounts to about 10 percent in the average firm, there are other sizable expense items. Yet in spite of this, the Department does provide information on I.R. & D./B. & P. to the Congress.

On March 15 of every year, we submit a detailed report to Congress and analyzing the top 90 firms receiving I.R. & D. Much of the

information is given—total program, mix of commercial and governmental sales, the amount of independent work that we feel is relevant to our interests and the ceiling and percentages. This is available to you personally. Senator McIntyre knows this is reported annually. Further, I.R. & D. the work receives a great deal of other attention. People in DOD laboratories and DOD management are familiar with what is going on in the I.R. & D. program. I personally know the I.R. & D. efforts of probably 100 companies.

Senator PROXMIRE. That is meaningless as far as congressional debate is concerned. It is classified. We are not given an opportunity to discuss it. We are never told who gets the I.R. & D. so that we can make our own independent judgment. We know where the research and development goes. We criticize some of it. We affirm other parts of it. We urge in some cases the Defense Department to spend more, in some cases, to spend less.

We don't have any public discussion because we don't have any basis to determine whether it is good, bad or indifferent.

Dr. CURRIE. In this report submitted to Congress as the overseers of the Nation, you have every bit of that information. That is presented——

Senator PROXMIRE. You tell us the individual firms?

Dr. CURRIE. Yes, sir.

Senator PROXMIRE. But it is proprietary so we can't discuss it. The amounts they get are classified. We don't know how much they get.

Dr. CURRIE. Certain aspects are considered proprietary just as certain aspects of our systems development are considered Government secret.

Senator PROXMIRE. What is proprietary about paying a certain amount of money to Lockheed? If the taxpayers' money is provided to these firms, what is proprietary about that fact?

Dr. CURRIE. I can't address the legal question here, Senator, Proxmire except to say that section 1905 of title 18, U.S. Code-prohibits Government employees, that is, we in the Defense Department, from disclosing on our own volition financial information given in confidence by private enterprise.

Senator PROXMIRE. Financial information given in confidence? This is the taxpayers' money taken out of appropriations for the Defense Department. Is that financial information given in confidence? Why?

Dr. CURRIE. It involves their commercial sales, how much they spend in commercial research and development. It affects their fundamental business posture.

Senator PROXMIRE. Why is the amount the Government spends and provides to one of the firms considered proprietary?

Dr. CURRIE. All of this information is given to Congress so you have it. The question is how much can be printed in the newspaper and made generally public?

Senator PROXMIRE. If we can't discuss it in open committee meetings and on the floor of the Senate, we are inhibited in having any effective evaluation of it.

Dr. CURRIE. I think that that question has to revolve around an interpretation of this law that is on the books. I am not prepared to discuss the legal aspects.

Senator PROXMIRE. How does the law apply to the case where the Federal Government is providing money to specific firms?

Dr. CURRIE. First of all, this information is all submitted to Congress so that it is available for you to pass judgment on.

The question on how much of it can be made public and whether that part you just mentioned can be made public versus all of their other financial information that they submit to us and we present to you can be made public, it is a matter for legal interpretation and I would like to submit for the record the legal position that has been taken here so that that can be debated.

Counsel is developing a position on this issue and will submit the paper to the subcommittee as soon as possible.

Senator PROXMIRE. I think this is a very important point. Regardless of the legality or illegality, I want to know what the merits are to concealing this information. You are the expert in this. There is nobody who can speak with more experience or more knowledge. If you can't tell us the justification it seems to me there is no justification.

Dr. CURRIE. One of the fundamental tenets of our Nation is that Government will not disclose information of a confidential and private nature concerning any individual or organization. The amount of money that an organization requires to remain competitive is of that private and confidential nature. We disclose without prejudice the amount of money awarded to a firm for a given number of articles but the details of that firm's operation in producing those articles is generally considered confidential to that firm and the executive branch respects that confidentiality.

Senator PROXMIRE. If it is going to remain classified, if we are not going to use it, there should be some justification. The public has a right to know everything we spend unless there is a very powerful reason for not disclosing it. I have not heard one single justification for it except you say there is a legal interpretation involved here.

We can change the law. That is our function as lawmakers.

Dr. CURRIE. If the law is changed and a different interpretation is placed on it, I would be the first to say let's publish it in every newspaper.

Senator PROXMIRE. As far as you know you can't give us any justification, any reason why the amount the Government spends with each contractor should be kept secret?

There is no merit except that it is in the law now and you have to abide by the law.

Dr. CURRIE. That is the current legal interpretation.

Senator CULVER. Dr. Currie, I wonder if you would be willing to address a larger policy question that concerns me. As you mentioned, when we talk about research grants given by the Government to the private sector, we are talking about a taxpayer subsidy for a purportedly desirable public end use and public good. The question I have is what percentage of these research grants in your judgment—I would like to have a ball park figure and perhaps for the record you could provide more specific information—what percentage of this money in these grants is related to defense research?

I realize it is a difficult thing to break down.

Dr. CURRIE. No. I can give you a pretty good idea of that, Senator Culver.

But first let me dispel the notion that these are grants or that this is a subsidy.

I was at least beginning to get into a discussion of here why it is fundamentally different than a grant or a subsidy. It is a cost of doing business in our free enterprise system.

Now we make a detailed survey every year of the contractors who participate above $2 million who are reimbursed for I.R. & D. in bidding and proposal expense. We receive from them very thick documents, complete descriptions of the programs that they are proposing and these would fill many bookshelves each year.

That is on a qualitative side. On the quantitative side in 1974 for I.R. & D. alone there was about $1.14 billion worth of effort in private industry which they considered relevant, that they were spending money on and considered relevant to DOD interests.

Of that amount we judged that 92 percent of that or $1.06 billion was indeed relevant to our interests after we had teams of people examining these brochures and making in-plant visits.

Rather than that $1.06 billion level, we established by negotiating a ceiling of $900 million for I.R. & D. this was the ceiling. We reimbursed them $457 million only of that work.

Senator CULVER. Perhaps I am not making myself clear. I have a relatively simple question to propose to you. I am interested in the larger general policy question as to what percentage of public moneys which are provided either through grants or various studies that are commissioned in the private sector including universities as well as the commercial side are related to the general subject of defense broadly defined?

What is this presently, related to the total amount of money spent? I want a rough sense of that.

Dr. CURRIE. The Defense R.D.T. & E. investment in research and engineering represents about 25 percent of that invested in this Nation. It represents about half the Federal expenditures for R. & D. and it represents a quarter of the total.

Senator CULVER. I have heard a very disturbing figure and I would like the opportunity, Mr. Chairman, to provide additional materials for the record.

Senator MCINTYRE. Yes.

Senator CULVER. I heard some extremely alarming figures to the effect that the neighborhood of 75, 85 percent of the moneys that were annually expended in terms of these grants and so on, both to universities and commercial programs were related to defense broadly defined.

And yet this went to support something like 15 percent of our gross national product. Now I wondered what kind of figures we are talking about there? We can go into this further. But the problem we face here is to get some public policy handle on this subject.

You talk about justifying the returns to the American taxpayer because of the usable character of this and so on. I am interested in things like whether the American taxpayer is making sufficient investment in a balanced sense in the national security interest and health care delivery systems and transportation R. & D. and so forth.

Where can we get a breakout of that and where can our taxpayers look at that big board and say with all due respect to you, Dr. Currie, we think that this is ludicrous, this distortion. It can't be justified in our own national security interests as we define it.

We don't have that kind of consideration in a comprehensive sense by the Congress or anywhere else to look at some of these numbers and make sound public policy judgments in the taxpayer's interest and in the national interest as to how this money is spent and for what public purposes.

Dr. CURRIE. The total Federal outlays for research and development in the large—and this includes the National Institutes of Health, Transportation, NASA, ERDA, and so on including all of what we call system development—is about $17 billion of which the Defense R.D.T. & E. is about half.

Defense represents half of the Federal outlays on science, technology, engineering in the large. Now of that, a very minor portion, a relatively small portion, perhaps 15 percent, goes into what I would call enriching the Nation's process technology base for the more basic research, exploratory development, and so on.

That represents in the defense budget about a $1½ billion figure. What we are talking about here for fiscal 1974 is $457 million spent in similar kinds of activities in industries at their own initiative.

I am asserting that that element of this total picture is in my mind probably the most important element. It is absolutely crucial, a crucial element for the vitality of this whole structure that you are addressing.

Senator MCINTYRE. Proceed with your statement, please, Doctor.

Dr. CURRIE. Thank you, Senator McIntyre.

I have related this I.R. & D. interest to the Federal interest; namely, competition. I have asserted that we do this because the payoff is so tremendous. Now what is that payoff? The problem that we continually come to is how do you measure it? I can present lists of things, end items that have come in some way from this effort.

For example, I can point to the origins of the high energy laser. I can point to the use of I.R. imaging and tactical missiles. I can point to the revolution in digital signal processes in radar. But the problem with such a list is that it is finite and it is totally inadequate to express the real value in my judgment which accrues from this individual effort.

The reason for this is that I.R. & D., contrary to all of the other Federal grants and most of our program is not directed from Washington. It makes use of individual motivations, energies of the finest technical and management people, all of them making their independent judgments as to their own future and their own success.

It is basically alined, in other words, with the motivations and incentives of the free enterprise system. That is why it has been so extraordinarily productive. As someone who has been both in commercial and defense industry for many years, I see every day the pervasive influence on how we can make things cheaper, more efficiently, how we can create new plateaus of capability. We get out capability for manufacturing processes that are the envy of the world is through this process.

In addressing the issues, there are a number of issues related to I.R. & D. which these committees are addressing. One is whether there should be a congressional statutory declaration of I.R. & D. policy. One is the degree of control we, as a government, place on

I.R. & D. The third is patent and data rights, the ownership of those; the access to commercial records; the focus of relevance and whether there should be a broad focus or narrowed as it is now in the NASA and DOD programs.

I would like to pick one, the degree of control, because I think that is what this debate is all about. It has been suggested—and I understand Mr. Staats even suggested this the other day in testimony contrary to the recommendations of the GAO report and even his inital testimony the other day—that one have line item funding, that one segregate this money, make it a subject of direct control, direct grants, direct contract control.

I believe that this overlooks the more fundamental aspect of I.R. & D. I.R. & D. is not a commodity we purchase on the open market. It is not something offered for sale and we buy like we do tanks and airplanes and the development of the B–1. It is a cost of doing business. Our responsibility—the responsibility that we have evolved over the years—then is to test for the prudence of this, the value of it, its reasonable level, to give it the visibility that it needs.

I feel that we have gone as far as is reasonable or desirable or economically sensible to directly control this resource.

I think the direct control of it by Government is, in short, alien to our way of doing business. It would have an impact and a risk involved in it which is unacceptable in my judgment.

Now beyond these basic reasons for not making it a matter subject of line item control and separate contract and grant, there are some other reasons.

First of all it would detract tremendously from the amount of effort we get. We get roughly $1 billion of effort which we review every year and which we directly influence for only 39 percent of that money.

Now, if that part that is recovered, $457 million is made a matter of direct award by the Government, it disincentives industry to spend the rest of that money. At the very least we would not have access to the rest of that effort and the ability to influence it. In the end, our technology base would suffer in this country.

A second reason is that the administrative costs of performing this, of issuing these grants, even supposing that we in Government have the knowledge to award these is astronomical. I can only quote here from the Government Procurement Commission Report on Direct Contracting of I.R. & D., and I will enter the full excerpt for the record if I may, Mr. Chairman.

Report of the Commission on Government Procurement volume 2, part B, p. 38:

DIRECT CONTRACT

It has been suggested that Congress could appropriate and control an annual sum of money commensurate with the national total of IR&D costs for Government contractors and that this money could then be allocated among the contractors involved by individual direct contracts.

The problems involved in this approach appear to be awesome. First, it should be realized that the national total of IR&D costs is composed of the costs of literally thousands of individual IR&D projects. Congress would have an impossible task in assessing the merits of the total program. In addition, an equitable basis for allocating such a total sum among contractors is not obvious, and the administrative cost of such an undertaking could be grossly uneconomic.

They recognized that it is upwieldy and would consume enormous resources. So there is the administrative cost. Furthermore, there is

the—and this is not often appreciated—in order to spell out the work, in order to award grants and administer those grants, it is necessary to create a further diversion of our prime technical personnel in the Government, our experts in our laboratories. They would be doing this about full time and at a time when their direct contributions to weapons systems acquisitions are needed and we are trying to enhance the quality and the direct contributions of the laboratories.

Fundamentallly it destroys the independence of action. It implies that a few Government people, no matter how talented, how creative, how astute they may be, can take the place of hundreds and thousands of equally qualified people in industry acting on their own behalf, independently mapping out their own I.R. & D. programs.

Now I want to hit head-on this subject of I.R. & D. being a subsidy or a give away. There have been repeated statements to this effect. On the contray. I pointed out that in industry at least 92 percent of the work evaluated in detail has been shown to be relevant to our interests in the free enterprise tradition and that we reimbursed only 39 percent of that.

I don't call that a subsidy. As a matter of fact one could make the reverse case that in these situations the industry is in fact subsidizing the Government.

Just one further point, and I appreciate your patience, Mr. Chairman. In studying the differences between us and the Soviet Union, which is my job and which I do constantly, I can assert that fundamentally it is the quality of independent competitive initiative that sets us apart.

It is why we can maintain the level of hard technology in this country at a time when our expenditures are very low and at a time when the Soviets are spending many more resources to try to catch up.

I think it would be ironic indeed, that should consider moving to more monolithic governmental control of this particular resource at the very time when the rest of the world and the Soviet Union itself are moving in our direction and trying to emulate us—thank you very much, Mr. Chairman.

Senator McIntyre. I think you were telling me that the Soviet Union in their R. & D. are beginning to take the chances that they have so often before not dared to so they can emulate our technology.

Dr. Currie. Following World War II they depended on technology transfer and they set up a bureaucracy, centralizing control to bring them forward in science and technology. As you know very well, Senator McIntyre, they have announced repeatedly that their concept of the world struggle between the two systems is in the area of science and technology.

The disturbing thing is that in the last 5 or 8 years everything I know about how they manage their technology is in a direction which is very nonsocialistic. They have found out that individual incentives, the competition between design teams, that will pay off and they are setting up a system to do this.

I would assert that this is the system we already have.

Senator Culver. Dr. Currie, if that trend is the case, and I think it is generally agreed that it is in terms of the relevant effort in Soviet Union, and we have this technological edge, what is your personal feeling about the wisdom in our national interest of the joint space

venture we have just completed with the Soviets in terms of the technological benefits and balance sheet of that exercise?

Dr. CURRIE. I will express a personal opinion on this because obviously it is out of my sphere. I don't really worry about that, only in the large. I believe that its scientific importance is secondary—must be considered completely secondary to other aims that have been achieved.

One aim has been at least a gesture on our part to try to get together on a meaningful basis and to try to establish a line of communications at the working level, so to speak.

I don't know how successful this process has been but I think we have learned quite a bit about them. We have learned something about their vision for the future, their determination. I have spoken to the Astronauts and a lot of the people involved in this effort.

I don't think that we would undertake a second effort like this at the investment that has been made. But this perhaps was a necessary investment and we reaped some benefit from it.

Senator CULVER. Are you talking about reaping benefit in a scientific sense or a political one? I am intersted in your testimony in an area in which I recognize your competence. What is the scientific technological balance sheet? Where do you feel the benefits fall?

Dr. CURRIE. Yes. We have gained nothing in technology or science per se in my view from the Apollo-Soyuz experiment. At most we have gained another channel of communications at the technical level. The benefits must therefore be seen largely in the political arena and I would prefer not to comment on that.

Senator CULVER. The scientific benefits fall to the Soviet Union. If anything the results have probably been in that direction.

Senator MCINTYRE. Can you tell us if the details by contractor which are provided in your annual I.R. & D. report to the Congress and classified for official use only can be declassified and made public?

Dr. CURRIE. It is the viewpoint of the legal counsel and the Defense Department based on the law I mentioned previously that it is probably for the most part proprietary.

It would involve a contractor by contractor examination to arrive at an opinion of how much could be made generally public.

Senator MCINTYRE. Don't you agree that if the I.R. & D. information by contractor were made public it would not have a significant effect on the I.R. & D. program?

Dr. CURRIE. I don't see how it would affect it at all. I think Congress is fully aware of how much we spend, what the levels are, what the general prognosis is. We have available all of the work.

I might add also that, as to the contents of the work, it is all put in a data bank. We have a very large computer down in Alexandria, Va. We have 50 remote access sites throughout the country.

Anybody in the Government, who has a need to know this proprietary information, can call the information from the computer. It is in general and widespread use.

Senator MCINTYRE. I am trying to ask if all this I.R. & D. information is kept secret or given to us in the Congress, but not made public, if it were, if the legal technicalities were thrown aside, would it have any effect on the future of I.R. & D.?

Dr. CURRIE. If it were all made public, then the technical strategies and some of the main technical directions chosen by a given organization would be sacrificed. This is a disincentive on the part of the industry to devote its prime resources to this kind of an effort.

Senator MCINTYRE. The question was with respect to all information spread on the public record. If that information were only in dollar amounts, would it have any significant effect on the future of I.R. & D.?

Dr. CURRIE. Yes, sir, it will. Its main effects would be on the business interests of the companies inasmuch as it reveals their strategies. If they spend twice as much as the Government allows on R. & D., that would work to the detriment.

Mr. FINE. If it is the single dollar line that you presented to us, with the breakdown as to total contractor expenditure, the usual breakdown of the items, are you saying that that information alone with no detail as to the contents, if it were made public would be in any way a negative effect upon the interests of industry to proceed as they now do with I.R. & D.?

Dr. CURRIE. You are speaking aside from the proprietary matters?

Mr. FINE. Proprietary being defined as something other than the dollar amount? Is that how you would define it?

Dr. CURRIE. Proprietary being defined as anything regarded a part of the proprietary information. I did obtain a legal opinion on this last week from my general counsel. His view is that it sounds plausible, Mr. Fine, but this is probably proprietary and would have to be examined on a contractor-to-contractor basis.

Mr. FINE. If the question is simply—if you could overcome that argument and you are able to make this public, in your opinion, would that have an effect on the I.R. & D. programs presently pursued by the various contractors?

Dr. CURRIE. If I am the president of a company not investing much in I.R. & D. and I see what my competitors are investing, at a much higher level, I might be persuaded that I must invest at a higher level.

And the converse is true. So it would have some effect from a business strategy point of view and that effect is very difficult to state. It has to do with the competitive process basically and company business strategies.

Mr. FINE. Isn't it also true that this would be a stimulant insofar as the competitive nature of I.R. & D. is concerned?

Dr. CURRIE. I.R. & D. by definition is already extremely competitive.

Mr. FINE. This would stimulate it by virtue of the fact that one would find out what their competitors were doing. One might be motivated to try to exceed the amount he is investing which would have a salutary effect on technology.

Dr. CURRIE. That is true and the converse is also true. I know of instances where companies are expending tremendous sums of I.R. & D. of which only a small portion is reimbursed and they would say why should we pay that much and cut their I.R. & D.?

Senator MCINTYRE. Senator Proxmire.

Senator PROXMIRE. You imply that what is at stake here is the basic research which is so essential in defense technology and other

technology if we are going to make progress and be able to defend our country effectively, is that right?

Dr. CURRIE. No, sir. I am not addressing what is generally classified as basic research. I am addressing the whole spectrum of basic, applied, product improvement. For example, some of the main benefits of I.R. & D.—and I can point to specific examples right now—are clever techniques for reducing enormously the costs of an airborne radar or an infrared set. So it has also to do with the cost of production.

It has to do with initiatives which will increase reliability. These are all part of the I.R. & D. effort.

Senator PROXMIRE. I am getting at the fact that they—we had testimony from the General Accounting Office and they investigated four typical I.R. & D. contractors.

They found that about 10 percent overall went for improving existing products. They found that between 64 percent and 100 percent, averaging around 80 percent, went for presently established customer directives, new things that services want.

They found that only an average of about 3 percent went for new concepts or future needs. It seemed to me you are wrapping yourself in this last factor which is a tiny proportion of the total, about $30 million of the $3 billion and saying because we have to be sure that we proceed and advance effectively in new concepts and meet our future needs, we need this $1 billion concealed in its present form.

Dr. CURRIE. No, sir, I am not saying that at all. It is true that a relatively small percentage is spent as basic research in the National Science Foundation.

Senator PROXMIRE. I am talking about the fact that there were three categories. One is improving existing product and I can't understand why we should not know about that. The second is the presently established customer directives, that is how the Army, Navy, and Air Force ask for particular research themselves.

I don't know why that should be secret or concealed or why the Congress should not know about it and evaluate it and have our say in it.

Finally you have new concepts that would be basic research in some cases and in other cases not.

Dr. CURRIE. These categories are arbitrary and subjective and I would maintain that much of the value of I.R. & D. is not in the basic new concept or in the basic research area but in the area of providing innovative solutions to military needs.

A military need might be stated as requiring a tactical missile to have all weather all night capability. That is stated as a need. There are many I.R. & D. approaches in this Nation right now working on the basic systems concepts that would bring about this future capability.

Senator PROXMIRE. You made a profound and correct statement when you said this is a badly misunderstood program. It is not, I think, the fault of the Congress that it is not understood. Unless it is because we have not changed the law.

The fact that this is a secret, not subject to public debate—it is not a line item. We don't have the basis for examining it so we can understand it. All of us have the same objective. We want strong Armed Forces at the lowest possible cost.

In order to know whether this is justified or not, we have to have the facts. We simply don't have the facts and we won't unless we can get more disclosure. In GAO's December 1974 report, they concluded that the Navy paid $87 million for I.R. & D., a portion of which was diverted for a commercial engine used in the 747.

Federal I.R. & D. funds may have also been used for other purposes, including an engine for the 727 commerical airline. If Congress does not review I.R. & D. funds, what reassurance is there against such abuses?

Dr. CURRIE. I would say that the Navy did improperly, in retrospect, in those early years to 1972 or so allow those costs although I am not sure of that. The costs were $49 million aggregated over 5 years or so.

This is notwithstanding that that development is of immense use to the Defense Department.

Senator PROXMIRE. As far as the commercial use, you would agree, you would agree that this was a misuse?

Dr. CURRIE. I don't have the facts before me. If a company has a commercial contract to deliver goods and services then no work towards the performance of that contract should be charged I.R. & D.

I would agree with that. That is our policy. The Navy is requiring certification to that effect now. We are studying right now how to more uniformly apply this policy.

Senator PROXMIRE. If it is typical and if it ended years ago, something should have been done to correct it and reclaim that money. Have any steps been taken to recover the funds that should not have been paid to the contractor?

If not, why not?

Dr. CURRIE. I can't tell you the details. It is the opinion of the Navy general counsel that these cannot be recovered because of the understanding between the Navy and Pratt-Whitney at that time, because of estoppel.

Senator PROXMIRE. Let me ask you about something else. On page 10 of your statement you talk about the patent policy that has concerned us for a long time. Frankly I just cannot see the justification in the Federal Government spending money on a program and not having patent rights.

Certainly the whole tradition in industry is that if they spend money, Xerox or General Motors or any other firm spends money in developing a product, they own it and they insist on taking advantage of it. They may have a brilliant scientist who does the work on it whose incentive is valuable and important, but the scientist does not own any part of it.

It is owned by the company. It is the scientists brains, ingenuity that may be responsible for it and in our free enterprise system that is a perfectly logical arrangement. A person puts up the money and buys it has a right to it.

In this case the Federal Government puts up the money so why shouldn't the Federal Government have the patent?

Dr. CURRIE. It comes down to the basic point of view and the premise that the Government does not stand in any special relationship as a customer to these companies.

Senator PROXMIRE. Well, the Government pays out money on these I.R. & D. contracts.

Dr. CURIE. The Government allows a number of costs as the cost of doing business. It allows the rent of a business. It allows health benefits, insurance benefits and so on. I.R. & D. within fairly narrow constraints is categorized in the same category.

It is the cost of doing business. In the case of the Xerox situation the scientists I can assure you in that company, benefits personally from that. The company passes along the costs of his work in the cost of the Xerox machine.

The public pays for that. The customer pays for that scientific and engineering development work very directly.

Senator PROXMIRE. You have a situation where the Government puts up the money, the scientist does the work. The corporation that handles the money and funnels the money from the government to the scientist, they end up with all the advantage.

They end up with a patent. I can see an argument for giving it to the scientist although I reject that on the basis of our capital system.

I can see a strong argument for giving it to the Government because they put up the money. I can't see any argument for giving it to the man in the middle who has not done anything except provide a convenient arrangement.

Dr. CURRIE. The I.R. & D. must be viewed as the cost of doing business. Let me mention one other thing in this context, Senator Proximire. The Government pays for only a fraction of the I.R. & D. program. I pointed out that there was over $1 billion in 1974, over $1 billion of work that we judged directly relevant.

Of this, $900 million was placed as a ceiling, and that was divided between their other business and Government business to the extent that we only reimbursed $457 million. So much of the effort on processes, patents, ideas, basic know-how is coming from other customers and is already coming from pretax profit of those companies.

Senator PROXMIRE. Isn't it true that in cases where the contractors get patents for products that are developed with Government I.R. & D. funds, and then sells the product on the commercial market, that the public is paying twice for it, first as a taxpayer and second as a customer who has to pay more because the company has been able to take advantage of their patent?

Dr. CURRIE. No, sir, I would not say that, and I speak as one who has developed things in both spheres, commercial and industrial.

If there is a commercial fallout from a Government idea or concept first of all I have to invest in the commercial product development, but I may or may not pass that along to the customers in the interest of price competitiveness.

If I don't have to amortize the cost of engineering and research in the commercial product, I can be more cost competitive, and that is the name of the game.

Furthermore, I will always try to sell to the customer at the highest price, independent of costs, that he will pay. That is the fundamental premise of our system.

Senator PROXMIRE. It may well be, but the fact is the Federal Government is paying for something for which it does not get any effective reimbursement.

Senator MCINTYRE. You have referred to your personal experience for I.R. & D. program. Will you identify the company?

Dr. CURRIE. The experience was some 13 years at the Hughes Aircraft Co. where I began as a scientist doing original research. I then managed the corporate research laboratories which comprised much of the I.R. & D. program at Hughes and later became general manager of one of the large equipment divisions for several years where as a part of my business I.R. & D. was an integral part.

The division's business was at about the level of $100 or $120 million a year.

Senator MCINTYRE. In comparing I.R. & D. with the other programs, would you say it covers only research and exploratory development or also advance development?

Dr. CURRIE. I.R. & D. work covers the spectrum, basic research to product development. Let me give a concrete example because we seem to be talking in abstractions.

At this moment, there is fierce competition between the two large companies for the radar for the new F–16 airplane. This will be on a subcontract, not on a prime basis. Now, I have been familiar with both of those companies, with the I.R. & D. effort, their own initiated effort, over the last several years. I have viewed the designs which are flying this month. I can assert categorically that this Government is infinitely better off from a performance and from a cost point of view having these contractors in their own self-interest invest money in how to improve reliability, how to reduce production costs.

I have seen some startling innovations in this type of effort. In the old system one began with paper designs from the basic concept on up. Now that money is spent not only in basic research, not only in new systems concepts, but in those processes and in a know-how which leads to driving our production costs down and increasing the reliability.

The reliability of these radars will be an order of magnitude better than anything we have done in the past.

Senator MCINTYRE. Do you believe that the benefits of Defense-funded I.R. & D. is worth $800 million annually?

Dr. CURRIE. Yes, sir.

Senator MCINTYRE. Does the Defense Science Board report of 1974 make any critical observations of the DOD I.R. & D. program?

Dr. CURRIE. Under the auspices of the Defense Science Board, I commissioned a study about 1½ years ago, headed by Dr. Gerald Tate. This group consists of distinguished people from Government and largely academia.

They—their main criticism of the I.R. & D. process as it exists, and I told them to go back to square zero and figure the whole thing out—their principal concern was the overdirection of it, the overcontrol of it. They felt that then we had gone a little too far as it is.

They stress throughout this report which I have submitted for the record that the major benefit from I.R. & D. is derived principally from the "I," the independence of the contractor. They did recommend a Government-wide approach to I.R. & D.

Senator MCINTYRE. What has been OSD and military departments' experience under DOD Directive 5100.66 and related armed services procurement regulations? What has been industry's reactions?

Dr. CURRIE. We reissued this very recently, last springtime. It sets forth essentially the management of I.R. & D. by the Department.

In particular, the central management tool is the Policy Council, the I.R. & D. Policy Council which I chair and which the Assistant Secretaries of the services participate in.

We set the overall policy. We look at sales trends. We look at budget trends. We look at the experience, and we set general guidelines for the services and delegate to the several services the negotiation of the advance agreement.

I would say this has been a very healthy development. I think we have excellent accountability. Equally importantly, I think we have achieved a strong communication between our Government technical people and the technical people in the industry who are performing this work. We benefit from that enormously.

Senator McINTYRE. What did industry have to say about it?

Dr. CURRIE. Industry chafes a little bit under the degree of control that is exerted right now by the executive branch. I think they understand it. I think we receive good cooperation. They were doubtful, I would say, about our expansion of the I.R. & D. data bank but are now fully participating in it since their proprietary interests are being represented.

Generally, industry would take the point of view that as a necessary cost of doing business, I.R. & D. really is not a subject for eix ternal examination at all. We recognize that Government business ts somewhat different than commercial business, and therefore this seof policies and these procedures make sure that we do have the relevance and the equitability.

Senator PROXMIRE. Are these I.R. & D. contracts increasing competition, or are they sole source contracts so that there is no competitiveness? One of the advantages you suggested for I.R. & D. is that it increases competition.

Dr. CURRIE. In the original award of any system, it is hotly contested industrywide. The companies draw heavily on their own research to enter into that competition. During the second source procurement, the competitors have to draw on their base of expertise in order to be competitive.

Senator PROXMIRE. The next one is Philco's effort leading to the laser designator system. How about that?

Dr. CURRIE. I would say right now in one of our major developments in the Army, the fact that there is a competitive approach is putting tremendous pressure on that program.

Senator PROXMIRE. I don't challenge that. I am trying to get at whether any of these were sole source procurement? Or then were they consistently competitive programs?

Dr. CURRIE. They were largely design competitions with cost as an important element.

Senator PROXMIRE. How about the laser designater system?

Dr. CURRIE. I guess a number of companies now are using that basic concept in their proposals.

Senator PROXMIRE. How about Rockwell's diffusion bonding technology?

Dr. CURRIE. I can't comment on that except that is a basic manufacturing process which allows one to become competitive.

Senator PROXMIRE. How about the Hughes ionic process?

Dr. CURRIE. That was to improve the frequency, performance, and speed of integrated circuits. It has found its way into the heart of many of our systems.

Senator PROXMIRE. Was competition in this case enhanced?

Dr. CURRIE. That particular development certainly put Hughes in a more competitive position to meet the needs of the military departments. Since then that technology as they all do has been diffused throughout industry.

Senator PROXMIRE. Was this a competitive procurement?

Dr. CURRIE. I don't know what procurement. That was done on I.R. & D. and it found its way into the entire industry. Probably in their design competitive award, they had a tremendous advantage for a few years.

Senator PROXMIRE. Boeing developed better methods for a particular type of——

Dr. CURRIE. There again they were in a much better competitive position.

Senator PROXMIRE. For us to have some notion as to whether or not these examples of yours are indeed an argument for I.R. & D. as presently constituted, how much of I.R. & D. was spent by Hughes and Philco and Boeing and Rockwell to develop these products and processes?

Dr. CURRIE. That information is obtainable and accessible by Congress.

Senator PROXMIRE. But is it classified?

Dr. CURRIE. Not in any usual sense.

Senator PROXMIRE. It is classified in the sense that we can't discuss it. It is proprietary, is that right?

Dr. CURRIE. Most of these examples are chosen from so many years ago I doubt whether that is even regarded proprietary by the companies.

Senator PROXMIRE. Then tell us how much I.R. & D.—what proportion of the cost of developing this was from independent research and development? Will you do that?

Dr. CURRIE. I can tell you that.

Senator PROXMIRE. Give it to us so it can be discussed publicly.

Dr. CURRIE. I will be happy at any time to present to you the bookshelves of information we have on any of this for your use on a proprietary basis.

Senator PROXMIRE. I want to get it on a public basis. It is very difficult for Senators to discuss things that are proprietary or classified.

We should not really. At least I don't think we should. It is easy when we do that to disclose classified information and none of us wants to do that. See if you can give us as much as possible that is in the public domain.

Dr. CURRIE. Senator, I want you to understand that we submit to Congress details about anything you want to know about. But I work within the laws created by Congress and that is for you to decide.

Senator PROXMIRE. What I am asking now for is to see what you can give us. You say this is from years ago and there may be no constraints on the public use of it.

Senator McINTYRE. Dr. Currie, you support the concept of a uniform governmentwide treatment of I.R. & D. and B. & P. reflecting the lead agency approach based on the predominant contracting agency?

Under this approach, DOD probably would be the lead agency in many cases involving ERDA and other Government agencies who now have their own unique regulations. Wouldn't this prejudice ERDA's unique requirements and possibly others?

Dr. CURRIE. The Government would have to work out the mechanics of this so it does not get unwieldy. I would envision our review of the I.R. & D. process taking place with team members from each one of those agencies at least for the particular companies and industries they were interested in.

I think it is a workable problem.

Senator McINTYRE. Referring to the concept of a single face to industry, you state that attempting to implement a specific approach to uniformity via legislation does not recognize the dynamics of the situation and would be inappropriate and unduly constraining. Will you explain why?

Dr. CURRIE. I feel that as a matter of management flexibility between the departments and so forth, we need to have the wherewithal to be responsible for the administration of such an overall policy.

I think that Congress in setting up the Office of Federal Procurement Policy offers an ideal vehicle for achieving these objectives and that was the reason presumably that it was set up.

Senator McINTYRE. In November 1974, an interagency committee, with DOD as lead agency, considered the recommendations of the Commission on Government Procurement and came up with seven proposals for the executive branch shown on pages 81 and 82 of the GAO report of June 5, 1975. Do you agree with all of these proposals?

Dr. CURRIE. This section pages 80, 81, and 82, I do endorse.

Senator McINTYRE. Mr. Staats, appearing in his capacity both as Comptroller General and head of the Cost Accounting Standards Board, testified last week that he supports the concept of line item budgeting for I.R. & D. as a substitute for the present system prescribed by section 203, Public Law 91-441, including the use of direct contracts or grants with industry.

This was a major departure from the GAO report dated June 5, 1975, but it was simply restating the conclusion presented in his report to Senator Proxmire dated March 8, 1971. A copy of the report will be placed in the record.

(See p. 323.)

Do you agree with Mr. Staats?

Dr. CURRIE. No, sir.

Senator McINTYRE. Why not?

Dr. CURRIE. I believe it fundamentally changes the nature, and the value of the program. It changes the whole set of incentives which we are trying to encourage.

Furthermore, the costs of this approach as I mentioned would be awesome indeed and I am quoting that word from the Commission on Government Procurement.

It represents a major diversion of our technical resources. It provides no more meaningful information to Congress than exists at the

present time. Most fundamentally, it constrains the initiative of our free enterprise system for the individual judgments of the relatively few people in Government to be judging these proposals and making these contracts and awards.

That basically is a change in policy and I do not endorse it.

Senator McINTYRE. Assuming that the Congress decides that the line item approach should be adopted, would it be practical without any change in existing law to do this on a trial basis based upon the following:

First, establish a line item for $100 million for fiscal year 1977 in the DOD budget as a nonadd item, the funds to be derived by transfer during the years from various other programs now proposed in the budget.

Secondly, modify existing DOD procedures to accommodate this 1-year trial period to cover the contractors who would be included.

Third, report the results to the Congress together with recommendations as appropriate in conjunction with the fiscal year 1978 budgets to provide a basis for congressional consideration of any further legislative action.

Dr. CURRIE. Senator McIntyre, obviously we can implement a program directed by Congress, but I would not concur with the plan. All we are talking about is the mechanics by which a transition is made from a process that is very valuable to the Nation and to the Defense Department to something that is much less valuable.

Again, I cannot support that position.

Senator McINTYRE. I think the purpose of the question directed to you is to provide a trial period that might establish some sort of an answer that seems to be on the mind of Congress that there is a need to have this control, this line item approach to this I.R. & D. program.

I think in that frame, could this be made to work as a trial to see whether we can impose some further controls on the I.R. & D. or not?

Dr. CURRIE. It could be—it obviously could be done but I believe that it would constitute a first step and a crucial step—an absolutely crucial step—in fundamentally destroying something that has been of immense importance to this country.

That has to be based on my technical judgment and my management judgment and in light of the responsibilities that I have to Congress and to the Nation.

Senator McINTYRE. I think you agree that is a judgment that we in the Congress have to make, and not the Department of Defense.

Dr. CURRIE. Yes, sir.

Senator McINTYRE. GAO suggested that the proposed line item amount be considered by the Congress in conjunction with the total of the R.D.T. & E. appropriations so that Congress would obtain a clearer picture of the total current expenditures authorized for research and development. Do you agree that the amount authorized for I.R. & D. should be related to the amount of the R.D.T. & E. appropriation?

Dr. CURRIE. Not basically at all. The two have quite different purposes. There exists no rationale that I can think of for correlating one to the other on a 1-to-1 basis. As a matter of fact, I can argue that the converse should be the case.

At the time that this Nation feels that it can afford and can turn the corner on the total R.D.T. & E. for our national security, at the time we can turn the curve from a declining curve to a positive slope in the future, then we may not need as much I.R. & D.

We may choose to reimburse at a lower level. Conversely, in the present circumstances in which the fiscal constraints and overall constraints on defense have hit R.D.T. & E, for more than any other element to the disadvantage of this country, we should have more liberal policies toward administration of I.R. & D. since this resource is so highly leveraged and returns its value so many times over to the country.

Mr. FINE. Recognizing that you do have an overriding concern as to the amount of money that the United States spends annually for defense research and development, nevertheless, practically speaking in establishing the total defense budget as part of the total national budget, relationships are taken into account, the ratio of 10 percent of R. & D. to the total of the Defense Department.

This does not vary significantly from year to year. As a practical consideration, shouldn't I.R. & D. in the aggregate recognize these relationships and therefore be considered in the same context?

Dr. CURRIE. I would submit that I.R. & D. is a highly visible program to Congress. If Congress wants to hire a technical staff and take part in the evaluations, it has that prerogative now.

As a matter of fact, I would encourage, as I have members of the GAO, taking part in in-plant reviews. It is understood that the I.R. & D. does comprise—I am talking about I.R. & D. separate from bidding and proposal expense—consists of about 4 percent of the total R.D.T. & E. expense.

It is understood by the authorizing and the appropriating committees. The track record in I.R. & D. is very well understood. It has been almost exactly constant funded for the last period of years.

Its ratios remain the same and it is highly predictable. This is not going to change drastically overnight so that my position is that it is already implicit in the total R.D.T. & E. appropriations.

It is well understood both as to its, if not precise then approximate, magnitude and furthermore its value is understood. It is implicitly there. There would be nothing served by splitting it out and making it a separate line item with the direct control that I have mentioned is so dangerous.

Mr. FINE. The original question had to do with whether you agree that the amount authorized for I.R. & D. should be related to the total amount of money handled by the DOD.

On the last answer you gave——

Dr. CURRIE. I said there is no rationale that says that one should be a fixed ratio of the other. My last answer was going back historically. I can give you all that information you want. But I can say that as the defense investment goes up in any one year, my policy and it has been the policy of my predecessors, is to exert a leveling influence on it.

We don't go up dramatically in I.R. & D. This is in the records.

Senator MCINTYRE. You state that you feel that the Government has gone as far as reasonable or desirable or economically sensible in the control and accountability of the process, and that control is cur-

rently exercised to the degree necessary to protect the Government. Is this simply your opinion or do you have any supporting facts?

Dr. CURRIE. My supporting facts have to do with the number of in-plant reviews we make, the number of pages of descriptions of proposed I.R. & D. programs and our auditing after the fact.

It has to do with the numbers and the visibility given to Congress as influenced by my technical judgment.

Senator MCINTYRE. How, as you say, would further controls change our basic national policy?

Dr. CURRIE. It would constitute in the end a direct control of I.R. & D. expenses and provide the potential for Government overcontrol as has occurred in monolithic societies like the Soviet Union. It provides the potential for the Government to determine who competes with whom, what companies will specialize in what, and it is one more step on the road to destroying that competitive fabric in our free enterprise system on which we fundamentally depend.

Senator MCINTYRE. How do you conclude that the line item approach will move toward increased governmental bureaucratic control which could be essentially a continuation of the present procedures but only with congressional establishment of a total dollar ceiling?

Dr. CURRIE. With line item funding, there are—even assuming that one could go along philosophically—there are mechanical problems. If Congress splits this I.R. & D. and appropriates it as a fixed amount for a given year, it means that the I.R. & D. work has to be planned well in advance.

We have to project well in advance the whole texture of our business, sales to individual organizations.

We have the prospect of prejudging the I.R. & D. programs and allocating them in a future sense so that the amount spent turns out to be the amount appropriated.

That, I submit, changes the fundamental texture of I.R. & D.; it mitigates its usefulness.

Senator MCINTYRE. Will you elaborate on your statement that it has not worked successfully elsewhere?

Dr. CURRIE. I would be the last to say that there are not imperfections in any system. My own lack of omniscience guarantees there are imperfections in our I.R. & D.

Would you repeat the question?

Senator MCINTYRE. Would you agree that one benefit of line item control, if the Congress intended only to set a dollar ceiling but make no other change in present procedures, would be to instill a measure of beneficial discipline in DOD as well as in industry—or would you say that there is no looseness or imperfection in the present system?

Dr. CURRIE. I believe and it is my considered judgment that we have that discipline. There is no doubt in anyone's mind that we have a very competitive environment. In the R. & D. area and in the new system area, it is fairly competitive. The self-interest of the companies force them to spend the I.R. & D. expense in a direction that is useful to their futures and addressed directly to their needs or else they don't stay in business.

Furthermore, I think that our review system is very exhaustive. It involves a number of laboratories, hundreds of people and all of that guaranties on a reasonable basis but not without imperfection that we do have accountability and we do have direct relevance to the needs of the Defense Department.

Mr. FINE. Dr. Currie, throughout your statements and your answers, there appears to be a strong concern on your part that the establishment of a ceiling or a line item approach by the Congress necessarily imposes or implies a control at a level greater or an intensity greater than you presently are using.

Recognizing that the sense of the questions that are being asked are intended not to convey any direction of control below the level of an aggregate amount as a single dollar ceiling for the Defense Department and recognizing that there is apprehension on your part that this might be a first step towards a more stringent set of controls that the Congress might impose.

If you would respond in terms of the simple question of aggregate total dollar ceiling and consider that that is the extent of the congressional intent, perhaps you might feel differently.

Dr. CURRIE. Part of my concern is that it is a first step to taking control of I.R. & D. administration from the executive branch where it belongs. It is concern that nothing useful is gained by it. You have all the visibility you need already. It is a very concrete concern that, despite words that you are saying now and the intents of Senator McIntyre who I know supports the Defense R.D.T. & E. and despite all of our good intent, that further on down the road as people change and events change that there is a step in the wrong direction and it is a needless step because no more visibility will be gained.

No more wisdom will be gained in the whole authorization and appropriations process nor in exerting Congress responsibility to the taxpayer and fiscally.

Senator MCINTYRE. This committee will stand in recess for a period not longer than 15 minutes.

Thank you.

[Brief recess.]

Senator MCINTYRE. The subcommittees will come to order.

For the 5-year period 1970 through 1974, compared with the amounts authorized and appropriated for the total DOD R.D.T. & E. appropriations, the amounts of Defense I.R. & D. and B. & P. payments reflect an increase in ratio from 8.87 percent in 1970 to 10 percent in 1973 and 1974.

Would you agree that if a ceiling on Government payments for I.R. & D. and B. & P. is considered for adoption it would be reasonable to relate it to annual appropriations for R.D.T. & E.?

Dr. CURRIE. No.

Senator MCINTYRE. Wouldn't such an approach provide a measure of stability and perhaps equity to the Government as well as to industry?

Dr. CURRIE. No, sir.

Senator MCINTYRE. Can you suggest any other means whereby Congress can exercise control over the total amount spent for I.R. & D. and B. & P. without interfering with the desired freedom of enterprise for industry?

Dr. CURRIE. I feel that Congress has all of the visibility required at the present time.

Senator MCINTYRE. The GAO report discusses on pages 64 to 67 the possibility of substituting for the present system a method of using a profit factor for I.R. & D. cost recovery.

The report points out that this approach received many favorable comments because it would eliminate the need for advance agreements

and give contractors the incentive to eliminate unproductive engineering efforts, while permitting industry the opportunity for original thinking. Conversely, this approach was criticized for possibly leading to reduced allowances for I.R. & D. and loss of technical visibility. What are your views on this approach? If a profit approach should be adopted, do you feel that the rate of profit should be computed on the basis of sales or on the company's invested capital?

Dr. CURRIE. I feel that this is a totally unacceptable and unrealistic approach. It again mitigates the understanding of I.R. & D. as a necessary expense of doing business.

In general, apart from the I.R. & D. question, how profits should be negotiated I feel that it should not be strictly as a percentage of sales but the return on vested capital should be an important factor and we are working in that direction, as you know.

Senator PROXMIRE. Analysis of DOD reports of I.R. & D. and B. & P. expenditures for the past several years reveals that some of the major defense contractors receive between 85 and 100 percent of their expenditures for I.R. & D. and B. & P. In these cases, little or none of the contractors' own funds are invested in these programs although they will realize substantial benefit. Do you believe that an alternative formula should be considered which wou'd limit the Government's share to 50 percent with a dollar ceiling for each contractor so that the principle of cost sharing would become a reality?

Dr. CURRIE. No. I.R. & D./B. & P. expenses are incurred primarily to meet the requirements for competition imposed by a contractor's customers. Such expenses therefore should be allowable as overhead charges to the extent they are judged reasonable. The 85 to 100 percent levels of recovery are the levels judged to be reasonable by the Department of Defense.

Senator PROXMIRE. On November 11, 1974, the Comptroller General addressed a letter to the Secretary of Defense on the subject of establishing guidelines for consideration of contractor invested capital in negotiating profit. A copy of this letter will be inserted in the record.[1] That letter indicates support of this goal and recommends that this policy be made mandatory. Do you feel that I.R. & D. and B. & P. payments by the Government also should be based on invested capital instead of on sales?

Dr. CURRIE. No. I.R. & D. and B. & P. expenses are determined by a judgment of what is needed to keep that company competitive in its area of the market modified by how much increase in the price of the products of the company can be accepted. This normal commercial practice should be retained where possible. DOD uses, as one factor in establishing a reasonable level of I.R. & D./B. & P. for those companies operating without sufficient cost risk, the ratio of I.R. & D./B. & P. to sales but only because such a ratio provides a simple approximation of commercial practice.

Senator PROXMIRE. If you consider that defense industry profit margins are adequate and reasonable based upon invested capital, do you agree that DOD's profit 1976 study plan should recognize that increasing profits may not be the means for strengthening our competitive industrial base and reducing the cost of systems and hardware?

[1] See p. 319.

Dr. CURRIE. I prefer to await the results of the profit 1976 study before commenting on this question.

Senator MCINTYRE. Have you ever replied to the letter received from the GAO Comptroller General?

Dr. CURRIE. Yes, sir.

Senator MCINTYRE. Make that part of the record.

(The letter follows:)

ASSISTANT SECRETARY OF DEFENSE,
Washington, D.C., January 30, 1975.

Hon. ELMER B. STAATS,
Comptroller General of the United States,
General Accounting Office,
Washington, D.C.

DEAR MR. STAATS; This is in response to your letter to Secretary Schlesinger, November 11, 1974, regarding the Department of Defense Contractor Capital Employed Profit Policy promulgated in December 1972. (OSD Case #3941)

This Department shares your belief that a policy of negotiating profit based on invested capital can contribute materially to the goal of motivating contractors to invest in cost-reducing equipment and facilities. Our experience with the referenced policy and its related procedures promulgated in December 1972, however, suggests that those procedures cannot be used effectively to attain that goal. This is especially true in view of the current economic environment. Accordingly, we do not feel it would be propitious to make those procedures mandatory for contract negotiation purposes.

As you indicate in your letter, the implementation of a capital-oriented profit policy could be expected to intially increase the customary profit rates of some contractors and decrease others. From the minimal contractor participation in the Contractor Capital Employed Profit Policy we conclude that the possible profit increases are of insufficient magnitude to attract participation, whereas, it has been recognized that the possible profit decreases could in some cases be severe. The ability of contractors to invest in cost-reducing equipment and facilities would not be enhanced by further reduction in their profits from defense contracts. We note also that any profit policy change may not have the desired effect so long as extraordinary inffation, unprecedented costs of both debt and equity capital, and instability in defense procurement programs continues.

Nevertheless, the Department of Defense continues to believe in the general premise that its profit policy should give greater emphasis to contractor invested capital. We do not believe that the Contractor Capital Employed Profit Policy is the appropriate vehicle for attaining that goal. We are examining various alternative approaches which might be more practicable and appropriate.

Your interest in this critical policy area is greatly appreciated.

Sincerely,

ARTHUR I. MENDOLIA,
Assistant Secretary of Defense,
(Installations & Logistics).

Dr. CURRIE. We are in the process of reviewing that now, and I don't want to comment until I am better informed.

Senator MCINTYRE. How long will that take?

Dr. CURRIE. The study will be completed on the 30th of June next year. However, our position will be established much before that date. Our general feeling is that there is a disincentive at the present time for industry to invest capital which would increase their productivity and which in turn would then reduce the manufacturing costs and the efficiency from the Government.

Senator MCINTYRE. Do you believe that the $2 million threshold now required for negotiation of advance agreements should be revised? If so, what thresholds would you recommend?

Dr. CURRIE. I think it is a pretty good level, Mr. Chairman. With that threshold we review between 90 and 100 companies—the full

scope of their programs. I believe the position of the majority of the Government Procurement Commission would reduce the number of companies to perhaps 10 or 12 and I think that is too few.

Senator McINTYRE. Last week Mr. Woodfin, of NASA, suggested that the contractors share in the cost of I.R. & D. and B. & P. from the first dollar.

What is your position?

Dr. CURRIE. I don't agree with that. The I.R. & D. effort—those expenses we judge to be relevant—we judge to be reasonable and are reasonable costs of doing business. If one determines something as being a reasonable cost of doing business, it is a contradiction in terms to force a cost sharing of that.

Rather, we recognize a ceiling beyond which we will not reimburse. The industry at large spends much more that that. It is the mechanics I disagree with and do not feel we should undertake cost sharing from the first dollar.

Senator McINTYRE. In commenting on technical evaluation of contractors' brochures, Mr. Staats stated that Defense personnel performing these evaluations have minimal or general knowledge of, and interest in, the particular projects they are asked to evaluate.

In fact, the GAO report states that only 45 percent of the 1974 technical evaluations showed that the evalutators had specific knowledge of work in the area or on similar projects. Had DOD taken corrective action? Has this practice been detrimental to the interests of the Government?

Dr. CURRIE. I simply don't agree with that appraisal. We have a limited number of technical experts in the Defense Department so we can't always get a perfect match.

We can't get a genius working on every problem. However, on the whole, we have done pretty good. The Air Force has made a study of this and their study tends to be fairly harsh. It says over 12,500 evaluations, 20 percent minimal qualifications and 63 percent specific current knowledge in the technical areas being evaluated.

I think that we exert a major attempt in the Defense Department to get evaluators of the highest caliber and generally succeed in doing this.

Senator McINTYRE. Do you recommend continuation of technical evaluation or do you believe that it is of little real value and should therefore be discontinued?

Dr. CURRIE. I recommend its continuation because it accomplishes two purposes: One is to insure the relevance and accountability of the work. The second is to create the broad and diverse lines of technical communication between the people who perform the I.R. & D. and the technical people in DOD who can use it.

Senator McINTYRE. Mr. Fine?

Mr. FINE. From a Department of Defense point of view, will you say that administration of relevancy requirement which has disallowed an average of 8 percent of total I.R. & D. projects proposed has been worth the cost?

Dr. CURRIE. I think in general it has, and it is primarily for the purpose of establishing the communications, the useful coupling of the I.R. & D. effort to our own needs and our own thinking in the Defense Department.

It has perhaps been somewhat on the excessive side but not overly so. We are finding our level just about where it is now. I would not advocate any increased level; perhaps cutting it down by 30 or 40 percent would be useful.

Mr. FINE. Thirty or forty percent of what?

Dr. CURRIE. Well, in terms of the total number of manhours and total expense incurred by the Department in performing these evaluations. I think we can find ways of doing it more efficiently.

Mr. FINE. Would you elaborate on that for the record as to the ways to do it more efficiently?

DR. CURRIE. For example, one can always make the individual company in-plant reviews at a less frequent interval.

One can substitute devices such as I.R. & D. symposia held at various of our internal development centers: things that would not require the total diversion of time by technical people as in the current procedure. This is fairly speculative and I think we are somewhere at the right level now.

Mr. FINE. If a uniform Government-wide application of relevance were to be adopted, would not DOD wind up paying contractors for work which would not be of benefit to the Department of Defense?

Dr. CURRIE. Yes, we would be reimbursing some contractors whose work was most relevant to transportation, energy, and so forth and vice versa.

Mr. FINE. From the Department of Defense's point of view, would you feel that you would rather such a Government-wide relevancy approach were not adopted?

Dr. CURRIE. I think that we would support a uniform face to industry certainly in terms of the overhead rates and the financial structure that was presented to each of the agencies and I would generally support a governmentwide policy.

If you look in the large, it is in the Defense Department's best interest to make certain that the industry maintains its business level, reduces its overhead rates and gets the most efficiency. I can afford to say a lot of this because most everything is relevant to Defense interests. It is just a fact of life.

Mr. FINE. The following questions relate to the subject of patents and technical data. There is a major difference in the policy of the DOD and ERDA in that ERDA and its predecessor agency, AEC, have required royalty free licenses and data rights based on a scale of cost participation in I.R. & D. recovery.

This also is recommended by GAO.

Shouldn't there be a single Government policy on this matter?

In your opinion?

Dr. CURRIE. I believe there should be.

Mr. FINE. Have you talked with ERDA to see how their procedures work?

Dr. CURRIE. Yes. ERDA had a representative at each of the Policy Council meetings. I do not support their policy.

Mr. FINE. What fault do you find with ERDA's experience which has proved to be practical?

Dr. CURRIE. The realities of ERDA efforts are concepts, patents but more often it is know-how, processes, design techniques.

We feel that is it counter to the basic incentive system for the Government to have the right to walk into a plant and commandeer those very techniques and that very know-how that provides the competitive basis for that company.

It is inconsistent with the policy of I.R. & D. effort as a necessary cost of doing business.

Beyond these fundamental observations, there are a host of other problems. There is the problem of disincentivizing industry to maintain the quality of its I.R. & D. effort if it is going to be technically leveled with the rest of industry.

If the ideas and so on are dissipated broadly, there would be no incentive to maintain quality.

On the whole, DOD pays for only a small fraction of their total work. If DOD in a certain instance pays 43 percent of the total effort of a contractor, does it get 43 percent of a patent?

How does one administer this? How do we administer the hundreds and perhaps thousands of small companies who have I.R. & D. programs below the $2 million threshold?

How do we, from a sheer mass of effort point of view, administer all of this? Certainly such a policy would have to be a uniform one. There are many mechanical difficulties.

Mr. FINE. If you would set aside for a moment the large number of companies that would not be susceptible because they are small and not subject to criteria, limiting our discussion to those that are subject to agreements, is it your view that if you took a major defense contractor whose profits center is substantially defense if not totally defense, the logic which supports ERDA's approach with respect to the percentage of participation by way of I.R. & D. participation should not enter into the consideration as to whether the Government should or should not be entitled to patent.

Dr. CURRIE. I feel that that should not alter our policy. While one particular part of a company may be involved in a program for the Government at one particular time, during the life of that program, he must maintain a competitive position for his future.

So placing special restrictions on him even if we could define and delineate which ones satisfied that criteria would even be counter to our fundamental policy. Now all of that notwithstanding, in our present I.R. & D. negotiations with such companies who have a large program and can be regarded as sole source for that product after the initial competition, our negotiators have a great deal of freedom in using judgment in establishing a ceiling for that division of that company.

That is part of the flexibility we need in managing this program. We do not want a preordained, written-in-stone formula that would apply to all. It would destroy the competitive process and create much greater inequities in the end.

Mr. FINE. You find no significant merit to ERDA's policies relating to that?

Dr. CURRIE. I don't. I think it arose from an unusual set of circumstances under ERDA or AEC, since most of their development was with a small contract base, very localized.

It probably arose also in connection with the Atomic Energy Act from years ago in which anything in this area was very closely guarded anyway.

Mr. FINE. In the context of our discussion, are you interpreting patent rights as representing a royalty-free license on the part of the Government rather than acquiring total patent rights?

Dr. CURRIE. Yes; I am.

Mr. FINE. For the sake of illustration, you are familiar with the Sikorsky Blackhawk?

Dr. CURRIE. Generally.

Mr. FINE. There were some $5 million invested which were reimbursed by I.R. & D. If the Department of Defense had undertaken to directly contract for that development program it would have acquired the patent rights as a matter of form as a contract.

Dr. CURRIE. Yes. The patent rights in the sense of royalty-free use of those patents. This is versus ownership.

Mr. FINE. How do you see a distinction since in both cases it came from the Defense Department as to a logic of whether or not a royalty free patent should be allowed?

Dr. CURRIE. In direct procurement, we are buying something. We are buying an object. We are buying an engineering result. In the case of I.R. & D. we are not buying anything. It is an expense of that company in laying its competitive base and competing in the future.

Therefore the whole set of incentives and motivations on that company's part would be destroyed if we marched in and assumed ownership of I.R. & D. in order to be able to give to somebody else. Now all of that also notwithstanding, let me throw another perspective on this.

Much of I.R. & D. effort, whether it is in basic research or in reliability improvements or cleverness of design concepts or whatever is aimed at receiving Government business.

The rights to proprietary ideas which are developed on I.R. & D.; the royalty free use of those rights in my view; should be negotiated at the time a document contract is awarded based on that concept.

That is the avenue by which the Government should obtain royalty-free use of particular documents which it will explicitly use versus demanding royalty-free rights to everything that is done by the company on its I.R. & D. effort.

Mr. FINE. It is your conviction that in the case such as Sikorsky had they known at the outset that the Government would have been entitled to royalty-free license for the Blackhawk, they would not have undertaken to use I.R. & D. funds to——

Dr. CURRIE. They might well have chosen the opposite direction. I am not that familiar with that particular situation but I do know this would be a widely prevalent attitude and a widely prevalent result.

Mr. FINE. I can see the logic to what you say with respect to the lower level of technology—when you speak of the technology base that a company must maintain in its own interest. But if you speak in terms of an end item of hardware, a distinct system, let's assume that the Department had taken a royalty free license.

Wouldn't you agree that the Sikorsky would have been in a substantially more preferable position in a competition by virtue of

having built it, of having the facilities available to build it and to have the technology available which derived from having built it so that as a function of time there would have been little likelihood that if the Blackhawk ever became a candidate for procurement, that this would have entered into the mind of the company?

Dr. CURRIE. Although that was an independent development, I don't know what fraction of it was paid for by I.R. & D. The minute the Government would have expressed an interest in buying it to use as one of its systems, there is no question in my mind that Sikorsky would have turned those rights over to the Government.

However, to the extent that they paid for some of this development out of pretax profit and from other commercial business, then there would be no equity in the Defense Department or the Government claiming royalty-free rights to that development.

I don't know what royalty-free rights mean in this case. It might have involved an invention or whatever as part of the system. Most of what I.R. & D. results in is not patents, it is in processing which is relatively nontransferrable anyway.

Mr. FINE. One must recognize that the Department does engage in sole source as a vehicle in some areas and does not employ competition as a way of doing business on a uniform basis, across the board.

Dr. CURRIE. We encourage competition wherever it is possible. There are times when a company on its own effort, reimbursed or not, will come up with a unique idea.

Certainly he is in a position to sell that to the Government providing it fulfills one of our urgent needs, more or less on a sole source basis.

I think the point that I would like to make is that at the time the Government, based on the company's proprietary position, initiates a development, that is the time when the Government should request royalty-free use in that idea for second source or whatever and negotiate the deal with the company.

It is the time when the company in its own self-interest is more likely to convey those rights to the Government.

Mr. FINE. This would relate to the recent actions of the Congress on the military procurement bill having to do with the attempt on the part of the House to establish a law requirement for the acquisition of technical data which was modified somewhat in the final outcome of the bill.

Dr. CURRIE. Let me talk hypothetically now because I obviously don't support it. But if one were to impose obtaining all the process rights, all the data rights, one would be immediately cutting the size of that total effort about in half.

This is an extraordinarily complex process, exceedingly complex to get all the drawings, the processes, the documentation required to convey that knowledge and know-how.

Mr. FINE. So there must be some judgment and discretion as to how far you go in acquiring these rights from the contractor.

Dr. CURRIE. Absolutely. Oftentimes we do not choose to procure all of those rights because economically it does not make sense.

Mr. FINE. You point out that data and patent rights of contracts with smaller I.R. & D. programs not subject to negotiation of advance agreements would not be available to the Department.

How significant would this be?

Dr. CURRIE. I don't know how significant that would be. A lot of the very fine work at the subsystem and component level originates in the smaller companies with I.R. & D. programs less than $2 million. How significant that would be in the aggregate, I don't know. But the suggestion fundamentally presupposes splitting the industry into two groups, one on which patent rights are imposed and the other group on which you don't.

Mr. FINE. Isn't that what ERDA does?

Dr. CURRIE. I don't know what ERDA's current policy is.

Mr. FINE. They do draw a distinction.

Dr. CURRIE. If so, I would say it is inequitable and certainly on the scale of the whole Government procurement, it is untenable.

Mr. FINE. You state that the results of a study will be considered by your I.R. & D. Policy Council during the late summer and fall. Could you state what could result from these reviews?

Dr. CURRIE. We studied several case histories in which at the time of initiating a development contract with a company based on a proprietary idea, those rights were not conveyed to the Government and resulted in subsequent difficulties.

So I have asked that we go back on a service-by-service basis and bring forward what some of those difficulties are and how other services have solved those.

One service in particular feels that it has had difficulties. Another service feels that it has solved them very nicely. So it is a study of the set of circumstances so that the Defense Department and the three services can study this together and get a uniform policy with respect to data and patent rights at the initiation of full-scale development programs.

I expect that to be available in the next month or two, probably by November.

Mr. FINE. Does that include considerations of I.R. & D. as well?

Dr. CURRIE. Yes. It is specifically oriented to I.R. & D. and the ideas and consents flowing from I.R. & D. into direct programs.

Mr. FINE. Could the results of that be made available to the committee when it becomes available?

Dr. CURRIE. I have summarized those and submit them to the committee.

[Subsequent to the hearing, the following reply was received:]

This study is currently underway and is anticipated to be completed and presented to the Policy Council during the winter of 1975. At that time a copy of of the summary of the study will be forwarded to the two subcommittees.

Mr. FINE. Did the interagency committee also consider and recommend continuing the I.R. & D. data bank?

Dr. CURRIE. Yes. As a matter of fact, in the last year we have expanded that data bank by action of the Policy Council very considerably so that it embraces all contractors with advance agreements for I.R. & D.

Mr. FINE. Since industry contends that royalty fees are not charged to the Government and that any royalty income is minor, isn't industry's objection to the proportionate royalty free patent proposal more emotional than ever really significant?

Dr. CURRIE. I think it is a matter of fundamental principle certainly and I don't think it is emotional. I think it is like many other things.

We do things in practice which are not legislated by law which if they were legislated by law which lead to governmental abuses.

That is what we are contending should not take place.

Senator CULVER. Mr. Kaufman.

Mr. KAUFMAN. Dr. Currie, at present do expenditures for I.R. & D. come out of funds authorized and appropriated for procurement or for research and development?

Dr. CURRIE. They come out of both. It is an allowable expense, so it is spread across the totality of the Government business.

Mr. KAUFMAN. To the extent that the costs are allocated to production contracts, the funds would come out of procurement side of the budget, would they not?

Dr. CURRIE. Yes.

Mr. KAUFMAN. In the budget document submitted to Congress, there is a line item under "National defense for research development test and evaluation."

Do the funds, then, do all the funds or only part of the funds spent for I.R. & D. come under that line item?

Dr. CURRIE. Part of them, the majority of them, perhaps the bulk of them. But not all of them.

Mr. KAUFMAN. To the extent that the I.R. & D. costs are charged to the procurement side of the budget, they would not be included in the budget document under the line item for research and development test and evaluations?

Dr. CURRIE. That is correct.

Mr. KAUFMAN. Is it correct that the line item for research, development, test, and evaluation in the budget is understated?

Dr. CURRIE. No. It is not understated. Let me answer that in two parts. I.R. & D. effort conceptually is not for basic research. Much of the R. & D. effort—and I can't quantify how much goes into production processing. How do I produce something cheaper?

How do I make something that can be reproducible in a production sense? That therefore is a legitimate cost of business of this enterprise. It affects his production line as well as the R. & D. side of his house.

Mr. KAUFMAN. But to the extent that any I.R. & D. funds are spent for research and development activities and are charged to production contracts, is it correct that to that extent, the expenditures are not shown in the line item for research development test and evaluation?

Dr. CURRIE. Yes; and the converse is also true to the extent that it works both ways. In other words, it is a cost of doing business and whether it affects the B. & D. or the production line is a judgmental matter and I don't know what the split is.

Mr. KAUFMAN. I take it there is no data or estimates in the Department of Defense as to how much of I.R. & D. has not been included in the R.D.T. & E. line item?

Dr. CURRIE. Not explicitly. The costs of generating that would be so subjective that it would be a useless pursuit.

Mr. KAUFMAN. I would like to ask just a couple of questions about general and administrative expenses and the way they are handled with respect to I.R. & D. Is it not correct that general and administrative expenses are not being allocated to I.R. & D. and that if they were, the total cost to the Defense Department of I.R. & D. would be shown to be about as much as $200 million greater than is currently reported?

Dr. CURRIE. What is generally termed G. & A. or general and administrative costs are not allocated to I.R. & D. As to what that amount would be were they allocated, I don't have that number.

Mr. KAUFMAN. The G. & A. expenses include as I understand it, the cost of salaries for corporate officials, for attorneys hired by the corporation, for the auditing and accounting staff, for all secretarial and support that goes with those offices within the company and in the case of direct R. & D. contracts, those costs are allocated, those G. & A. costs are allocated as a part of R. & D.

Dr. CURRIE. Yes; along with a host of things making up the general corporation.

Mr. KAUFMAN. There is a great similarity of the kind of work pursued under R. & D. contracts and the work pursued under I.R. & D.

Why should not those G. & A. costs be allocated to I.R. & D. just as they are now allocated to R. & D. contracts?

Dr. CURRIE. The G. & A. of a corporation under current accounting practice makes I.R. & D. part of the G. & A. that is applied to the various products, lines and businesses, Government and non-Government, of the corporation. I.R. & D. is G. & A. One could set up different accounting conventions and do it differently. I don't know that anything would be gained by that.

I don't understand what your point is here. One can always set up different accounting principles.

Mr. KAUFMAN. The point is that the same types of people, the costs of the same types of people are being treated from an accounting standpoint differently for R. & D. and I.R. & D. and that if you treated the G. & A. costs uniformly as between high technology R. & D. contracts and high technology R. & D. activities, you would show a significant increase according to estimates I have seen, as high as $200 million, in the annual cost of I.R. & D.

Dr. CURRIE. I.R. & D. whether it is high technology or low technology is a cost of doing business. It is a general cost of the doing of business.

Therefore it should be grouped with other general costs of doing business of a corporation from an accounting point of view. That is the logic of it. As to your $200 million, I don't see where that could be arrived at. G. & A. in itself, in its totality for corporations, is generally in the 5 to 10 percent area and if our reimbursible share is $457 million, I fail to see how that percentage of the $457 million could yield the $200 million you talk about.

Mr. KAUFMAN. On the subject of access to contractor's commercial records, the GAO has recommended that it be given access to contractor's commercial records in order to determine whether I.R. & D. expenses were incurred for commercial purposes.

As in the case of the Pratt Whitney investigation with the GAO, the GAO was not able to have access to the company's records so it could not make a definitive determination in that case.

You have recommended that instead of access to records, contractors might be required to submit certifications as to cost and sign those certifications. What good would a certification from a contractor be if the Government had no way of verifying it?

Dr. CURRIE. If a certification existed and if it is found out later that commercial development may have been funded, then there would be cause for litigation.

The GAO in recommending access to the commercial records for companies—I do note that Mr. Staats places careful reservation on this; he full well realizes the delicate nature of this proposal and he full well realizes the difficulties, the mechanical difficulties of doing this—was careful to point out that this would have to be an extremely limited basis. I think this is a delicate question.

We are proceeding in the Navy with a certification process to see how this might apply across DOD but DOD has not made a decision on it yet.

Mr. KAUFMAN. Thank you, Mr. Chairman.

Senator CULVER. Dr. Currle, I wonder if I could ask you to sort of shift gears a little bit from the specific line of questioning you have been responding to. I am especially interested in this larger issue of the relationship of the Federal Government on the one hand to American universities private and public on the other, the extent of increased dependency being experienced in education at the higher levels with the American Government.

In most instances this is for good and sufficient reasons and I think in many cases remarkably free of serious encroachments. However, the magnitude of this shift within our society poses in my judgment some very serious questions with regard to college and university policy both private and public to preserve their own independence and integrity, not in the conventional McCarthy period witch hunt sense, but it has ramifications of multiplicity of a kind in terms of their governments, in terms of their autonomy, in terms of their historical role in our society.

Similarly we who have a responsibility to the American public in the utilization of their tax dollars in drawing upon this particular rich resource of our society to perform various missions and carry out certain responsibilities, make certain contributions to our national life, and welfare, have a responsibility to think through this whole subject.

Now I realize I am opening up at a very late hour a very large subject and one that we can't resolve on this occasion.

I wanted to flag to you my particular concern in this area within your shop as to some of the problems and I hope that in the future, we will have opportunities to development in the appropriate committees what I think is a very fundamental policy issue which has been seriously neglected both on the side of the university in terms of properly examining implications to their own survival and independence as well as the proper discharge of the public obligations we Members of Congress have in the wise and proper distribution and allocation of taxpayers' dollars to promote research and in those limited cases developments of various kinds.

Just to show some of the parameters of the problem, I would like to quote to you the text of a speech by Mr. Girard Piel, the publisher of Scientific American. This was an address he made on the occasion of the annual meeting of the American Philosophical Society in Philadelphia, Pa., April 22, 1965.

In 20 years, from 1945 to 1965, the annual federal outlay for what is now called R. & D. has mounted from $500 million to $15 billion;

And you say that figure has mounted to $17 billion today.

So these figures have to experience some adjustments. But the

thrust and the policy implications of their numbers remain disturbingly constant. He goes on to say,

The more than $1.5 billion now flowing into the universities from federal agencies constitutes 15 percent of all expenditures in U.S. institutions of higher learning and 76 percent of the expenditures for research in those institutions.

Military and paramilitary agencies, the Department of Defense, the Atomic Energy Commission and the National Aeronautics and Space Administration supply 6 percent of these funds.

That was 10 years ago and I would appreciate your updating these figures.

Dr. CURRIE. The total Federal R. & D. obligations (plant excluded) for fiscal year 1975 amount to $18.905 billion. Of this amount $2.293 billion are performed by the universities and colleges of which $0.392 billion or 17.1 percent is provided by the Department of Defense, the Atomic Energy Commission (now part of ERDA) and the National Aeronautics and Space Administration.

Taken together with the outlays of the Public Health Service, the outlays of mission oriented agencies make up 90 percent of all federal expenditures for research in the universities. The National Science Foundation, the single agency dedicated to the support of federal investigation motivated by the aims of science as traditionally and conventionally understood swings about 7 percent of the total.

Giantism at the sources of the federal R&D money flows is matched by giantism at their destination. The top ten universities soak up 40 percent of the funds, the top 20, 60 percent and 100 universities account for all but ten percent of the funds. Beginning with Harvard the list of 20 includes the richest and grandest privately owned universities and the richest public universities. Funds include in the case of Harvard 20 to 85 percent of their total budget, there being some of the most distinguished state universities and from 75 to 100 percent of their research budgets.

Whatever their original identity they must now be reckoned as constituting a new class of institutions rightly labeled as "federal grant universities."

A full third of the federal money flow sluices into the 14 major and the many lesser research institutions and laboratories which the big universities operate for the Federal Government. Over the past 20 years these university associated institutes have carried through such assignments as the fashioning of the thermonuclear weapon, the perfection of instruments for detection of nuclear explosions, the design of the succession of continental bombers, the evaluation of weapons systems and strategies predicated upon them and economic and intelligence studies of suspected enemy nations.

The flow of Federal funds to the 20 federal grant universities makes up the commanding percentage of their expenditures.

The magnitude and the character of this relationship is really not appreciated or recognized. It seems to me that it presents some very profound questions of policy for the universities and the colleges, a historic redivision of their role.

It has implications to their faculties, and the autonomy of those institutions in a classical sense to the strength of those institutions. Above all, it is important in terms of the priorities of the Federal Government by its allocation of research funds and money to examine the extent to which it is healthy and desirable to have this kind of relationship based on mission orientation based so heavily and again for good and sufficient reasons in many cases security considerations and fears. In the interest of the contributions of science in the finest sense and in terms of its special contributions to mankind in the fullest sense, I wondered if you might care to just comment on this subject. If some of these figures and numbers have become obsolete, I submit that the figures would be even more disturbing today.

If you have given any consideration to some of these policy questions yourself, please comment, just in terms of your own experience and in view of your immediate responsibilities in administering this office.

Dr. CURRIE. I certainly share some of your concerns, Senator Culver. I am on an advisory board to the president of the University of California and have seen that whole campus response develop over the last 10 years.

Certainly many of these universities are absolutely dependent on Federal outlays for their research programs. They just can't sustain themselves without such outlays. I remember a few years ago when the National Institutes of Health cut back, it created havoc in university after university. These were the small swells, not the large ones, because the grants for microbiological research were attentuating.

It is true that one of our successes in World War II, much of the impact on the Defense Department, was by these groupings of scientists of various disciplines at Harvard and Columbia and MIT—this was the basis for the Manhattan project. It was a very close working relationship, and it was born in the years of World War II between the Defense Department, the Defense mission, and the universities.

After the war ended, this diffused somewhat westward. This gave rise in a residual kind of way to some of those laboratories—Los Alamos, Lincoln, and so on—that you spoke of.

But over the last 10 years there has been a drastic departure in that trend, not from a Federal point of view but from a Defense Department point of view, which I am concerned about because I wonder in this changing balance whether we are not missing something on the other side.

There has been a disaffection between the intellectuals in academia and the Defense Department which we are all aware of due to the events in Southeast Asia. The amount of research on university campuses at the present time is not much more than $200 million from the Department of Defense.

I have wondered why that has gone down. It has gone down 50 percent over—in the last 10 years. I have wondered whether we in DOD are not getting too far away from the universities, but I don't believe that we ought to control them in the sense that you are concerned about.

I believe that the support, the encouragement, for young people, the ability to do undirected research, is a necessity for universities. But in the end, the universities are there to serve the Nation and the large social good.

They are there to do medical research, microbiology, what have you. Nothing is of greater importance, at least to our National security as well as the social good. The intellectual communication that this relationship has engendered through the years has not suffered unduly, and the interests of national defense are not benefiting as they should from the academic community.

I want to find a way to revitalize these relationships without putting on the inhibitory controls and mandates from Washington and governing of their controls that you are taking about.

Senator CULVER. I appreciate your comments.

[Information for the record follows:]

PREPARED QUESTIONS FROM SENATOR PROXMIRE

[Questions submitted by Senator Proxmire. Answers supplied by Dr. Malcolm R. Currie.]

Question. DoD has used the CWAS (Contractors Weighted Average Share) concept as a means of eliminating the need for reviews and audits where they believe the contractor bears sufficient risk. Do you feel that contractors who qualify under CWSA should be exempted from the need for negotiation of advance agreements?

Answer. We do not believe CWAS qualified contractors should be exempted from negotiation of an advance agreement for IR&D/B&P. We do believe that CWAS qualification should be a consideration in the determination of ceiling mounts.

Question. What is the practicality of completely eliminating Department of Defense payments to contractors for IR&D and B&P as allowable costs under Department of Defense contracts?

Answer. Since IR&D/B&P provide the resources necessary to a company to keep a competitive posture in its chosen area of business, the result of disallowing IR&D/B&P would lead to a gradual reduction in the technical competence of companies to propose to and work for the DoD. The immediate company reaction to IR&D disallowance would be to divert profit dollars to the recovery of IR&D expenditures. However, this action could only be a short term solution since it would tend to dry up equity capital. The second company reaction would be to seek many more technology contracts. Direct contract technology effort would however sustain the technical competence of only a limited number of contractors since there is little or no redundancy in contractual effort. The loss of IR&D would have an immediate effect on the Department of Defense in that none of the fallout advanced technology and concepts would be available as in presently the case. The loss of B&P would also immediately reduce the number of competitive proposals the DoD would receive since each contractor would carefully shepard his profit dollars utilized for IR&D/B&P. The long term effect of IR&D/B&P disallowance would be to force many current contractors out of the defense business since they would be unable to sustain technical competence and propose for new contracts while at the same time maintaining sufficient profit to satisfy stockholders and the financial community. The net effect from DoD's point of view would be greatly increased number of sole source procurement actions in the early phases of system acquisition plus a very limited and essentially captive defense industry.

Question. What is the practicality of completely disallowing IR&D/B&P as allowable costs under DoD contracts in favor of an approach of establishing separate programs in each of the RDT&E appropriations for IR&D and B&P with an amount of funds to be distributed directly, by contract or grant, to industry. This distribution could be based upon such factors as the experience of negotiating teams, including technical review panels, and the same criteria presently used under the existing procedures?

Answer. Line item budgeting and contract implementation of IR&D/B&P can be used as a substitute for overhead recovery of IR&D/B&P only if the objective of IR&D/B&P is similar to directed R&D and if IR&D can be considered as a supplement to directed R&D under contract. Such an objective, however, could not be farther from the truth. IR&D and B&P do not have the same objective as directed contract RDT&E. RDT&E has the objective of equipping our forces with the latest and finest materiel possible. IR&D and B&P, on the other hand, have as their objective establishing and maintaining a competent and competitive base of contractors ready and able to provide that materiel on a competitive basis. These two objectives are not the same and therefore cannot be handled in the same manner. It happens that IR&D has, as a fallout benefit to DOD, the development of advanced system, subsystem and component concepts, the development of advanced technology, etc. It is this fallout benefit that has confused the issue since these fallout benefits of IR&D give both IR&D and B&P the erroneous image of merely being poorly controlled supplements to directed RDT&E. Actually, the objective of developing and maintaining a competitive posture is an action requiring the maximum of independence of action on the part of a contractor since it is only the individual contractor that knows where he is and is not competitive and competent.

It should be obvious then that unless the Congress is willing to amend the current laws endorsing and even stipulating competition as the primary basis for procurement, line item budgeting and contract implementation as a cost recovery technique for IR&D/B&P cannot be used.

Question. What is the practically of a combination of the present system, with an established dollar ceiling substantially lower than the $700 million level, and a separate, directly financed program as described under the previous question?

Answer. As I stated in answer to the previous question, the objectives of IR&D/B&P differ from the objectives of directed contract RDT&E and therefore must be administered differently. Recovery of the costs of IR&D/B&P through a contractor's overhead permits the exercise of that independence of action that is key to the achievement of the objective of maintenance of a competitive and competent posture.

Question. What is the practicality of the continuation of the present system but based upon a dollar ceiling which is reduced 10 percent each year with an equal increase in the directly financed program described under question 18 before?

Answer. Again, the question of the differing objectives of IR&D/B&P from those of RDT&E require a different treatment than that of directly financed contracts.

Question. What is the practicability as well as the desirability of establishing a separate ceiling for IR&D as distinguished from B&P if the decision is made to establish a total ceiling in law?

Answer. My answers to the previous three questions also answer this question.

Question. What is the practicability as well as the desirability of establishing an independent Government agency which will be responsible for the IR&D program on a Government-wide basis, as opposed to the present separate agency basis?

Answer. Each agency should be involved in the administration of IR&D/B&P recovered through that agency's contracts both for the reason of assuring the relevancy of the efforts to the agency's mission and of benefiting from the technical communications resulting from that administration. If each agency must be involved anyway, the lead agency concept would work better than an independent agency.

Question. Mr. Staats, appearing in his capacity both as Comptroller General and head of the Cost Accounting Standards Board, testified last week that he supports the concept of line item budgeting for IR&D as a substitute for the present system prescribed by Section 203, P.L. 91–441, including the use of direct contracts or grants with industry. This was a major departure from the GAO report dated 5 June 1975, but it was simply restating the conclusion presented in his report to Senator Proxmire dated March 8, 1971. A copy of the report will be placed at this point in the record. How would you justify such a line item to the Congress? How would you administer such a line item so that industry and individual companies would be treated equitably? Would this affect your total budget request for RDT&E considering that some of the IR&D payments are made from contracts financed from Procurement appropriations?

Answer. As I have previously stated, the approach of line item budgeting and contract implementation of IR&D/B&P recovery is totally inconsistent with the achievement of the objectives of IR&D/B&P. If however this approach should be imposed over our strong objections. The Department of Defense would have to carefully develop a method of implementation that would provide adequate ustification, equitable treatment of companies and sufficient funds from the RDT&E appropriations. As has also been stated previously, this implementation would be quite difficult.

Question. The GAO report of March 8, 1971, contains in Appendix III a comentary on the OSD letter, in effect a rebuttal of the OSD objections. DoD contended that Congress will require detailed information on the projects to be supported in order to approve the line item. GAO feels that such back-up support may not be as detailed as is normal for budget line items but would nevertheless be useful to the Congress. Would you comment?

Answer. The purpose of establishing the line item approach to the approval of IR&D/B&P expenditures is to provide Congressional oversight on the amounts expended for this purpose. In order to exercise this oversight, the Congress must have more information than simply a single estimated figure for all contracts with advance agreements or even a single figure for each of the contractors with advance agreements. To permit a judgment of value of IR&D against the funds for the effort to be made, information regarding each IR&D project must be developed and provided to the Congress. The detail of this information can be no less than that provided for normal RDT&E efforts and in fact, since IR&D is a controversial and misunderstood effort, the information provided will likely have to be more detailed in order to support justification. To gloss over the amount of information likely to be needed is not compatible with the detailed analysis that should be made concerning this radical departure from current, old established practice.

Question. The GAO report of 8 March 1971 contains in Appendix III a rebuttal of the OSD objections to line item budgeting of IR&D. DoD contends that it is inappropriate to compare an IR&D/B&P line item with the Defense procurement budget. GAO feels that too much emphasis is being placed on precise data whereas all that will be needed is the best information available, similar to data used for justifying other portions of the Defense budget. Would you comment?

Answer. IR&D/B&P have completely different objectives than does the Defense procurement budget. It therefore is akin to comparing apples to oranges to place any reliance on a ratio of IR&D/B&P to the Defense procurement budget. Such a relationship has no meaning and cannot be used as a legitimate management tool for determining the proper size of the IR&D/B&P expenditure. Further, to speak of too much emphasis being placed on the need for precise data with which to better understand and hopefully better manage a $700 million effort is to not present all the facts in analyzing this approach.

Question. The GAO report of 8 March 1971 contains in Appendix III a rebuttal of the OSD objections to line item budgeting of IR&D. DoD anticipated problems due to the fact that contractors generally submit plans for the calendar year whereas the Government's fiscal year begins in July. GAO feels that contractors generally plan on a long range basis and therefore should not have great difficulty in preparing a plan for the Government's fiscal year. Would you comment?

Answer. It is likely that adaptation by contractors to the different fiscal year requirements would present no unsurmountable problems. However, of greater concern would be the problems of trying to match certain projects to be supported with funds from specific fiscal year appropriations. The identification of projects for justification of an amount of money must not be permitted to override the ability of a contractor to substitute or redirect projects if their value changes due to changes in the circumstances which initiated the projects.

Question. The GAO report of 8 March 1971 contains in Appendix III a rebuttal of the OSD objections to line item budgeting of IR&D. DoD mentioned many problems in budgeting, negotiating ceilings, and segregating costs that would materialize if the GAO proposal were adopted. GAO agrees that there will be problems in converting the IR&D system, but feels they will be eliminated once the conversion is completed. Would you comment?

Answer. It is true that a system could eventually be devised to provide the methodology to implement line item budgeting and contract implementation of IR&D/B&P cost recovery. However, the methodology will never eliminate the basic irrationality of attempting to force an important technical effort into a recovery mode which does not permit the attainment of the technical effort's primary objective.

Question. The GAO report of 8 March 1971 contains in Appendix III a rebuttal of the OSD objections to line item budgeting of IR&D. DoD urgued that contractors receiving direct payments of IR&D would have a competitive advantage over companies not getting such payments. GAO believes that the IR&D amount percentagewise is small, and that the competitive advantage could be offset by adding a factor to enable equitable comparison of bids, as is presently done under certain circumstances. Would you comment?

Answer. There is no question that being able to reduce one's overhead by 3 to 4% would substantially improve one's relative and absolute position competi-

tively. It may be possible on certain procurements to use a factor that would offset such an advantage. However, such an approach would be applicable only to certain DoD procurements, would not be easily used outside of DoD in other agencies or commercial proposal evaluation and certainly would be difficult to communicate effectively in order that equitable treatment of each type of bid would result. Of concern also is the strong possibility that those firms below the advance agreement threshold would demand similar recovery treatment. Such an event would be completely beyond DoD's ability to administer within current or anticipated resources.

Question. The GAO report of 8 March 1971 contains in Appendix III a rebuttal of the OSD objections to line item budgeting of IR&D. DoD stated that because of the importance of IR&D no revolutionary change be made. GAO feels that a budget line-item method would not affect the contractor's independence in selecting work projects any more than the current advance agreement method. Would you comment?

Answer. Line item budgeting and contracting for IR&D would not appreciably affect the contractor's independence in selecting IR&D projects or B&P opportunities. What would be affected and seriously is the right to initiate selected projects if in the review cycle Congress should decide that certain projects appear to be duplicative to other contractor programs or to DoD's contracted R&D program and therefore would be disallowed. Congress would be reviewing IR&D projects using as criteria measures of value to the Government rather than measures of the value to the contractor. Use of such criteria would further restrict the freedom of the contractor to conduct those projects which in his opinion were necessary to the maintenance of his competitive posture for responding to the future requests of the DoD. Following Congressional review of the IR&D program based on a given inventory of proposed IR&D projects, the contractor's freedom to modify his efforts to respond to changes in his competitive environment would be greatly restricted. GAO's reaction to the DoD objections stem from a continuing lack of understanding of the primary objective of IR&D. This misunderstanding is still evident in the 1975 testimony of Mr. Staats. The GAO still considers IR&D as a poorly controlled supplement to directed RDT&E which IR&D is not. IR&D is that effort that every business must conduct in order to remain technically competent and competitive in its chosen area of effort. IR&D has as a fallout innovative ideas for system and subsystem concepts and for technology advancement. Therein lies the core for the misunderstanding that has prevailed for many years.

Question. Would you elaborate on your statement that "it has not worked successfully elsewhere"?

Answer. Governmental bureaucratic control and the attendent stifling of competition has not worked successfully in such countries as the Soviet Union. In fact there is ample evidence that the Soviet Union is increasingly turning to the benefits of competition to meet its goals.

Question. The GAO report of December 10, 1974 (B–164912) questioned the inclusion in IR&D of certain commercial development costs for Pratt and Whitney engines for the Boeing 747 and recommended that the Government be authorized access to a contractor's commercial records where there are indications that commercial development costs are being included as IR&D.

Your letter of August 22, 1975, commenting to me on the GAO report states that "it is not practicable to make a technical audit of commercial contracts to positively determine that such costs are not included although it would be possible to review selected cases if there were means available to indicate that these costs may not have been eliminated."

a. Isn't this what the GAO had recommended, that the Government have the right to review cases where there are strong indications that IR&D is being used to cloak commercial work?

b. Does your reply mean that you concur with the proposal in dissenting position 1 to the Procurement Commission recommendation on IR&D, that the Government have access to contractors' commercial records *when needed* to determine that costs are allowable?

c. Do you agree with the Navy position in the Pratt and Whitney case that its handling of the IR&D negotiations was sound and that no recovery from the contractor is warranted? If not, what action do you plan to take?

Answer. It is my understaning that the GAO recommended that access be granted to all commercial records for review. This would be an overwhelming burden of administration and would also be subject to possible abuse of a contractor's right to privacy. The DoD believes that a certification of exclusion would serve the purpose in the great majority of cases. The DoD is currently studying the feasibility of "march-in" rights in those few cases where other available records indicate a strong possibility of improper cost allocation. I will await the results of that study before responding. In regard to the Navy's handling of the P&W case, I agree with the Navy's position regarding the soundness of its approach in the years of 1968 through 1971. I further agree that the principle of estoppel prevents recovery of any costs for the years of 1972 through 1974.

Question. On July 25, 1975, I wrote to the Secretary of Defense and requested that the GAO Report dated June 5, 1975, be reviewed and that comments and appropriate recommendations be submitted to provide a more meaningful basis for these hearings. Your letter dated 22 August 1975, provided the requested information. Copies of both letters will be inserted in the record.* Are there any significant statements in your letter which you have not already covered today and which you wish to cover now?

Answer. I believe that you have given me the opportunity to cover all the significant points of the IR&D/B&P question.

Question. Page 40 of the GAO Report of 5 June 1975, indicates that the estimated cost to DoD for administering the IR&D program is $223,500 for negotiation and $1,898,500 for technical evaluation, making grand total of $2,122,000. Isn't this rather modest considering the benefit derived from these efforts?

Answer. Yes, I believe that we receive benefit from technical communication and understanding which far exceeds the rather modest cost of $2 million. We are seeking ways to improve that ratio of benefit to cost for the future.

Question. What is the estimate of the number of man years and the costs incurred annually by DoD in administering the relevancy requirement?

Answer. There is no way to identify the costs incurred in relevancy checking from among the costs estimated for technical evaluation as a whole. The figure of $2,122,000 for technical evaluation and negotiation includes the efforts of the evaluators in determining relevancy of IR&D projects and of the negotiators in determining the relevancy of B&P projects.

Question. In your letter of 22 August 1975, you state that elimination of project by project relevancy determination would reduce administrators' workload substantially and permit consideration of technical evaluation approaches which may be far more efficient and effective than today's brochure review and at-plant visits. What approaches do you have in mind?

Answer. We are studying several possibilities for improving our technical evaluation and communications of IR&D. Relevancy determination might better be conducted by the IR&D Technical Evaluation Group who have a far better knowledge of the breadth and depth of DoD's mission responsibilities than is likely by bench level personnel. On-site reviews might be reoriented to an evaluation against the same criteria that we use in our evaluation of our in-house laboratories. Also the on-site review might be more efficient and less costly if we use higher level technical personnel and fewer of them. An alternative might be the substitution of evaluation of IR&D projects in his discipline when an engineer or scientist visits a contractor for another purpose. This alternative would eliminate the formal, large on-site review at a specific time for a series of individual reviews during the year.

Question. You state that the quotations on patents from the 1964 letter from the Assistant Secretary of Defense for Installations and Logistics to Senator McClellan is as true today as it was 11 years ago.

a. In what context was that letter written?

b. What was the Senator's reaction to this 11 years ago?

Answer. The 4 February 1964 letter from the Assistant Secretary of Defense for Installations and Logistics to Senator McClellan was in response to several letters from Senator McClellan in his capacity as Chairman of the Subcommittee on Patents, Trade-marks and Copyrights of the Committee on the Judiciary.

*See p. 320.

The records available to me do not indicate what the Senator's reactions were to the letter.

Question. Don't you agree that the Government does have a special relationship as a customer, particularly with companies whose sales are primarily to the Government and whose major products are developed substantially under direct Government contract? And why shouldn't this entitle the Government to royalty-free licenses and technical data resulting from IR&D?

Answer. No, I do not believe that the Government should enjoy a special relationship as a customer. Such relationships tend to become one-sided due to the Government's dominance as the only buyer. The one-sidedness further tends to force industry into a captive role to the detriment of competition and innovativeness. Having no special relationship eliminates the question of data and patent rights since no other customer demands and receives such rights.

Question. You point out that data and patent right of contractors with smaller IR&D programs which are not subject to negotiation of advance agreement would not be available to DoD. Why wouldn't it still be worthwhile to obtain these for contractors covered by advance agreement?

Answer. The strong possibility of loss of motivation by those contractors who normally support the DoD still overrides the issue regardless of the number of contractors involved.

Question. Considering that DoD, NASA and ERDA account for practically all the Government IR&D and B&P expenditures, why should a Government-wide policy be established? Why not continue with legislation that is unique to each agency?

Answer. The issue is not how many agencies are involved but whether equity is being served if each agency has different policy and procedures for treating contractors. The commonality of contractors among those supporting DoD, NASA and ERDA increases the need for common policy and procedures in the interest of equity.

Question. A basic argument in favor of allowing IR&D as a necessary business cost is to provide competitive sources for future procurements. Where a company has established a separate division for a unique system, such as the B–1, and direct research and development contracts are awarded to enable this division to develop and produce this system for a 10 to 15 year period, do you feel that the Government should pay for any IR&D performed by such division? If so, how would payment of such IR&D costs lead to competition for future business?

Answer. There is no such thing as an assurance that a company will be funded for a system for 10 to 15 years. Therefore, any division of a company must keep current with the state-of-the-art in its field regardless of the potential longivity of a particular product. Secondly, while each system contract has limits on the performance goals under the specific contract, there are always growth versions of every system. The B–52 has passed through the H version during the years since its inception. A company must be continuously studying the potential for growth of the system under contract. Lastly, a division as large as the B–1 Division of Rockwell has a large number of highly competent people involved in the design and production of the B–1. It is in the best interest of both the company and the Government that the capabilities of these people be stimulated and be planned for. Even in the event that the system is produced for 10 to 15 years, the various disciplines involved with the design and production of the system will be utilized for periods less than the full 15 years. The engineering talent and the manufacturing engineering talent will peak in the first two years then gradually tail off to a low level of maintenance by the 6th or 7th year. Only with growth versions will these type of professionals be brought back to the system.

COMPTROLLER GENERAL OF THE UNITED STATES,
Washington, D.C., November 11, 1974.

Hon. JAMES R. SCHLESINGER,
Secretary of Defense.

DEAR MR. SECRETARY: In December 1972 your Department established guidelines for considering contractor invested capital in negotiating profit, that

relied on voluntary participation by eligible contractors. We have been advised that contractors volunteered to negotiate profit using invested capital on only four contracts.

The primary objective of including profit on invested capital in profit negotiation is to reduce reliance on capital provided by the Government, by motivating contractors to invest their own funds in cost-reducing equipment and facilities. A collateral benefit would be a reduction in the amount of equipment and facilities the Government has had to provide to its contractors.

We support this goal and believe a policy of negotiating profit based on invested capital can contribute materially to its achievement. In our report "Defense Industry Profit Study" dated March 17, 1971, we recommended that uniform Government-wide guidelines be developed for determining profit objectives for negotiating Government contracts that will emphasize consideration of contractor capital required.

The implementation of capital-oriented profit policy could be expected to initially increase the customary profit rates of some contractors and decrease others. For this reason we have reservations about the effectiveness of attempting to test the feasibility of the policy by making it optional on the part of contractors. Nevertheless, we concurred in a test of the policy on this basis. We believe sufficient time has now elapsed to conclude that the voluntary route does not work and recommend that the policy of establishing profit objectives based on contractor invested capital be made mandatory.

We would appreciate your views on this matter.

We are sending copies of this letter to the Chairmen, House and Senate Committees on Appropriations, Armed Services, and Government Operations; and the Chairman, Subcommittee on Priorities and Economy in Government, Joint Economic Committee.

Sincerely yours,

ELMER B. STAATS,
Comptroller General of the United States.

JULY 25, 1975.

Hon. JAMES R. SCHLESINGER,
Secretary of Defense,
Washington, D.C.

DEAR MR. SECRETARY: The Subcommittee on Research and Development is planning to hold open hearings in mid-September on the subject of Independent Research and Development.

At that time it is planned to have the Director of Defense Research and Engineering and the Assistant Secretary of Defense for Installations and Logistics appear for the Department of Defense, as well as the Comptroller General, other federal government, and industry representatives to provide a comprehensive coverage of this subject.

In preparation for these hearings, I would appreciate your review of the General Accounting Office report dated June 5, 1975 titled "Contractors' Independent Research and Development Program Issues and Alternatives" and the submission of comments and appropriate recommendations by August 25, 1975. This information will provide a more meaningful basis for these hearings.

Sincerely,

THOMAS J. MCINTYRE,
Chairman, Subcommittee on Research and Development.

DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING,
Washington, D.C., August 22, 1975.

Hon. THOMAS J. MCINTYRE,
Chairman, Subcommittee on Research and Development, Committee on Armed Services, U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: The Department of Defense is pleased to respond to your request of 25 July 1975 to comment on the General Accounting Office report dated June 5, 1975 titled "Contractors' Independent Research and Development Program—Issues and Alternatives." After careful review of the report and after discussion at the DoD Independent Research and Development Policy Council, the Department offers the following comments.

Overall, the report appears to support both the policy of allowing Independent Research and Development (IR&D) and generally the procedures which the DoD has developed over the years to handle such costs. However, there are several findings and conclusions on which the Department wishes to comment in addition to the recommendations of the report.

GAO found that they were unable to make a determination of the benefits of IR&D. Such a determination in the normal audit sense would be difficult to make; however, over the past five years or more the Department of Defense has made several, fairly comprehensive surveys of this question. The results of these surveys have been provided to the Subcommittee. In each case, the evidence indicated that IR&D is of benefit to the DoD and to the Federal Government. IR&D provides some of the most advanced technological efforts available to the DoD and at the same time provides the means for more than one contractor to maintain the technical competence necessary for the competitive acquisitions desired by the Department. Further, it should be recognized that since the time to realize benefits is longer normally than the two years considered by the GAO, benefits of those two years efforts would be even more difficult to identify specifically. It should be noted that in spite of the lack of auditable data to prove the benefit of the IR&D efforts, GAO still recommends IR&D with the following statement:

"GAO continues to support the views expressed in dissenting position 1 of the Commission on Government Procurement (COGP).

Recognizing IR&D and Bid and Proposal (B&P) expenditures as being in the Nation's best interest to promote competition, advance technology, and foster economic growth.

Establishing a policy recognizing IR&D and B&P efforts as necessary costs of doing business."

In the report, the GAO makes the statement that the technical evaluation results were "a negligible factor in the final agreement." This situation is understandable since in the great majority of the cases the contractors' IR&D programs are judged to be of high quality. This fact coupled with the fact that the technical evaluation result is only one of a number of factors which must be considered in establishing the final IR&D ceiling, would explain the finding that the technical evaluation results are a negligible factor in the final agreement. However, it must be borne in mind that the impact on the advance agreement is not the only objective of conducting the technical evaluation. Technical communications between peers in the same discipline is perhaps the greatest benefit from the technical evaluation. It is believed that these communications could be enhanced if certain constraints were removed as explained in a following paragraph.

The GAO recommends that the Congress clarify the policy for IR&D support by establishing guidelines which set forth the purposes for supporting IR&D, the appropriate amount of support and the degree of control which should be exercised over the program. DOD concurs in possible statutory language setting forth the purposes for which Government supports IR&D costs and suggests the first two points of both the majority and the dissent 1 positions of the COGP as appropriate. These two points were quoted in a previous paragraph of this letter. However, DOD nonconcurs in statutory guidelines which attempt to set forth either appropriate amounts of financial support or the degree of control to be exercised by the Government over contractor programs. These are executive management considerations for which flexibility of action must be retained in order to adapt to the many differences among contractors in sales levels, sales trends, cost consciousness, technology quotient in each industrial segment, etc.

As its second major recommendation, the GAO continues to support dissent position 1 of the COGP as the appropriate policy and procedures guidelines for Government-wide application. Dissent position 1 recommended:

1. "Recognizing IR&D and B&P expenditures as being in the Nation's best interest to promote competition, advance technology, and foster economic growth.
2. Establishing a policy recognizing IR&D and B&P efforts as necessary costs of doing business.
3. Uniform treatment of IR&D and B&P, Government-wide, with exceptions treated by the Office of Federal Procurement Policy.
4. That DOD procedures for negotiating advance agreements be retained when applicable and that, in all other cases, use of the DOD formula for reasonableness be continued.
5. That the Government have access to contractors' commercial records when needed to determine that costs are allowable.
6. That nothing in this policy precludes a direct contract arrangement for specific research and development contracts proposed by a contractor.

7. That allowable projects have a potential relationship to an agency function or operation in the opinion of the agency head."

The DOD concurs in the first four points and in the sixth point of that position since these points effectively endorse the current DOD approach to handling IR&D and B&P. In regard to the fifth point concerning access to a contractor's commercial records, the DOD has been studying this area and has been considering the advisability of requiring contractors with advance agreements to certify that IR&D/B&P programs do not include costs required in performance of contracts. We have concluded it is not practicable to make a technical audit of commercial contracts to positively determine that such costs are not included although it would be possible to review selected cases if there were some means available to indicate that these costs may not have been eliminated.

Regarding the last point of dissent position 1, DOD believes that the experience with relevancy determination over the past several years, as described in this report, casts strong doubt on the need and usefulness of relevancy determination, particularly if a uniform Government-wide application of current DOD policy and practices is instituted which brings into play a range of interests even broader than DOD's. Elimination of project by project relevancy determination would reduce the administrative workload substantially and, further, would permit consideration of technical evaluation approaches which may be far more efficient and effective than today's brochure review and at-plant visits.

GAO's third recommendation concerned having the Government represent one face to industry, i.e., one advance agreement, a joint technical review, a single overhead rate, etc. DOD concurs with the presentation of a single Government face to industry and believes that lead agency concept based on the predominant contracting agency would work well. However, DOD nonconcurs in having this approach established by legislative action. A legislative policy statement establishing the purposes of IR&D support and recognizing IR&D/B&P as necessary costs of doing business would be useful. However, including executive management direction would be inappropriate and unduly constraining. The Office of Federal Procurement Policy provides an excellent vehicle for achieving the Government-wide approach.

As its final formal recommendation, the GAO recommends that legislation provide for including in advance agreement patent and technical data provisions granting the Government royalty-free licenses and data rights, based on a scale of the agencies cost participation (in IR&D recovery). The Department of Defense continues to support its long standing policy of not acquiring patent and data rights in the results of IR&D. The rationale for this policy was very adequately stated in a 1964 letter to Senator McClellan from Mr. Tom Morris then Assistant Secretary of Defense for Installation and Logistics responding to a similar GAO report.

"The Government does not stand in any special relationship as a customer, and it, like other customers, should pay its share of the cost of operating an industrial firm which includes IRD program costs. It therefore, as any other customer, does not seek or expect patent rights when the price it pays for commercial products includes costs of IRD programs. Nor does the Department see any rational basis for applying more stringent rules, such as requiring patent rights if it supports IRD programs, simply because the contractor happens to have sales predominantly to the Government, provided the IRD expense is allocated to all customers on a fair and reasonable basis. We recognize, however, that in these instances there is greater than normal need to provide assurance that the expenditures are reasonable, i.e., no larger than would be spent by a prudent management in a commercially oriented business."

"We believe that the position recommended in the report is contrary to the best interests of the Government because it would inevitably result in discouraging businessmen from using their engineering talent and other resources for the development of products designed to meet the needs of the Government. It is a truism that one of the primary sources of strength of the American economic system is to be found in the incentives that the system affords to inventive talent and capital. Among the most important of these incentives is the prospect of earnings that an inventor or developer may reasonably anticipate from the sale of products that turn out to be marketable. The policy expressed in the report would effectively smother this incentive as far as defense contractors are concerned by making it clear in advance that rights in data resulting from a company's independent research and development efforts would have to be turned over to the Government for use in enabling other companies to compete with the original developer in connection with any sales to the Government."

"If companies that develop new products for Government use at their own risk and initiative may thus be denied the rewards normally afforded successful risk takers under our economic system, they will obviously have little motivation to continue to expend money, talent and other resources on the development of Government-oriented items. This would be a serious loss. Independent research and development has been a source of ideas and products of immense value to military technology as well as to our economy and technology generally. In the opinion of the Department of Defense, this contribution to the continued improvement of our weapons and military equipment is indispensable."

"It has never been suggested, that a customer, in buying a TV set or an automobile, should similarly acquire rights in the seller's designs and technical data (or in its facilities and equipment) even though the price includes a pro rata share of the seller's research and development costs as well as his other normal costs of doing business."

"The report, however, would establish a different rule if the customer happens to be the Government, since it would give the Government rights which no other customer obtains."

"Since the recommendation applies to situations in which 'the Government has borne a substantial portion of the research and development costs,' it would be invoked against companies that do a substantial amount of work for the Government, as opposed to companies whose business is predominantly of a commercial nature. The former, however, are the very companies which, by virtue of their special skills, experience, and orientation, are the ones whose contribution to defense technology is most indispensable."

While DoD continues to support its policy concerning data and patent rights in IR&D, the Department is currently studying its experience with this policy particularly as the policy impacts on the Department's ability to use any innovation developed under IR&D in any DoD system or equipment. The results of this study will be considered by the DoD Independent Research and Development Policy Council during the late summer and fall.

The GAO offered two informal recommenaations in the manner of suggestions. One concerned the manner of conducting technical evaluations and of using the results of the evaluation in the negotiation of ceilings. The other concerned the desired continuation of the IR&D Data Bank. DoD concurs in both of these suggestions and currently has the DoD IR&D Technical Evaluation Group of the IR&D Policy Council studying alternative ways for improving the effectiveness and efficiency of the technical evaluation process. The results of this study will be presented to the Policy Council within the next several months.

We hope that these comments will prove useful to the Subcommittee and look forward to additional discussion of this subject during the forthcoming hearings.

Sincerely,

MALCOLM R. CURRIE.

FEASIBILITY OF TREATING CONTRACTORS' INDEPENDENT RESEARCH AND DEVELOPMENT COSTS AS A BUDGET LINE ITEM

COMPTROLLER GENERAL OF THE UNITED STATES,
Washington, D.C., March 8, 1971.

B-164912
Hon. William Proxmire,
U.S. Senate.

DEAR SENATOR PROXMIRE: Reference is made to your letter of October 5, 1970, requesting our views as to the feasibility of converting contractors' independent research and development to a budget line item.

We have given this matter serious consideration. Based on our analysis we believe that a line-item control of independent research and development payments to major defense contractors can be developed using estimates based on historical data, together with the Department of Defense's estimate of the amount of research and development and procurement activity to be contracted. However, we suggest that no further legislative controls be imposed pending evaluation of the effect of the legislative restrictions sat became effective January 1, 1971.

As you know, the recently enacted Section 203 of Public Law 91-441 [1] requires the Department of Defense to establish certain controls over the payments for

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[1] See p. 330.

independent research and development to its major contractors and to provide the Congress with annual reports on the payments made. Although this law does not contain all of the limitations on independent research and development that were embodied in your bill or in the Senate procurement bill, it does contain certain restrictions on payments for independent research and development that may achieve results comparable to those sought to be obtained through a line-item control mechanism.

For example, the law now requires that a report be made to the Congress by March 15 of each year showing statistics for companies that received payments from the Department of Defense for independent research and development (and bid and proposal) of more than $2 million. Thus, the Congress for the first time will be provided visibility of the extent of the Department's expenditures for independent research and development costs of major contractors, and therefore will have the means for deciding whether more or less restrictions are required.

In view of the re_ency of this legislation we believe it would be desirable to allow sufficient time—at least one year, preferably two—for evaluating the law's impact before considering introduction of legislation to establish additional controls.

In this connection, we have been informed by officials of the Department of Defense that preliminary reports show that expenditures by major defense contractors for independent research and development declined during the past year. Comparison of the report to be submitted to the Congress by March 15, 1971, with data for previous years should show the trend of expenditures and should assist in determining whether additional controls may be necessary.

During our study of this matter we prepared a paper (appendix I) describing (1) the present system for allowing independent research and development as a contract cost and (2) a system which we believe would enable line-item control. We asked officials of the Office of the Secretary of Defense for their views on our proposal. In a letter dated December 19, 1970 (appendix II), the Assistant Secretary of Defense (Installations and Logistics) objected vigorously to the suggested system. He described several problems which he believes would be created by imposition of such a system and he contended that implementation of a line-item control could have a serious adverse impact on the technological base of this country.

Although we agree with his position that line-item control of independent research and development would lead to additional administrative burden, we believe such control can be established. If such control is determined to be necessary, we suggest that a system change of this magnitude be tested on a trial basis before legislation is proposed requiring its implementation on a broad scale. Our analysis of the views expressed by the Assistant Secretary is included in appendix III.

We hope this information will serve the purposes of your request. If we can be of further assistance to you in this matter, please let us know. We plan to make no further distribution of this letter unless specifically requested, and then copies will be distributed only after your approval has been obtained or public announcement has been made by you concerning the contents of this letter.

Sincerely yours,

ELMER B. STAATS,
Comptroller General of the United States.

APPENDIX I

GAO VIEWS ON FEASIBILITY OF LINE-ITEM CONTROL OF INDEPENDENT RESEARCH AND DEVELOPMENT

DEFINITIONS

In this paper, "line item" is intended to mean a congressionally approved aggregate limitation or limitations that may not be exceeded by the agency or agencies responsible for controlling the applicable appropriated funds. Also, the term "independent research and development (IR&D)" is construed in its broadest sense—it includes bid and proposal (B&P) costs and costs of other technical efforts that are closely related to either IR&D or B&P costs.

PRESENT SYSTEM FOR ALLOWING I.R. & D. AS A CONTRACT COST

At the present time IR&D is considered by the Department of Defense (DOD) as an indirect cost (overhead item). Contractors doing business with DOD

accumulate IR&D costs in various overhead accounts and allocate them by various methods to the work they perform for both Government and commercial clients. DOD generally allows such costs to be charged to its contracts if properly allocated and reasonable in amount.

In determining reasonableness of these overhead costs for contractors or their divisions whose work is predominantly or substantially with the Government, DOD has for many years attempted to negotiate advance agreements setting out the maximum amount of IR&D to be recognized as an overhead cost allocable to all of the contractor's activities. Section 203, Public Law 91–441,* requires that, beginning January 1, 1971, such advance agreements shall be negotiated for companies which received from DOD more than $2 million of IR&D and B&P during the preceding year, or for product divisions of such companies which received more than $250,000 during the preceding fiscal year. DOD is planning to expand this requirement to cover the top 100 Defense contractors. DOD estimates that this will cover over 85 percent of the total amount of IR&D costs absorbed under DOD contracts.

In preparation for advance agreements, the contractors are required to submit brochures describing the IR&D work planned. Section 203 requires that DOD make a technical evaluation of the contractor's IR&D plans. Such evaluation will also serve to determine whether there is a potential relationship of the IR&D project to a military function or operation as required under Section 203.

PROPOSED SYSTEM

We believe that a line-item control for IR&D would be feasible if the limitation is restricted to payments to the larger companies, and if for these same companies IR&D is paid directly under a special contract rather than as an allocated overhead charge under various contracts. It would be extremely difficult, if not impossible, to adequately administer a line-item limitation for any segment of overhead because some type of control would have to be developed to accumulate data on costs allocated to each of thousands of procurement contracts.

In lieu of the overhead advance agreements described above, annual special contractual agreements could be negotiated with the larger companies providing for direct payment (up to a ceiling) of the appropriate share of the contractor's IR & D. The special agreement for IR & D would be nogotiated in a manner similar to the present advance agreements with major contractors and would continue to permit the contractor to conduct IR & D in the manner and to the extent he deems advisable. However, the special agreements would provide for direct payments by DOD to the contractor for up to the agreed amount, rather than establishing an amount acceptable for inclusion in the contractor's overhead allocable to all of his customers which then must be distributed to all of his contracts. The special agreements also would provide that IR & D would be excluded from charges for costs under the contractor's regular negotiated contracts with DOD.

The agreement for IR & D would, in effect, provide for payment of a proportionate share of the actual costs of the contractor's IR & D program not in excess of the agreed ceiling. The agreement also would provide that the payment may not exceed the total costs of IR & D work which, in the opinion of the Secretary of Defense, has a potential relationship to a military function or operation.

The DOD share of the contractor's IR & D program would be based on the ratio of the contractor's negotiated contract activity for DOD compared to the contractor's total workload. Inasmuch as the actual ratio cannot be determined until the end of the year, the proportionate share could be determined on the basis of the ratio for the most recent year completed at the time the contractor's proposed IR & D program is submitted for evaluation. To avoid additional administrative effort and to enable orderly planning by the contractor, the proportionate share so determined should not be changed even though the actual ratio may differ from the ratio used in determining this share. If the actual ratio differs substantially, DOD might consider its effect as a factor in negotiating the special agreement for the following year.

Those contractors who do not come within the category of "major defense contractors" would continue to be reimbursed for the allocable share of their IR & D costs through distribution of overhead costs, as is presently done. Because of the smaller amounts involved, the IR & D programs of these contractors are not subject to technical evaluation by DOD. Those "major" contractors who prefer similar treatment could be offered the option of limiting their allocable

* See p. 330.

IR & D charges to DOD contracts to a stipulated maximum (perhaps $2 million as the law presently indicates for other than major contractors). Otherwise, "major" contractors would be required to enter into the special contract agreements for IR & D. As a practical matter, it is unlikely that many major contractors would refuse to enter into the special agreements in view of the significant difference in cost recovery.

BUDGET PRESENTATION

In its annual budget request, DOD would set out the amount or amounts for the proposed payments of IR & D to its major contractors. The budget line-item proposal would be developed based in part on historical data. Section 203, Public Law 91-441, requires annual reporting of the latest available Defense Contract Audit Agency statistics on IR & D or B & P payments to major defense contractors. Similar data is available for the past seven years. Such data, together with DOD's estimate for the amount of research and development and procurement activity to be contracted for, should provide a realistic basis to DOD for estimating the amount to be set out as a line item for the IR & D of major contractors. The budget back-up would explain any significant changes anticipated by DOD in the ratio of the IR & D estimate to the contract work estimate.

At present, IR&D is included without identification in the budget as a part of the appropriations for research, development, test and evaluation (RDT&E), procurement, and operations and maintenance for each of the military services and the Defense agencies. To facilitate control and to eliminate the work involved in making extensive cost allocations to the numerous appropriations, it would be preferable to include the amount authorized for IR&D of major contractors as a part of only one of these appropriations. This appropriation would be used to fund the payments to each major contractor for the agreed share of his IR&D, as distinguished from payments made from the various appropriations for contract work performed.

A reduction in the amounts otherwise requested to be appropriated for DOD would, of course, be warranted corresponding to the amount(s) specifically requested to be appropriated for IR&D.

CONGRESSIONAL ACTION

The data presented by DOD in its budget submission, as explained above, should provide the Congress with good visibility of the basis for the estimated IR&D costs for major contractors. This should enable the Congress to be in a position to judge the propriety of the requested line-item amount.

The proposed line-item amount should, in our opinion, be considered by the Congress in conjunction with the total of the RDT&E appropriations. The activities carried out by contractors under their IR&D programs are closely related in nature to research and development work performed under Government contracts or in Government laboratories. If DOD's costs for participating in IR&D programs and its costs for direct RDT&E activities are considered as a package, the Congress would obtain a clearer picture of the total current expenditures authorized for research and development.

COMPLIANCE AND CONTROL BY DOD

The total amount of the planned IR&D programs for major contractors which DOD can determine to be reasonable and potentially relevant to a military function or operation obviously will not be known until all of the programs have been received and evaluated by DOD. When such determination has been made, the DOD would be in a position to gauge whether its share of such amount would be within the line-item limitation, or whether reductions will be needed. Consequently, it would be necessary for DOD to arrange for early submission and evaluation of major contractors' IR&D programs.

In order to permit continuation of IR&D efforts at the level authorized by Congress, it may be desirable to stipulate in each agreement that the amount payable by DOD may be increased at DOD's option, under specified conditions, to the extent funds are available within the line-item limitation. For example, if because of the appropriation limitation, DOD is unable to agree to support its full proportionate share of a contractor's IR&D program even though technical evaluation shows that the program is considered desirable and DOD-oriented, upward adjustment of the ceiling may be warranted if DOD determines that the full amount authorized for IR&D under the appropriation line-item will not otherwise be spent. This may provide an incentive to the contractor

to continue IR&D efforts beyond the amount that DOD has agreed to support, but would assure that the amount of DOD funds spent for IR&D would remain within the limitation.

EFFECT ON OTHER AGENCIES

The implementation of line-item control of IR&D applicable to DOD would probably create some additional burden on other Government agencies which negotiate contracts with major defense contractors, particularly the National Aeronautics and Space Administration (NASA).

At present NASA participates with DOD in the negotiation of advance agreements on IR&D, and such agreements are considered to be applicable to NASA, as well as DOD contracts. If special agreements are negotiated by DOD for direct payment of IR&D such agreements would not have any effect on NASA, and separate agreements would be required. Inasmuch as the negotiations leading to the IR&D special agreements would be similar to those presently used for advance agreements, it does not seem that the execution of separate agreements for NASA's participation in IR&D should require extensive time and effort.

NASA was asked to review our proposal for line-item control and to comment on problems it might present. A NASA official replied informally that his agency felt that a line item control would cause them problems that they do not now have, but until they know what DOD's procedures would be they could not reasonably evaluate the impact.

APPENDIX II

ASSISTANT SECRETARY OF DEFENSE,
Washington, D.C., December 19, 1970.

Hon. ELMER B. STAATS,
Comptroller General of the United States,
U.S. General Accounting Office,
Washington, D.C.

DEAR MR. STAATS: Recently, members of your staff furnished to us draft copies of a GAO Study titled "Feasibility of Line-Item Control of IR&D." I understand that this study was prepared at the request of Senator Proxmire. The paper describes a method of establishing budget line-item control which requires very significant changes from past practices that have been followed by the Government and Industry. There is no evidence that any in-depth study has been made of the impact. Yet, the report gives the impression that the approach is simple to administer, assures equitable treatment to contractors, provides good visibility of IR&D and B&P costs and, in the opinion of the GAO, is feasible. There is no evidence that the detailed analysis required to support these claims has been undertaken.

In the short time we have had to consider this proposal we have found a number of problems. I would like to touch briefly on some of these.

BUDGET PLANNING

The GAO paper expresses the view that a realistic line item amount could be established for IR&D and B&P using historical data on payments to contractors and relating this to the procurement budget. Such an approach is no more than a projection of historical costs without consideration of the value of the effort that is to be supported. In addition, for budget purposes, our latest data would have to be projected two years in advance. We believe that it is unrealistic to expect Congress to approve such a line item without some detail as to the projects that are to be supported. At the same time, we believe it is unrealistic to expect that contractors can furnish valid information two years in advance on IR&D projects to be performed. If they are required to do so, it is inevitable that they will find it increasingly more difficult to depart from "approved" projects and contractor initiative will disappear. With respect to B&P projects, advance information could not possibly be furnished.

Comparison of an IR&D and B&P line item with the Defense procurement budget is also an inappropriate approach because such a comparison is not valid. Items in the Defense budget will be placed on contracts to be performed over a period of several years. The IR&D/B&P line item is to be expended in the fiscal year for which it is appropriated. The proposed comparison should therefore be made with contractors' sales to the DOD in an appropriate fiscal year. This figure is not readily available until the year is near its end. Even if it were proper to compare the IR&D/B&P line item to the procurement budget we would have the problem of determining that portion of new procurement dollars that would be

awarded to contractors who had been selected for negotiation of advance agreements and we would need to know the dollar amount of their new contracts that would be performed in house and the amount to be performed by subcontractors who were not on the advance agreement list. The difficulty of this task is apparent when you consider that at this point in time we would not know what contractors would be successful in capturing the new awards.

ADVANCE AGREEMENT NEGOTIATIONS

The fiscal year used by most contractors is the calendar year. The Government's fiscal year begins with July. The GAO plan provides for the IR&D/B&P line item to be expended during the Government's fiscal year. This would require advance agreements to be negotiated with two six-month ceilings. The problems this may cause require investigation. Advance agreements would have to provide for after the fact negotiation to adjust for changes in the business mix between DOD and other customers since this can only be estimated at the outset. This would substantially increase administrative effort.

OTHER ADMINISTRATIVE PROBLEMS

Present contracts have all been negotiated under existing law and the ASPR. These contracts would still recover IR&D and B&P costs in overhead. Until they phased out over a period of several years they would not be affected by the proposed line item approach. This would present problems in budgeting, negotiating ceilings and segregation of costs. None of these problems have been considered in the GAO proposal.

EFFECT ON COMPETITION

The impact of the proposed plan on competitive awards presents a major problem that would have to be resolved before such an approach could be considered. Payment of IR&D and B&P as a direct cost removes these costs from the overhead accounts of those contractors subject to the proposed control. This means that in competitive situations, these contractors would be relieved of this burden and would be able to quote lower prices than companies who do not have advance agreements; or, conversely, would receive duplicate recovery of IR&D and B&P costs. The proposal does not indicate how this would be handled.

IR&D plays an important part in maintaining the technological base of this country and careful consideration is imperative before any revolutionary changes are made that could have a serious adverse impact. There is no indication that the GAO proposal is supported by anything approaching the type of in-depth study required. Yet it infers that the proposed line item approach is feasible and desirable. I urge that a report of this nature, with its inferences, not be furnished the Congress or anyone else. I would also suggest that a complete in-depth study of this vitally important matter be conducted before any conclusions or recommendations are made.

Sincerely,

BARRY J. SHILLITO,
Assistant Secretary of Defense.

APPENDIX III

GAO COMMENTS ON ASSISTANT SECRETARY OF DEFENSE LETTER OF DECEMBER 19, 1970, ON INDEPENDENT RESEARCH AND DEVELOPMENT

The Assistant Secretary refers to our line-item proposal as being a revolutionary change, and suggests that a complete in-depth study be made before considering it for implementation. He also commented on several problems that he felt would result from establishing a line-item control on IR&D.

BUDGET PLANNING

DOD believes that presenting a budget item based on historical data would not take into consideration the value of the IR&D effort to be supported; that the Congress would not approve a line item without some detail of the projects to be worked on by the contractors; that the contractors would not realistically predict in advance the content of projects to be performed during the budget year; that if required to submit such data, contractors would hesitate to depart from their planned IR&D programs, and thus would lose their initiative; and that advance information on bid and proposal projects could not possibly be furnished.

We recognize that a line item in DOD's budget covering the IR&D costs to be reimbursed to contractors must necessarily be based on estimates and cannot be supported by a detailed listing of contractors showing the precise amounts to be paid each contractor. However, we believe that the historical data now available showing the total costs to DOD for supporting IR&D programs of major contractors during the past seven years should serve as a realistic base for projecting the line-item estimate for the next budget year. While such back-up support may not be as detailed as the normal support for budget line items, we believe the information would be useful to the Congress inasmuch as it should present an understandable and verifiable basis for the amount proposed. Although we cannot predict that such information would be acceptable to the Congress as support for the budget line item, we believe it may suffice under the circumstances.

DOD also questions the validity of comparing a proposed line-item amount for IR&D with the Defense procurement budget. Although many of the problems and points discussed by DOD in raising this question appear to be valid, it seems to us that DOD is suggesting that we are proposing much more preciseness in justifying an IR&D line item than exists in justifications for other portions of the Defense budget. There obviously is a relationship between IR&D and the procurement budget and all we are suggesting is that the best information available and the best estimates of contractual activity that can be made, using historical and other data, be presented to the Congress for use in its deliberations.

ADVANCE AGREEMENT NEGOTIATIONS

DOD says that because most contractors use the calendar year as their fiscal year, whereas the Government fiscal year begins with July, the special IR&D contractual agreements would have to be negotiated with two 6-month ceilings.

If the special IR&D contractual agreements were to be negotiated on the basis of the contractor's fiscal year (apparently the calendar year for most contractors) DOD's comment would appear to be valid. Under such circumstances, DOD could not enter into a contract covering the contractor's IR&D program for the second half of the calendar year until funds covering that period of time had been appropriated by the Congress. While the special contractual agreements would be similar in many respects to the advance agreements presently negotiated with major contractors, a significant difference would be that they would cover the contractor's IR&D program to be conducted during the Government's, rather than the contractor's, fiscal year. This would preclude the need for two 6-month ceilings.

We believe that the contractors would be able to prepare a proposed program to be implemented during the Government's fiscal year even though their planning in the past may have been on a calendar-year basis. Actually, IR&D programs are generally planned by contractors on a long-range basis—two or more years—and, therefore, the contractors should not have great difficulty in preparing a plan for the Government's fiscal year.

DOD also says that increased administrative effort would be required by the need for after-the-fact negotiation to adjust for changes in the contractor's business mix between DOD and other customers. This comment was prompted by the draft proposal reviewed by DOD which suggested that the proportionate share of a contractor's IR&D program to be paid by DOD be adjusted to conform to the actual ratio of Defense work to all of the contractor's work, in the same manner as presently followed.

In view of the administrative problems involved and to facilitate effective programming by the contractors, we have revised the suggested proposal to provide that once a special IR&D agreement has been negotiated, the contractor will be paid for the work performed using the proportionate share considered in negotiating the agreement. No adjustments of the share would be made if the mix of business changes during the year, but DOD should give consideration to the effects of such a change in negotiating the agreement for the following year.

OTHER ADMINISTRATIVE PROBLEMS

DOD states that there would be problems in budgeting, negotiating ceilings, and segregating costs due to the fact that present procurement contracts would continue to recover IR&D costs in overhead.

There undoubtedly will be problems encountered in converting from the present system to another, but such problems should be eliminated once the conversion is completed. In making the conversion, we believe the problems mentioned by DOD may be minimized through amendments to major contractors' current contracts eliminating amounts equivalent to the IR&D costs to be included in the special agreements. These contractors will probably find it essential to continue to receive substantial funds for IR&D from DOD in order to sustain their

technological capability, and should, therefore, be willing to adjust their current contracts in consideration of DOD's guarantee of additional financing.

EFFECT ON COMPETITION

DOD contends that contractors receiving direct payments of IR&D from DOD would have a competitive advantage as they would be able to quote lower prices than companies not having special IR&D agreements; or, conversely, such contractors receiving direct payments of IR&D could obtain duplicate recovery of IR&D.

We recognize that additional safeguards would be needed to preclude competitive advantages in bidding for Defense contracts. However, we believe the problems cited by DOD can be substantially avoided. IR&D costs generally represent a very small portion of a contractor's costs and, therefore, a small portion of his bid price. To the extent that the share of IR&D paid by DOD (which is based on the business mix of the preceding year) is greater than the actual DOD share, the contractor may have a slight competitive advantage. However, the share paid by DOD also could be lower than the actual. In any event, we believe that any competitive advantage would probably be minor.

Nevertheless, we agree that steps will be required to reduce or eliminate such advantage wherever possible. We believe there are ways to do this, but we doubt that it will be possible to ensure that companies are always bidding on precisely equal terms.

One procedure that could be adopted as a means of offsetting such competitive advantage so far as Government business is concerned would be to add a factor to the major contractor's bids to offset the amount of IR&D paid directly by DOD. This factor could be derived from the special IR&D agreement as it would be based on the ratio of the maximum DOD payment to the total estimated sales; in fact, to minimize administrative effort, it might be advisable to include in the special agreement the agreed factor for use in evaluating any bids presented by the contractor during the following year.

While use of a factor to enable equitable comparison of bids would entail some additional administrative effort, we believe it should not be too difficult inasmuch as a similar technique is used by DOD in other situations, such as in evaluating bids of companies, some of which have Government-owned property or equipment at their disposal.

EFFECT ON TECHNOLOGICAL BASE

In the last paragraph of his letter, the Assistant Secretary states that "IR&D plays an important part in maintaining the technological base of this country and careful consideration is imperative before any revolutionary changes are made that could have a serious adverse impact."

We understand that the basis for this statement is DOD's concern that through the line-item method Congress would gradually impose further controls that would lead to the elimination of the independence of contractors in selecting work projects and eventually cause a drying up of this source of new technology.

We cannot, of course, predict what the Congress may do in the future. It is our view that a budget line-item method as suggested would not affect the contractor's independence in selecting work projects to any greater degree than the advance agreement method required under Section 203 of Public Law 91-441. Under current procedures, the contractor determines the research and development projects he wishes to pursue in his IR&D program. This procedure would not be affected under the suggested line-item method.

SECTION 203—PUBLIC LAW 91-441

Section 203 of the DOD Military Procurement Authorization Act of 1971 (PL 91-441) establishes certain requirements with respect to IR&D and B&P costs. Section 203 reads as follows:

SEC. 203. (a) Funds authorized for appropriation to the Department of Defense under the provisions of this or any other Act shall not be available after December 31, 1970, for payment of independent research and development or bid and proposal costs unless the work for which payment is made has, in the opinion of the Secretary of Defense, a potential relationship to a military function or operation and unless the following conditions are met—

(1) the Secretary of Defense, prior to or during each fiscal year, negotiates advance agreements establishing a dollar ceiling on such costs with all companies which during thier last preceding fiscal year received more than $2,000,000 of independent research and development or bid and proposal pay-

ments from the Department of Defense, the advance agreements thus negotiated (A) to cover the first fiscal year of each such contractor beginning on or after the beginning of each fiscal year of the Federal Government, and (B) to be concluded either directly with each such company or with those product divisions of each such company which contract directly with the Department of Defense and themselves received more than $250,000 of such payments during their company's last preceding fiscal year;

(2) the independent research and development portions of the advance agreements thus negotiated are based on company submitted plans on each of which a technical evaluation is performed by the Department of Defense prior to or during the fiscal year covered by such advance agreement; and

(3) no payments for independent research and development or bid and proposal costs are made by the Department of Defense to any company or product division with which an advance agreement is required by subsection (a)(1) of this section, except pursuant to the terms of that agreement.

(b) In the event negotiations are held with any company or product division with which they are required under subsection (a)(1) of this section, but no agreement is reached with any such company or product division, no payments for independent research and development or bid and proposal costs shall be made to any such company or product division during the fiscal year for which agreement was not reached, except in an amount substantially less than the amount which, in the opinion of the Department of Defense, such company or product division would otherwise have been entitled to receive, subject to appeal by such company or product division under regulations to be prescribed by the Secretary of Defense.

(c) The Secretary of Defense shall submit an annual report to the Congress on or before March 15, 1971, and on or before March 15 of each succeeding year, setting forth—

(1) those companies with which negotiations were held pursuant to subsection (a)(1) of this section prior to or during the preceding fiscal year of the Federal Government, together with the results of those negotiations;

(2) the latest available Defense Contract Audit Agency statistics, estimated to the extent necessary, on the independent research and development or bid and proposal payments made to major defense contractors, whether or not covered by subsection (a)(1) of this section during the preceding calendar year; and

(3) the manner of his compliance with the provisions of this section, and any major policy changes proposed to be made by the Department of Defense in the administration of its contractors' independent research and development and bid and proposal programs.

(d) The provisions of this section shall apply only to contracts for which the submission and certification of cost or pricing data are required in accordance with section 2306(f) of title 10, United States Code.

(e) Section 403 of Public Law 91-121 (80 Stat. 204) is hereby repealed.

AN ANALYSIS OF INDEPENDENT RESEARCH AND DEVELOPMENT/BID AND PROPOSAL (I.R. & D./B. & P.)

OFFICE OF THE DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING

Washington, D.C., April 30, 1975.

Memorandum To: Secretary of Defense.
Through: Director of Defense Research and Engineering.

The Defense Science Board's Task Force on Independent Research and Development (IR&D) has completed its study of IR&D considering the rationale for supporting IR&D, the administration of the IR&D Program by the Department of Defense and the alternatives for the contractor recovery of IR&D costs. the final report on the study is hereby submitted. The conclusions and recommendations of the Task Force are summarized in the first few pages of the report.

SOLOMON J. BUCHSBAUM,
Chairman, Defense Science Board.

OFFICE OF THE DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING,

Washington, D.C., April 18, 1975.

Memorandum for: The Chairman, Defense Science Board.
Subject: Report of the Task Force on Independent R&D.

Submitted herewith is the report of the Defense Science Board Task Force on Independent Research & Development. The Task Force supports the national policy of dependency primarily upon industrial suppliers for goods and services

and emphasizes strongly that the exercise of an independent research and development effort by the potential contractors is a necessary condition for promoting competition and making progress.

The Task Force believes that much of the confusion surrounding the Defense Department funding of Independent Research and Development (IR&D) and Bid and Proposal (B&P) expense is associated with a misunderstanding of their roles. The Task Force has devoted considerable attention to this problem and has attempted to point out that the support of contractors' Competitive Technical Effort (CTE), which collectively describes IR&D and B&P, is necessary to achieve maximum returns to the Government.

We find no significant deficiencies in the present system but do believe that simplifications and improvements can be made such that the burden on the Department and the contractor can be reduced while still obtaining the benefits of technical information exchange, planning and competition.

The Task Force has discussed its conclusions and recommendations with the IR&D Policy Council.

GERALD F. TAPE,
Chairman, Task Force on Independent R&D.

EXECUTIVE SUMMARY

The Task Force concurs in the national policy that requires the Department of Defense to rely primarily on competition to select sources for developing and producing its military hardware and for providing it with needed services. The Task Force believes that the DoD's own best interests are served in this way. It also believes that DoD reimbursement of independent Competitive Technical Effort (CTE)—the combination of Independent Research and Development (IR&D) and Bid and Proposal (B&P)—is necessarily implied by such a policy. Finally, it believes that the CTE allowance is basically a method of compensation for past costs incurred by the contractor in preparing himself to compete technically and pricewise for the contracts against which the allowances are charged. Prior approval of the content and relevancy of CTE activities is, therefore, not really appropriate.

Specifically, since much of the benefit of competition flows to the government, the Task Force recommends that:

The DoD reimburse, through overhead, defense contractors for CTE in the amount considered necessary to maintain a truly competitive environment among DoD's industrial sources of supply;

The amount of CTE authorized be determined to the greatest extent possible automatically on the basis of commercial market place experience or negotiated on the basis of simple formula and guidelines changeable by DoD periodically as conditions dictate;

The DoD IR&D Policy Council provide guidance as to the level of CTE reimbursement by setting CTE policy and guidelines, and reviewing CTE goals and results at regular intervals;

The DoD not attempt to manage, direct, or require prior approval of the substance of CTE programs; however, continue technical exchanges for the benefit of contractor and DoD;

DoD reduce the tendency to be more restrictive than the agency-wide intent of the law in defining relevancy, by issuing instructions that assure that relevancy tests are not limited by the narrow interests of reviewing specialists. In any consideration of future changes, DoD should support the view that it is in the Government's greater interest that there be no tests for relevancy applied to CTE, or, at a minimum, that such tests be for Government-wide benefits, not simply for individual agency benefits; and

The DoD promote the use of inter-agency coordinated CTE policy and procedures to the extent other agencies depend on competitive sources of supply in the way DoD does, but not support a central agency for CTE administration.

In utilizing the term CTE in this report to describe collectively IR&D and B&P, the Task Force does not intend that the present systems be rewritten to replace the terms IR&D and B&P.

As a final note, while the Task Force believes that the DoD should support a strong CTE among its contractors, it recognizes that CTE is only one aspect, though an important one, of the large and complicated question of how best to establish and maintain a competitive industry to serve DoD needs. It therefore warns against attempting to solve the whole problem through control of CTE, an attempt that is not only unlikely to succeed, but which may lessen the contribution CTE itself makes.

A more detailed listing of the Task Force's Conclusions and Recommendations is provided on the next two pages.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions	*Recommendations*
I. *The major benefits from IR&D are derived principally from the "I"; namely, the independence of choice and execution by the contractor.*	1. Competitive Technical Effort (CTE), independently conducted by a contractor, must be accepted as an essential component in the maintenance of a competitive industrial base responsive to DoD needs.
	2. CTE be considered in conjunction with direct contract/grant R&D and inhouse R&D; each has a role to play in maintaining the Nation's technological base and capability.
II. *CTE (IR&D/B&P) is a legitimate cost of doing business and is logically an overhead expense.*	3. Treatment of CTE expense, including burden but not G&A, as an overhead cost element should be continued.
III. *The treatment of CTE expense and the test for reasonableness should be closely coupled to commercial practice and as free from technical audit judgment as possible.*	4. The DoD should employ to the greatest extent possible competitive market place controls over contractor IR&D/B&P (CTE) and less judgmental pre and post audit-type controls. In doing so, subjective tests for reasonableness would be replaced where applicable by objective criteria as illustrated by the CWAS concept.
	5. The DoD IR&D Policy Council should exert greater control at the policy level, reviewing CTE trends and needs, establishing guidance for reimbursement and implementation, etc. This effort should concentrate on minimizing the number of negotiated agreements, in providing crisp guidance and procedures to shorten negotiating periods of advance agreements and in expediting implementation at the field level. Negotiators should be encouraged to refer unusual situations to the Service Policy Councils for specific guidance.
IV. *Government controls on CTE in the absence of direct and continuing market pressures on contractor costs should seek to achieve an optimum balance between protecting the Government's interest and encouraging the greatest freedom in the exercise of the CTE resource.*	6. Relevancy requirements ultimately should be eliminated in their entirety or, as a minimum, the narrow agency relevancy requirement be broadened to one of government-wide relevancy. In the meantime, DoD should reduce the internal tendency to be more restrictive than the agency-wide intent of the law.
	7. Effective technical exchanges between the contractor and appropriate DoD personnel are important and should continue to be encouraged, but not for the purpose of prejudging IR&D programs.
All agencies of the government should support CTE to the extent that the contractors involved are a part of a pool of competitive suppliers.	8. Where other government agencies rely on competitive sources in a manner similar to DoD, DoD should encourage CTE policies and procedures that recognize CTE as a necessary business expense.

An Analysis of Independent Research and Development/Bid and Proposal

INTRODUCTION

The issue of reimbursement of contractors' independent research and development and bid and proposal costs (IR&D and B&P) has had a long history within the DoD and the government generally. The debate has usually centered around amount, specific relationship to individual contracts, control and financing. An added consideration for the government as a whole and a concern expressed by many contractors has been the lack of uniformity in treatment from agency to agency.

The Defense Science Board (DSB) Task Force on IR&D has reviewed the extensive work done by others both inside and outside of the government in the examination of IR&D policies and procedures. Discussions were held with members of an industry Tri-Association study group; with the IR&D Directors from several defense industry firms; with senior representatives of government agencies, such as DoD, AEC, NASA, SBA, GAO: and finally with representatives of small contractors, some working exclusively in the commercial market place, some working almost exclusively for the government and others with mixed product lines.

The Task Force was asked not to start *de novo* but to reassess the fundamentals concerning IR&D/B&P with specific emphasis on:

1. the various objectives and uses of IR&D/B&P from the viewpoints of both the government and industry, and
2. alternate means for satisfying the various objectives, including analysis and evaluation of methods to be used.

The full charter of the Task Force is included in Appendix 1; the membership of the Task Force is given in Appendix 2.

To avoid misunderstandings, the definitions used by the Task Force are those developed by DoD and are stated in Appendix 3. The major points of the present DoD policy on IR&D/B&P and the general features of its implementation are given in Appendix 4.

RELATED STUDIES

At the request of the Choirmen of two Senate Subcommittees and a member of the House, the General Accounting Office (GAO) has undertaken a study of IR&D/B&P and has submitted a number of questions to the DoD. The basis for the GAO review appears to be a questioning by some Members of Congress as to whether there should be increased government control over that part of a contractor's IR&D/B&P that is reimbursed by the government, whether there should be more emphasis on direct R&D contracting versus IR&D, and whether there should be a budgetary ceiling on the total IR&D supported by DoD. The GAO study is still in progress; however, the GAO has issued a partial report of its investigation (dated 16 Aug 1974).

On the industry side, the Ad Hoc Committee on IR&D/B&P of the Tri-Association (Electronic Industries Association, Aerospace Industries Association and National Security Industrial Association) has completed a study of the subject and has presented a statement of principles and recommendations in a Position Paper dated 22 March 1974. (See Appendix 5 for a listing of specific recommendations.) The following recommendations are pertinent to this discussion:

1. The requirement for potential military relevancy should be eliminated.
2. The requirement for establishing ceilings on IR&D/B&P costs should be eliminated in the interest of encouraging competition and maintaining a strong industrial capability.
3. IR&D/B&P costs are indirect costs, part of overhead, and should not become line items in agency budgets.
4. IR&D/B&P are indirect business expenses and should be fully reimbursed. The government should pay for such costs on the same basis as all other customers.

The Commission on Government Procurement included recommendations on IR&D in its December 1972 report; the majority view, set forth under recommendation B–10, sought to:

1. recognize in cost allowability principles that IR&D and B&P expenditures are in the Nation's best interests to promote competition, to advance technology, and to foster economic growth;
2. establish a policy recognizing IR&D and B&P efforts as necessary costs of doing business and provide for a) uniform Government-wide treatment, b) acceptance of company practice when over 50% of sales are accounted for by firm

fixed price Government contracts and commercial products and services, and c) application of relevancy to a potential agency function or operation when contractor cost centers have more than 50% cost-type contracts.

There were dissenting views by some members of the Commission. These included, *inter alia*, a more encompassing requirement for relevancy, greater access to contractor records in order to determine allowability, and annual agency reporting to the Congress on criteria and magnitude of allowances. An additional dissent noted that other mechanisms to achieve the benefits of IR&D had not been sufficiently explored and further study was necessary. The recommendations of the Commission on Government Procurement are under review by the Executive Branch; a policy position has not been established.

Other principal documents reviewed by the Task Force included "A Review of IR&D" dated February 1974, prepared by a DoD Working Group on the Nature, Objectives and Effects of the Independent Research and Development Program, and a staff report to the Commission on Government Procurement entitled "Independent Research and Development Special Project No. 1" by James E. Carpenter. A bibliography of the more significant documents considered by the Task Force is given in Appendix 6.

No attempt has been made to present individual points of view nor to distill the essence of the various discussions or studies. The Task Force has, however, as a result of all of its discussions and deliberations, reached certain conclusions and offers recommendations which are later set forth.

COSTS AND TRENDS

The costs associated with IR&D/B&P programs of major DOD contractors since 1964 are given in Appendix 7. The contractors included are estimated to account for more than 85% of all IR&D/B&P (and in earlier years OTE) expenditures recovered in DOD contracts. It must be noted that many changes have taken place that make trend comparisons difficult. For example: (1) A requirement for reporting burdened dollars was introduced (this did not take place at one time and the actual figures for a number of years are a mixture of burdened and unburdened dollars); (2) the base of contractors reported on changed from year to year (while a large number of companies are in the base through the entire time period, the remaining part of the data base varies considerably from year to year); (3) the DCAA current rules for companies to be reported is different in the last years than in the initial years; (4) OTE costs reported separately in earlier years have in later years been included for the most part in IR&D reporting.

From Appendix 7 it will be noted that for 1974, 90 major defense contractors incurred total costs of $1,694 million. Through advance agreements with the larger contractors and by application of a formula for others, the DOD considered as "acceptable", cost of $1,405 million. Since these contractors also have non-DOD contracts, the DOD portion, allocated on the basis of sales, was $808 million, about 57% of the total acceptable. It should be emphasized that under the present DOD policy, essentially all of these expenditures, $779 million out of the $808 million, were covered by advance agreements. The comparable figures for IR&D only were $445 million out of $457 million.

I.R. & D./B. & P.—THE TASK FORCE APPRAISAL

The need for independent technical effort in contractors' organizations

Every successful organization must have the ability to survive in the competitive market place. This applies to the U.S. Government in its continuing effort to maintain a world leadership role, to provide for the Nation's security, and to satisfy the needs of its citizens. The U.S. Government provides a framework within which elements of its society can operate but leaves much of the actual responsibility for meeting these needs to the private market place. The necessary continuing technical advances therefore, result principally from the individual initiative of those interested in and having a responsibility for education, research, development, production and provision of services. From long experience, we have found that the most innovative and productive ideas stem from grass roots initiatives by those individuals and organizations that recognize and understand what needs to be done and what can be done.

All organizations, and especially those whose continuing success is dependent upon more advanced technologies, must carry out research and development in order to remain aware of and to make advances in the state of the art, generate

new products or new techniques to meet ever-changing needs, reduce costs, etc. In other words, they must remain competitive. This applies to universities in generating new knowledge and in training students, to Government laboratories in fulfilling their commitments to their respective agencies, and to industry in supplying products and services for both the public and private sectors.

R&D of the highest quality is necessary for the preservation of our National security since we must be prepared to cope with potential adversaries who continue to demonstrate their full commitment to advanced and ever-improving military systems. The question is how best to obtain the nceessary R&D to satisfy U.S. needs. A part of the answer is that we must take advantage of all possibilities, ranging from that which is controlled and directed by the customer, i.e., the Government, to that which encourages the greatest possible independence and initiative by the supplier.

Virtually everyone the Task Force talked to, as well as the Task Force members themselves, believe tht IR&D/B&P plays a role in meeting DoD needs that is at least highly important if not absolutely necessary. Yet it is clear from the history of IR&D and the voluminous documentation made available to the Task Force that IR&D has been almost continuously subject to serious challenge. The challenges have usually been about one or another aspect of the procedures for handling IR&D and how independent it should be rather than whether or not IR&D should exist. Since, however, there did not seem to be anything seriously wrong with existing procedures, the Task Force came to the conclusion that the real trouble may lie in the lack of a generally-agreed upon, or perhaps understood, rationale for IR&D for which a consistent set of procedures could be applied. It became clear that without agreement on why DoD supports IR&D and what it hopes to accomplish by so doing, the misunderstandings would remain.

The Task Force, therefore, discussed this problem at some length and has defined a rationale which it believes goes to the heart of the issue.

A rationale for I.R. & D./B. & P.

The two fundamental questions concerning Government support of I.R. & D./B. & P. are:

Why should the Government reimburse expenditures for I.R. & D./B. & P.?

If there are sound reasons for such reimbursement, what rules should be used to allocate the funds available for it among competing claimants?

The answers commonly given to the first question include objectives such as to increase knowledge, to improve technology, to explore and test innovative ideas and concepts, to retain key staff, etc. These are all worthy objectives and they contribute to the health of the defense community. Since they are generally stated in industry-benefiting terms, the questions naturally arises: Since they are beneficial to industry, why shouldn't companies use their "own money' to pay for them rather than expecting the Government to do so? And, even if beneficial to industry, what makes them beneficial to the Government?

The answer commonly given to the second question generally takes the form of a statement that work of this sort is a necessary cost of a firm's doing business, and, therefore, should be paid for by any customer—including the Government. While this is valid, under the present method for reimbursing I.R. & D./B. & P. expenditures confusion arises since the Government seems to be paying the costs of preparing for and acquiring future work as part of the expense of current, sometimes unrelated contracts. This raises questions such as: Why should the Government invest in a company's future work? And how can the Government be sure that they money invested is actually spent in work from which it can benefit?

Why should the Government support I.R. & D./B. & P.?

The Government has decided as a matter of National policy that the Department of Defense and other Government agencies should rely primarily on competition to select sources for developing and producing its military hardware and providing them with needed services. The Task Force believes that this policy is fundamentally sound. Competitive procurement, whether of a formal or informal nature, will in the long run be more efficient and economical, result in higher quality, and be more flexibility responsive to DoD's changing needs.

This policy has a price, however. The price includes assuring the continued existence of sufficient number of organizations qualified to meet DoD needs so that a truly competitive environment can exist. Furthermore, these organizations must be sufficiently staffed with qualified and knowledgeable people that they can do the jobs required. The cost of conducting the actual competitions must

also be met. To the private organizations involved in the competitions, this cost is the expense of preparing quality proposals, with all the underlying technical and administrative activities that such proposals require. To the Government, the cost is that of informing industry of its needs, managing the competition, evaluating the proposals and selecting the performer. These costs are not small. They are, in fact, substantial; but they are considered to be more than justified by the savings accruing to the Government from effective competition as well as technology growth inherent from such competition.

Since the ultimate benefits of such competition accrue to the Government, it is the Government which must pay for the cost of them. Part of such cost is what is commonly called IR&D/B&P—the technical activities of the competitive companies including research, development, design, demonstration, proposal writing, etc., i.e., all those activities required for them to engage in real competition. As a result, such activities might better be described as Competitive Technical Effort—CTE.

Thus, the answer to the first fundamental question—why the Government should reimburse the costs of IR&D/B&P—is that it must do so to help gain the benefits of competition, benefits which are the essence of a free enterprise system. It should be emphasized that if the Government is unwilling to pay in some fashion for the price of such competition, then the competitive atmosphere will weaken as some organizations withdraw from the arena and others cease to make significant investments in the competition, thereby resulting in proposals that are inadequately supported or technically unimaginative. In either case, the DoD would be left in a position in which it would not have real choices, but would have to make its source selections on the basis of less appropriate criteria, such as, for example, whose turn is next.

DOD like the AEC and NASA does, of course, satisfy some of its needs through the use of organizations which are essentially "chosen instruments" in various areas, selected to compete for specific programs and paid to do so as a part of their contractual relationships with the Government. These include in-house laboratories, GOCO (Government-owned contractor-operated) organizations and FCRC's (federal contract research centers). But, while important to DOD and other Government agencies to be able to provide this type of tailored competition for special needs, this approach is not the solution to their obtaining the vast bulk of the goods and services they need annually.

How should the Government pay for competitive technical effort?

A private contractor must have made an investment in CTE for him to have obtained a competitive contract. The Government should, therefore, permit the contractor to recover prior CTE costs as a part of each such contract. The Government should recognize that CTE costs are company-initiated costs, made under company control for the purpose of being able to satisfy Government needs in a competitive manner. The Government should also recognize that it is really compensating a contractor for his investment only if he has been successful in obtaining a contract. In fact, it should be clear that the Government will reimburse only successful contractors and not those whose prior CTE was not good enough to satisfy some Government need.

Successful competitors will wish to use CTE monies recovered on contracts in a variety of ways, all being investments in the future, that is, directed at increasing the contractor's ability to obtain new contracts. The choices are up to them. It is also up to them to decide what contracts—and, in fact, what customers—they wish to go after, and to decide how to allocate the money in their various CTE activities. They can invest more if they are hopeful that this will pay off; they can invest less if they are pessimistic. The essential point is that recovered CTE monies provide an opportunity to invest in ways determined by the company to enable it to engage effectively in valid competitions.

If a company is successful on the average in competitions, such investments will pay off; if a company is unsuccessful on the average, CTE investments will fail to pay off. "On the average" is stressed because, to stay in business, contractors must recover their CTE costs on unsuccessful as well as on successful bids. If, for example, the Government would like three bidders on the average, then the average contractor will achieve one success out of three tries and must recover CTE costs expended on the two failures as well as CTE costs related to his one success.

With the exceptions noted in the following discussion, the present DoD procedures for reimbursing CTE costs are believed to recognize the factors discussed in the previous paragraphs.

Possible procedures

Having established that CTE is the price that the Government must pay to maintain competitive sources of supply and that the payments should be considered as reimbursements for past expenditures, there remains the problem of how to size, allocate, and control Government CTE reimbursements.

The simplest and most ideal solution to this problem is also the one most consistent with the stated philosophy—successful contractors would be allowed to recover CTE costs through charges to overhead up to a maximum determined by a simple formula.

The formula would be determined at the highest level in DOD, probably by the IR&D Policy Council, and would be based on a considered, periodic judgment of the needed level of competitive activity. Allocation among contractors would be based primarily on this formula but deviations therefrom deemed desirable by contract negotiators would be possible as a result of review by appropriate authority. Such deviations might recognize magnitude of total contractor effort, unusual year to year fluctuations or other special circumstances.

Since reimbursements would be for past independent technical activities (which were, by definition, successful or the contractor would have no contracts against which to recover them), there could be little question of relevancy, or content, or quality. Thus, no IR&D planning documents would be required and no technical evaluations of such plans would be called for. New CTE activities would be truly independent and contractors would recover their costs only if they ultimately bore fruit in new contracts. Normal pressures on contractors to find out what the DOD wants and to tell DOD of their capabilities would be depended on to force the needed information interchange.

The question arises: Suppose the contractor, for whatever reasons, does not apply his new CTE in a fashion that leads to effective competition for new Government work? There are two answers to this question. The first is that it is really his money; and if he wastes it, it is his mistake. The second is that, if he wastes it, he will fail to win future contracts, his contract level will fall and the DOD reimbursement for CTE will likewise fall. In the long run, the system would thus be self-correcting.

The Task Force does not, however, recommend that DOD embrace this ideal CTE procedure completely, despite its attractive consistency and simplicity. The Task Force recognizes the special nature of the DOD's relationship with its major contractors and hence that IR&D/B&P reimbursements in a given case do not always result as fully and directly from competitive technical effort as ideally envisioned. It also recognizes the Government's duty to oversee the expenditure of taxpayer money, even if such oversight reduces effectiveness and increases costs to some extent; and it is aware of the existence of a considerable body of pertinent law, regulations and precedent. Most importantly, the Task Force recognizes that there are varying degrees of competition involved in DOD procurements. Competition covers a broad spectrum from formal price competitions for commercial shelf-items at one extreme, through informal competitions for design ideas and capabilities, to chosen instruments of long duration at the other extreme. These variations in competition and the differing degrees of cost control consciousness that these variations may invoke, need to be recognized and dealt with, even at the expense of some increase in the complexity of IR&D/B&P procedures.

Finally, the Task Force recognizes that DOD has a need to keep close track of the CTE process, in order both to assure itself that CTE is playing its proper role in the larger matter of maintaining DOD's competitive sources of supply and to provide informed judgment to future CTE policy decisions.

The Task Force had neither the time nor sufficient detailed knowledge to conduct an adequate study of the procedural aspects of the problem. It, therefore, presents the suggested procedure more as an illustration of what it believes is needed than as a definite set of recommendations. The Task Force suggests a simplified version of the existing DOD procedure along the following lines:

1. The contractor-determined CTE overhead charge should be accepted where competition and continuing cost consciousness can be clearly demonstrated, i.e., where cost centers are dominated by competitive, firm, fixed-price contracts either Government or non-Government. The goal should be to remove as many contractors from more detailed consideration as is reasonable based on an adequate competition/cost conscious environment. The criterion ought therefore to be easily understood and readily accepted as opposed to covering all possible special circumstances.

2. Where this situation does not exist, contractors (cost centers) should be divided into two classes:

a. Small (DOD reimbursed CTE less than $2.0 million)—use a formula set by the IR&D Policy Council. Exceptions either up or down would be allowed with justification and appropriate approval.

b. Large (DOD reimbursed CTE greater than $2.0 million)—negotiate a dollar ceiling, consistent with standards developed and promulgated by the IR&D Policy Council.

3. Technical reviews should be kept to a reasonable level. Company brochures should be kept simple and used primarily for conveying information; and overhead costs associated with present reviews, which are probably too high for both government and contractors, should be reduced. The Task Force also believes that visits to contractors should be primarily to review past and on-going activities rather than future plans and that visiting groups should be made up primarily of those government people who are working in the fields to be covered and who want to go for their own information. Finally, the Task Force believes that reliable evaluations of quality are unlikely to result from the limited time that government scientists can apply to the review of brochures or to quick visits and therefore questions the desirability of computing an evaluation score to be used in negotiating the CTE level. The self-correcting nature of the overall system, as mentioned above, seems to be the best guarantee of quality.

4. The Task Force understands that, however undesirable it may be, the law requires a test for "a potential relationship to a military function or operation" and that it is therefore not within the discretion of the DOD to omit such a test. Further, the Task Force notes that Service procurement managers are all understandably tempted to lock in their suppliers to their own interests when they can. The Task Force believes that the DOD should resist this temptation and take a broad view of the Government interest. As a result, the DOD definition of relevancy should be clearly stated—and the instructions, procedures and forms used designed—to assure that the test is at least DOD-wide and not limited to the parochial interests of reviewing specialists. Furthermore, narrow interpretations should be avoided by contract officers.

5. The IR&D Policy Council should play a strong role in determining CTE policy, establishing the relationship of IR&D/B&P to the defense environment, setting formulas, and in reviewing overall results. Such a role is needed to assure proper DOD awareness and control of this large and important Government investment.

Alternate Recovery Methods

The Task Force was asked to consider alternate methods for reimbursing or financing CTE (IR&D/B&P). It concluded that the present procedure of reimbursement as an item of indirect expense should be continued.[1] Alternate methods considered included funding as a direct cost, from profits, and through tax credits. Comments on these rejected alternatives follow:

Direct cost reimbursement places CTE in the same category as direct research contracting and subjects it to all of the same judgments and controls at the many Government levels involved. In short, all of the advantages of *independence* in R&D are lost without any compensating benefits.

Financing from profits would provide the independence sought for CTE, namely, complete company control. One difficulty is that present fee structures would have to be revised significantly upwards to allow for the necessary CTE funding (perhaps 3–5% after taxes). An upward revision of fee structure does not seem likely. A second difficulty is that the Government and Indsutry under the present arrangement conduct a considerable amount of technical interchange. This might be diluted under complete company control and result in limitations on the dissemination of technology.

From time to time there have been proposals to permit IR&D-type costs to be recovered in whole or part as *tax credits*. IR&D cost recovery is only part of larger program of tax credit incentive problems which must be solved. Since the tax credit route would probably not eliminate some test of reasonableness which is also necessary under the overhead allocation procedure, the latter is preferable.

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[1] Toward the end of its work, the Task Force was made aware of the GAO's list of 14 possible alternatives. In the opinion of the Task Force, these are not independent alternatives but variations within the categories that had already been considered.

CONCLUSIONS AND RECOMMENDATIONS

General

The Task Force concurs in the policy that requires the Department of Defense to rely primarily on competition to select sources for developing and producing its military hardware and for providing it with needed services. Therefore, the conclusions and recommendations which follow address the question of how best to maintain a highly competitive industry, especially in fields of advanced technology that are of greater importance to the military than to the civilian market.

The Task Force believes that the Government should encourage a strong contractor Competitive Technical Effort—CTE (IR&D/B&P). At the same time, it recognizes that CTE is but one aspect, albeit an important one, of the large and complicated question of establishing and maintaining a competitive industry to serve DoD needs. The Task Force warns against attempting to solve the whole problem through control of CTE, an attempt that is not only unlikely to succeed but may lessen the contribution CTE itself may make.

The present system of implementation by the DoD is generally satisfactory. The following recommendations are made in part to emphasize various important features of CTE and in part to propose improvements such as administrative simplification, greater reliance on market place type controls, greater decision authority remaining with performers, etc.

Conclusion I.—The major benefits from IR&D are derived principally from the "I", namely, the independence of choice and execution by the contractor.

Direct contracting (including grants) for research and development is most useful when end objectives or fields of research are clearly specified. Government specialists then play an important role in selection and direction. The selection process is complex and the response time, which must include budgetary consideration and planning, is long. Direct contracting will and should remain the principal method for controlling the major allocation of R&D resources. With the wide variety of projects to be accomplished, different performers can be employed as appropriate, e.g., academic, not-for-profit, Government in-house, and industrial institutions.

The benefits from Independent R&D stem principally from the contractor's flexibility in decision making and execution of the work. Those with the deepest technical involvement are encouraged to innovate. Research and development decisions as to what, how, who and when are made where the work is done. Immediate judgments by peers permit more rapid and imaginative responses.

Additionally, the present procurement process depends heavily on guaranteed success, that is, previous extensive R&D, testing, evaluation, etc. Exploratory and conceptual research, component development and early testing through IR&D provide a better base from which DoD decisions for follow-on R&D or fabrication contract effort can be made.

All in all, IR&D is a major component of the contractor's Competitive Technical Effort. It provides him with both the expertise and knowledge with which to respond promptly and responsively as well as to propose new innovative concepts.

Recommendation 1

Competitive Technical Effort (CTE), independently conducted by a contractor, must be accepted as an essential component in the maintenance of a competitive industrial base response to DoD needs.

Recommendation 2

CTE must be considered in conjunction with direct contract/grant R&D and in-house R&D; each has a role to play in maintaining the Nation's technological base and capability.

Conclusion II.—CTE (IR&D/B&P) is a legitimate cost of doing business and is logically an overhead expense.

All organizations, especially those engaged in advanced technology programs, must support strong programs of CTE. It is a cost of remaining competitive and must be recovered either as a reimbursable cost or, if not allowable, from profits.

Recovery from profit would certainly provide the independence sought for CTE, namely, complete company control. The difficulty is that the present DoD fee structure would have to be revised upwards to allow for the necessary CTE funding (perhaps 3–5% after taxes) if gross profits from Government work were not to drop below present levels; such upward revision of fee structure does not seem likely. Yet to remain in business, a company must be profitable, and if it finds doing business with DoD is not profitable it will seek other customers where it can remain profitable.

Treating CTE as a direct cost places it in the same category as direct research contracting and subjects it to all of the same Governmental judgments and controls while losing all of the advantages of independence.

In the final analysis, CTE is an incurred cost having a bearing on the company's (or cost center's) total effort especially as that effort influences its future business. Since such work is not necessarily associated directly with an on-going product line, it should be expensed as an overhead cost and distributed in accordance with accepted accounting principles.

Recommendation 3.

Treatment of CTE expense, including burden but not G&A, as an overhead cost element should be continued.

Conclusion III.—The treatment of CTE expense and the test for reasonableness should be closely coupled to commercial practice and as free from technical audit judgment as possible.

Given that CTE is a necessary business expense, the question then centers on how much CTE is necessary. When buying a commercial product at a catalogue or shelf price, the amount of CTE expense included is not in question since it is included in the total price arrived at through market place forces. For a firm fixed price contract based on competition, the element of CTE expense is also in the firm fixed price and is therefore subject to cost control. The question of "how much" arises when the contract negotiated is sole source or cost-type and the Government negotiator is looking for a test of reasonableness.

Since the Task Force recommends that CTE be treated as an overhead expense, the problem is then one of negotiating and acceptable overhead allowance of which CTE is but one component. The present DoD-SPR system recognizes this and also that CTE deserves special attention, especially for the larger contractors. Thus for a CTE annual cost of less than $20 million per contractor, general overhead negotiating principles are followed with formula guidance on CTE for the negotiator. For contractors with larger CTE expense, dollar limits based on technical quality and relevancy tests are negotiated in advance.

Experience to date indicates that most high-technology defense contractors find it desirable if not necessary to spend more for CTE than the Government is prepared to reimburse. While this factor must be taken into account in the evaluation of reasonableness, it would be unrealistic to expect full reimbursement of CTE costs in those instances where there are few, if any, marker controls on those costs.

The Task Force recognizes that many advantages are to be gained through simplification of the tests for reasonableness. This could be automatically accomplished by making as much procurement as possible competitive firm fixed price. Next, where strong and continuing competitive cost pressures exist on a company's allocation of its own resources, the company's own decisions can be utilized for negotiated Government contracts as well. In short, every effort should be made to accept the pressures of competition and continuing cost consciousness as automatic tests for reasonableness where they exist.

In an earlier section of this report, entitled "Possible Procedures", the Task Force has offered a suggested procedure which in its opinion would provice for simplification, greater independence for some contractors, controls for DoD in the most sensitive areas, and exchange of technical information.

Recommendation 4

The DoD should employ to the greatest extent possible competitive market place controls over contractor IR&D/B&P (CTE) and less judgmental pre and post audit-type controls. In doing so, subjective tests for reasonableness would be replaced where applicable by objective criteria, as illustrated by the CWAS concept.

Recommendation 5

The DoD IR&D Policy Council should exert greater control at the policy level, reviewing CTE trends and needs, establishing guidance for reimbursement and implementation, etc. This effort should concentrate on minimizing the number of negotiated agreements, in providing crisp guidance and procedures to shorten the negotiating periods for advance agreements and in expediting implementation at the field level. Negotiators should be encouraged to refer unusual situations to the Service Policy Councils for specific guidance.

Conclusions IV.—Government controls on CTE in the absence of direct and continuing market pressures on contractor costs should seek to achieve an optimum balance between protecting the Government's interest and encouraging the greatest freedom in the exercise of the CTE resource.

The principal Government controls in effect today are on those contractors whose CTE expense is in excess of $2.0 million. The requirement for an advance agreement based on technical quality, potential military relationship and reasonableness consumes considerable effort on the part of both contractor and Government and does impact on the contractor's independence in pursuing his R&D program. On the other hand, some exchange of technical information at he planning stage and at appropriate achievement stages is beneficial to both parties.

The Task Force finds that benefits from the technical reviews accrue to the Government through exchange of information and in the early disclosure of new directions and results. Similarly, the company benefits from guidance on priorities, duplications and evaluations. The Task Force believes, however, that industry's application of CTE is best influenced by DoD through DoD's making known its future needs and intentions and not by judging in advance what CTE should be done to satisfy these needs. Therefore, current procedures may entail greater than necessary effort. More attention should be paid to the technical interests of those who participate. Review teams should be composed of those who will really contribute and benefit from such exchanges.

IR&D, almost by definition, should not be subject to a relevancy test. If, however, relevancy tests continue to be required, the Task Force fails to see why single agency relevancy should be applied, when the Government as a whole should benefit if possible from IR&D conducted by all Government contractors. Therefore, tests for relevancy, if necessary, should be general tests made by those who have a broad appreciation of relationships rather than by those seeking contributions to narrowly defined objectives.

Recommendation 6.

Relevancy requirements ultimately should be eliminated in their entirety or, as a minimum, the narrow agency relevancy requirement be broadened to one of Government-wide relevancy. In the meantime, DoD should reduce the internal tendency to be more restrictive than the agency-wide intent of the law.

Recommendation 7.

Effective technical exchanges between the contractor and appropriate DoD personnel are important and should continue to be encouraged, but not for the purpose of prejudging IR&D programs.

Conclusion V.—All agencies of the Government should support CTE to the extent that the contractors involved are a part of a pool of competitive suppliers.

The purpose of a contractor's CTE is to permit him to supply, and the Government to obtain, the best product possible in terms of performance and cost. Since such competition is of benefit to the Government, the policies and procedures applied should be as consistent Governmentwide as is possible. It is recognized that for various reasons there may be valid agency to agency differences. Thus, while the Task Force believes that there should be uniformity in the treatment of CTE among agencies having similar objectives and relationships with their suppliers, it sees the necessity for a clear understanding of the role CTE plays in helping a particular agency to accomplish its objectives and to maintain its supplier relationships before such uniformity is mandated. In any case, creating a central agency to administer CTE will not help.

Recommendation 8.

Where other Government agencies rely on competitive sources in a manner similar to DoD, DoD should encourage CTE policies and procedures that recognize CTE as a necessary business expense.

Appendix 1

Office of the Director of Defense Research and Engineering,
Washington, D.C., April 12, 1974.

Memorandum for: The Chairman, Defense Science Board.
Subject: Chapter of DSB Task Force on IR&D.

The letter of 8 November 1973 requested assistance from the DSB in the study of IR&D. As a result of several activities that are underway both in DoD and industry, it now seems clear that the prime thrust of the DSB effort should be the identification and examination of alterntive ways to accomplish the various IR&D/B&P objectives, both government and industry.

Several studies currently under way, namely the GAO study and the Tri-Association Industry study, are primarily concerned with improved administra-

tion of the current DoD approach to IR&D/B&P allowance. There are many who believe that the current statutes and regulations concerning IR&D/B&P are so constrictive that a fundamental change in the policy may be necessary to preserve the independence and the innovation of the effort. Some hold the view that the single approach to the allowance of IR&D/B&P has never completely satisfied the sometimes conflicting objectives both of government and industry.

I am, therefore, requesting that the DSB Task Force effort be aimed primarily at a reassessment of the fundamentals concerning IR&D/B&P. It should address but not necessarily limit its work to the following tasks.

1. Identify the various objectives and uses of IR&D/B&P both from the government and from the industry viewpoints and assess the criticality of each objective and use. Included would be objectives, such as

Increasing the base of fundamental knowledge;

Advancing the technology of current product areas;

Advancing the technology of future product areas;

Retaining key technical and scientific talent;

Identifying, exploring and developing innovative components/subsystems/systems;

Initiating innovative and responsive proposals.

2. Identify alternative means for satisfying each objective as developed under task 1. These could include the usual techniques of overhead allowance and profit allowance but could also consider other means such as contracts, grants, competitively funded continuing concept studies, etc.

3. Set forth and assess the pros and cons of various alternatives and recommend possible modus operandi for achieving the most important objectives as concluded under the task 1 assessment.

The Task Force should seek inputs from a broad spectrum of government and industry being particularly careful to recognize the possible differences in objectives between government and industry and between companies of different size and product.

The Task Force should target its efforts for completion and presentation to the DDRE by 1 September 1974.

ROBERT N. PARKER,
Principal Deputy.

APPENDIX 2

DSB I.R. & D. TASK FORCE MEMBERSHIP

Members

Dr. Gerald F. Tape, President, Associated Universities, Inc.

Dr. John D. Baldeschwieler, Chairman, Division of Chemistry and Chemical Engineering, California Institute of Technology.

Lt. Gen. Austin W. Betts, USA (Ret) Vice President for Operations Southwest Research Institute.

Dr. Raymond Bisplinghoff, Chancellor, University of Missouri.

Dr. Joseph V. Charyk, President, Communications Satellite Corporation.

Lt. Gen. Robert E. Coffin, USA (Ret) (Private Consultant).

Mr. Robert R. Everett, President, The MITRE Corporation.

Dr. Robert G. Loewy, Vice President-Provost, Rensselaer Polytechnic Institute.

Dr. Walter Orr Roberts, Director, Aspen Institute for Humanistic Studies.

Dr. O. G. Villard, Jr., Senior Scientific Advisor, Stanford Research Institute.

Government Representative

Mr. James W. Roach, Assistant Director (Engineering Policy), Office, Director of Defense Research and Engineering.

APPENDIX 3

DEFINITIONS

To avoid misunderstanding, the definitions used by the Task Force are those developed by DoD as follows:

Independent Research & Development (I.R. & D.)

A contractor's independent research and development effort (IR&D) is that technical effort which is not sponsored by, or required in performance of, a contract or grant and which consists of projects falling within the following three areas: (i) basic and applied research, (ii) development, and (iii) systems and other concept formulation studies. IR&D effort shall not include technical effort ex-

pended in the development and preparation of technical data specifically to support the submission of a bid or proposal. (ASPR 15-205.35).

Bid & Proposal (B. & P.) Expense

Bid and proposal (B&P) costs are the costs incurred in preparing, submitting, and supporting bids and proposals (whether or not solicited) on potential government or non-government contracts which fall within the following:

(A) Administrative costs including the cost of the nontechnical effort for the physical preparation of the technical proposal documents and also the cost of the technical and nontechnical effort for the preparation and publication of the cost data and other administrative data necessary to support the contractor's bids and proposals, and

(B) Technical costs incurred to specifically support a contractor's bid or proposal, including the costs of system and concept formulation studies and the development of engineering and production engineering data. (ASPR 15-205.3).

Relevancy

The requirement that IR&D work for which payment is received through overhead recovery on DoD contracts must have a potential relationship to a military function or operation. (Public Law 91-441, Section 203).

APPENDIX 4

MAJOR DOD I.R. & D. POLICY AND IMPLEMENTATION FEATURES

Policy

1. Use individually negotiated advance agreements for the control and reimbursement of these costs for large defense contractors (approx. 100). Such agreements, after a formalized detailed technical review of the proposed IR&D program, will establish a separate dollar ceiling for the DoD's reimbursement of each of these costs, but allowing the contractor to combine the individual amounts into a single pool if he chooses; and requiring the contractor to burden these costs as he would for a contract, except that G&A would not be added. The requirements to negotiate a timely advance agreement will be enforced by automatically establishing a low threshold for recovery of these costs where no advance agreement exists.

2. Use the DoD developed formula for control and determination of reasonableness of these costs for the remaining large number of smaller companies who recover IR&D or B&P. This will provide a workable, uniform system that can be uniformally applied and easily adjusted as needed.

3. That technical review and evaluation of contractors' IR&D programs, as currently established under DoD Instruction 5100.66 be strengthened and that detailed review and evaluation procedures be established and made uniform throughout the DoD. The system will require both the review of a company's individual IR&D projects as submitted at the time of the advance agreement and will be supplemented by periodic technical reviews of the contractor's ongoing IR&D programs at his facility. In addition, a data bank will be established to provide a centralized body of IR&D project information. This information will be available to the DoD technical community at large.

4. That each of the Military Departments formally recognize the need to increase the support and resources needed to effectively perform the required IR&D technical reviews and evaluations by establishing a specific line item in the Management and Support Category of their RDT&E Program to support this technical review and evaluation effort.

5. That the Department of Defense continue its present policy of not acquiring rights to technical data and patents arising from industries' IR&D programs.

GENERAL IMPLEMENTATION FEATURES

1. For major contracts involving IR&D/B&P annual expense of over $2 million, advance agreements are negotiated. These agreements are based on technical quality, relevancy to DoD needs, and reasonableness. Costs include cost center burden but no general and administrative (G&A) expense since the allowed IR&D/B&P is finally treated as a G&A cost.

2. For all other contracts no advance agreement is necessary, but in negotiating overhead allowances, a formula for control and determination of reasonableness is used. No test for relevancy is applied nor are technical reviews carried out.

3. Technical reviews encompass a review of the IR&D technical plan at the time of negotiation of the advance agreement and periodic on-site reviews of ongoing IR&D programs.

4. Acquisition of rights to technical data and patents arising from IR&D programs is not required.

TRI-ASSOCIATION STUDY OF I.R. & D./B. & P.

PRINCIPLES AND RECOMMENDATIONS

As the subject of IR&D and B&P is undoubtedly headed for continued debate in the Congress again this year, it is important that this study of the industry position on IR&D and B&P be clearly understood. A number of points have become evident during the course of this examination of the subject. Some of these points are more properly defined as statements of principles; others are more appropriately presented as specific recommendations.

Let us first consider those points which constitute a *statement of principles* on the industry position on IR&D and B&P:

1. The Congress and all Government agencies should understand and fully recognize in their actions the vital nature of IR&D and B&P in support of our national interests. Relative to programs of key national importance, these activities play a major role in advancing the technological capabilities of those industries most directly involved in support of the Government. Examination of the benefits of these activities suggests that a substantial part of many technological advances that have resulted in the US position of world leadership in defense and space have had their genesis in IR&D.

2. The right of industry to exercise management discretion on the content and amount of IR&D and B&P should not be abridged by arbitrary laws or regulations. It is essential that each company be able to evaluate the needs of the future in light of its own special capabilities and product interests. This is not only basic to the continued development of vigorous competition in a strong industrial base, but also provide the most prolific generation of new technology and concepts to address problems of major significance to the Nation. Rather than consideration of means to control and constrain the scope of IR&D and B&P efforts, the Government should be jealously guarding the "independent" aspect to avoid the loss of great ideas.

3. The Government should be motivated to encourage industry to increase IR&D and resulting B&P effort. In view of the need for increased effort for the US to stay in the lead in the competition between nations, and the major source of technological innovation represented by IR&D and B&P, it seems obvious that they should not be allowed to decrease. Yet in the past five years, the level of effort expended on IR&D and B&P has decreased. The increased dollar expenditures have not been sufficient to maintain real effort in terms of man-hours. This point should be understood, and preoccupation with misleading cost data, which has not been normalized to account for Government-directed changes to financial reporting method, including applications of burden to IR&D and B&P, should be avoided. The international challenge is great; this is the time to increase IR&D and B&P in terms of real effort to help meet the challenge, not the time for further retrenchment.

4. The Government should not seek ownership free rights in industry patents or inventions resulting from IR&D. This issue has been raised within the Government on numerous occasions, in the past, and is a further indication that the nature of IR&D and B&P is not understood. It should be recognized that these efforts are company initiated and company funded within the indirect costs of doing business. *The Government acceptance of its share of these costs appropriately allocated to Government contracts is no different than any other customer's payment of these costs included in the purchase price of a company's products or services.* As any other customer, the Government benefits from improved products or services resulting from inventions conceived during IR&D. Equity demands the company retain title to its own inventions and patents.

5. A common policy and practice of independence and allowability of IR&D and B&P which recognizes their true nature as essential business costs should be employed by all Government departments and agencies. The restrictive regulations currently issued should be appropriately modified.

6. Congress should recognize that IR&D and B&P costs are not "commodities to be purchased," but rather are normal "costs of doing business." As such, they are appropriately allocated to all products and services, and are included in the purchase price. On Government contracts, industry is required to negotiate burden rates. In the process, all indirect costs are reviewed and judgments are made as to the reasonableness of these costs. Legislation which singles out IR&D and B&P costs for undue scrutiny at the Congressional level implies that these

efforts are "commodities to be purchased or not" and jeopardize a company's ability to plan and manage its total business activities.

7. The basic difference between IR&D and B&P should be clearly recognized. IR&D efforts are primarily exploratory in nature, are directed toward the advancement of technology, are aimed at future needs, and are subject to continual evaluation to determine if adequate progress is being made or if a new or different approach is needed. By way of contrast, B&P efforts are directed toward a specific set of requirements, are aimed at present needs, and are primarily concerned with thoroughly explaining that the company has already developed its expertise and technological capability to a sufficient degree to assure success. A company's proposal must demonstrate a complete understanding of all technical problems, to the point of describing therein a substantially finished design of a viable version of the system to be furnished, and discussion of the merits of the chosen design versus possible alternatives. Associated technical efforts range from studies, computer modeling and design calculations to, in many cases, the construction of prototypes. Also involved in the B&P effort is the actual preparation of proposals, engaging in presentations and negotiations, and otherwise responding to the requirements of the procuring agency. This effort is often difficult and sometimes impossible to forecast since companies are responding to evolving Government statements of need. Clearly, IR&D and B&P efforts should not be lumped together and treated as the same kind of effort simply because the same or similar technical experts of a company are called on to support each of them. They are different in purpose and are performed for very different reasons. IR&D effort can be reasonably well planned while B&P effort is much more difficult to forecast since it must be responsive to customer requirements.

Having stated these principles, and recognizing that the present method for handling IR&D and B&P costs does not fully conform to these principles, there are several specific *recommendations* that seem appropriate:

1. The requirement for potential military relationship in Public Law 91-441 should be eliminated as unworkable. Defense-related technology does not exist in isolation, but is part of the main stream of knowledge generally described as the national technology base. Relevancy tests are fundamentally incompatible with the nature of IR&D and B&P and invite hindsight judgments. If such tests must be included in legislation, they should appear only in the broadest context and be expressed in terms of the totality of potential US Government needs.

2. The requirement for establishing ceilings on IR&D and B&P costs should be eliminated because it is in basic conflict with stated Government objectives to encourage competition and maintain a strong industrial capability.

3. Line items should *not* be established in any agency budgets for funding IR&D and B&P costs as though these efforts were commodities to be priced. These are indirect costs, part of industry overhead, and as such are appropriately included in product or contract estimates.

4. A new Government agency responsible for operational aspects of IR&D and B&P should *not* be established. Rather all Government agencies should follow a common policy and practice for IR&D and B&P which recognizes their true nature.

5. Congress, in the national interest, should specifically express positive support for IR&D and B&P and correct the current motivation to continually reduce this effort.

6. In considering "alternative methods" of funding IR&D and B&P, it should be remembered that IR&D and B&P are indirect business expenses and should be fully reimbursed. In summary, full cost recovery of IR&D and B&P would place the US Government on an equal footing with all other customers. Anything less than full reimbursement of these costs, in effect, is a subsidization of the Government by American industry.

Appendix 6

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APPENDIX 7

COSTS AND TRENDS DATA, STATISTICS RELATING TO I.R. & D., B. & P., AND OTE FOR MAJOR DEFENSE CONTRACTORS

[Dollar amounts in millions]

	1964	1965	1966	1967	1968	1969	1970	1971 [1]	1972 [2]	1973 [3]	1974 [4]
Sales:											
Total Government and commercial	$23,470	$24,054	$28,438	$34,167	$36,954	$36,430	$32,519	$32,065	$30,577	$37,635	$40,405
Total DOD only	$16,442	$15,644	$17,889	$21,371	$22,275	$22,692	$21,315	$19,568	$19,117	$21,148	$21,690
Percent DOD sales to total sales	70	65	63	63	61	62	65	61	63	56	54
I.R. & D.:											
Total industry cost incurred	$419	$439	$502	$591	$752	$808	$753	$703	$936	$1,164	$1,148
Total reimbursed on DOD contracts	$199	$198	$224	$277	$333	$389	$376	$354	$392	$441	$457
Amount reimbursed on DOD contracts:											
As a percent of total incurred	47	45	45	47	44	48	50	50	42	38	40
As a percent of DOD sales	1.21	1.26	1.25	1.30	1.46	1.73	1.76	1.86	2.05	2.09	2.17
B. & P.:											
Total industry cost incurred	$252	$277	$315	$338	$387	$426	$414	$428	$469	$553	$546
Total reimbursed on DOD contracts	$182	$186	$202	$230	$275	$286	$278	$265	$306	$360	$351
Amount reimbursed on DOD contracts:											
As a percent of total incurred	72	67	64	68	71	67	67	62	65	65	64
As a percent of DOD sales	1.11	1.19	1.13	1.08	1.23	1.26	1.30	1.35	1.60	1.70	1.62
OTE:											
Total industry cost incurred	$182	$237	$238	$292	$252	$178	$151	0	0	0	0
Total reimbursed on DOD contracts	$71	$76	$91	$92	$77	$79	$60	0	0	0	0
Amount reimbursed on DOD contracts:											
As a percent of total incurred	39	32	38	32	31	44	40	----	----	----	----
As a percent of DOD sales	.43	.49	.51	.43	.35	.35	.28	----	----	----	----
Grand total:											
I.R. & D., B. & P., OTE incurred	$853	$953	$1,055	$1,221	$1,391	$1,412	$1,318	$1,131	$1,405	$1,717	$1,694
Total reimbursed by DOD	$452	$460	$517	$599	$685	$754	$714	$619	$698	$801	$808
Amount reimbursed by DOD:											
As a percent of total incurred	53	48	49	49	49	53	54	55	50	47	48
As a percent of DOD sales	2.75	2.94	2.89	2.80	3.07	3.32	3.35	3.16	3.65	3.79	3.73
Total incurred as a percent of total sales	3.63	3.96	3.71	3.57	3.76	3.88	4.05	3.52	4.59	4.56	4.19

[1] The data represents that for 84 contractors comprising 175 profit centers. The cost principles in ASPR have been revised to include in their definitions of I.R. & D. and B. & P. certain technical costs not previously included. These changes have become effective and therefore separate data for these other technical effort will not be included in this and subsequent reports.

[2] The data represents that for 77 contractors comprising 167 profit centers. $32,000,000 of the costs is burden applied to I.R. & D. and B. & P. for the 1st time by those contractors who had not previously burdened I.R. & D/B. & P. & 13,800,000 is the amount of I.R. & D/B. & P. applicable to foreign military sales reimbursed to the DOD.

[3] The data represents that for 83 contractors comprising 182 profit centers. Included in the data are sales of $1,027,300,000 to foreign governments placed under DOD contracts but reimbursed to DOD by such foreign governments. The applicable I.R. & D./B. & P. recovered in these sales is $38,200,000. $55,000,000 in the data represents burden applied to I.R. & D./B. & P. by the last of those contractors implementing the overhead requirement of DPC 90 dated Sept. 1, 1971.

[4] The data represents that for 90 contractors comprising 236 profit centers—an increase of 7 contractors and 54 profit centers due primarily to the addition of contractors with advanced agreement who previously were below audit thresholds. Included are the foreign Government sales of $1,353,500,000 with $42,000,000 of applicable I.R. & D./B. & P. allocable to these sales. There was little or no impact due to increased burdening in 1974 because full implementation of burdening as required by DPC 90 was completed by most contractors in 1973.

Source: Annual DCAA report, "Summary of I.R. & D. and B. & P. Costs Incurred by Major Defense Contractors"

Appendix 8

Contributors to DSB/I.R. & D. Panel

Dr. John L. Allen, Office, Director of Defense Research & Engineering, OSD.
Mr. Joseph Beardwood, Electronic Signal Processing, Inc.
Dr. Frank Brand, Microwave Associates, Inc.
Dr. Albert Brodzinsky, Naval Research Laboratory.
Mr. James Carpenter, National Science Foundation.
Mr. William Carry, Dalmo Victor.
Mr. James Conway, The Perkin-Elmer Corporation.
Mr. S. DeFillippo, Tech Operations, Inc.
Dr. Richard DiBona, Microwave Associates, Inc.
Dr. Robert Fossum, ESL, Inc.
Mr. Osmund F. Fundingsland, General Accounting Office.
Mr. Elliott B. Harwood, the Boeing Company.
Mr. Jack S. Heinbaugh, General Accounting Office.
Mr. Max Heller, Tri-Association (NSIA/EIA/AIA).
Mr. Richard E. Horner, E. F. Johnson Company.
Mrs. Carol S. Ann Hubert, Electronic Signal Processing, Inc.
Dr. D. A. Linden, Dalmo Victor.
Mr. Arthur D. Little, Dalmo Victor.
Mr. James Lovett, Tri-Association (NSIA/EIA/AIA).
Mr. Neal Mackey, National Aeronautics and Space Administration.
Dr. William J. McCune, Polaroid.
Mr. James O'Brien, ESL, Inc.
Mr. Thomas Pawnall, Tri-Association (NSIA/EIA/AIA).
Mr. Harold H. Rubin, General Accounting Office.
Dr. Roderick Scott, the Perkin-Elmer Corporation.
Mr. Charles Trell, Atomic Energy Commission.
Mr. Robert Walsh, Small Business Administration.

Proposed Executive Branch position for Recommendation B–10 of the Report of the Commission on Government Procurement

I. STATEMENT OF RECOMMENDATION

COGP recommendation B–10 appears on page 31 of Volume 2 of the COGP Report. The recommendation is as follows:

Recommendation of the Majority.—Recognize in cost allowability principles that independent research and development (IR&D) and bid and proposal (B&P) expenditures are in the Nation's best interests to promote competition (both domestically and internationally), to advance technology, and to foster economic growth. Establish a policy recognizing IR&D and B&P efforts as necessary costs of doing business and provide that:

(*a*) IR&D and B&P should receive uniform treatment, Government-wide, *with exceptions treated by the Office of Federal Procurement Policy (OFPP).*

(*b*) Contractor cost centers with 50 percent or more fixed-price Government contracts and sales or commercial products and services should have IR&D and B&P accepted as an overhead item without question as to amount. Reasonableness of costs for other contractors should be determined by the present DoD formula with individual ceilings for IR&D and B&P *negotiated and trade-offs between the two accounts permitted.*

(*c*) Contractor cost centers with more than 50 percent cost-type contracts should be subject to a relevancy requirement of a potential relationship to the agency function or operation in the opinion of the head of the agency. No relevancy restriction should be applied to the other contractors.

There were two dissents to this recommendation:

Dissenting Position 1.—Recognize in cost allowability principles that IR&D and bid and proposal expenditures are in the Nation's best interests to promote competition (both domestically and internationally), to advance technology, and to foster economic growth. Establish a policy recognizing IR&D and B&P efforts as necessary costs of doing business and provide that:

(*a*) IR&D and B&P should receive uniform treatment, Government-wide, with exceptions treated by the Office of Federal Procurement Policy.

(*b*) Allowable projects should have a potential relationship to an agency function or operation in the opinion of the agency head. (These will be determined in the negotiation of advance agreements with contractors who received more than $2 million in IR&D and B&P payments during their preceding fiscal year.)

(c) Agency procurement authorization and appropriation requests should be accompanied by an explanation as to criteria established by the agency head for such allowances as well as the amount of allowances for the past year.

(d) A provision should be established whereby the Government would have sufficient access to the contractor's records for its commercial business to enable a determination that IR&D and B&P costs are allowable.

(e) In all other cases, the present DoD procedures of a historical formula for reasonableness should be continued.

(f) Nothing in these provisions shall preclude a direct contract arrangement for specific R&D projects proposed by a contractor.

Dissenting Position 2. One Commissioner believes that in addition to the prime and dissenting recommendations advanced above, additional mechanisms exists which if explored adequately may offer reasonably acceptable solutions to the IR&D dilemma.

II. PROPOSED EXECUTIVE BRANCH POSITION

The following represent the position of the majority of the Interagency Committee. The AEC member did not fully agree and his dissenting position paper is attached.

(a) It is recommended that the Executive Branch adopt as its standard the policy and procedures presently established in ASPR 15–205.3. (Bid and Proposal Costs) and 15–205.35 (IR&D Costs), with the exception that the relevancy requirement be broadened to encompass Government-wide relevancy with the ASPR and Public Law 91–441, Section 203 amended accordingly.

(b) This policy would be a satisfactory standard for Government-wide use where dealing with a competitive industrial base.

(c) It is further recommended that both the Majority Recommendation and Dissenting Position 1 be considered unacceptable as currently proposed.

(d) It is also recommended that the OFPP be recognized as the authority for the review and authorization of exceptions to the uniform Government-wide IR&D/B&P policy and procedures. The OFPP should also initiate, at an appropriate time, studies of those concepts of Dissenting Position 2 that appear sufficiently viable to be considered in depth.

(e) Consideration should be given to application of the CWAS to ASPR Paragraphs 15–205.35 and 205.3 and to the Executive Branch document which implements, Government-wide, the policies and procedures proposed in paragraph II. a. above.

III. BACKGROUND

In the course of preparing this report the committee discussed at length the features of the majority and two minority recommendations. The various members contributed drafts and discussion papers prepared in coordination with other individuals in their agencies responsible for policy matters and these, too, were discussed by the committee. The chairman of the committee made a presentation to the IR&D Policy Council of the Department of Defense and the views expressed by the Council members were also included with the committee's considerations.

IV. FINDINGS

(a) *Industry R. & D. expenditure comparisions*

The committee does not take issue with the factual discussion of background history included in the commission report following recommendation 10. However, we question the validity of the comparison between DoD contractors and other industries which is presented in figure 6 on page 38 of the report. Our review of the source data for this chart leads us to suspect that the figures calculated for drugs, electronics, etc. contain a broader spectrum of R&D costs than that included in the DoD figure. The fact that the chemical, computer, electronics and drug industries spend significant sums on R&D is not disputed, but the validity of the comparision to defense expenditures is questionable. The portion of sales dollars reported as R&D expenditures in those industries probably represents all R&D expenditures in those industries. In the defense industry, substantial additional dollars of R&D effort are directly supported by contract or are included in B&P expense. If these dollars were included in the computation, the defense industry expenditures for R&D would be much closer to those of the other industries.

(b) *Procurement commission philosophy*

In its discussion and recommendation, the Commission's report accepts present practices and concepts about IR&D and concerns itself primarily with examining the degree of control exercised by the Government. This approach is also followed in the first dissenting position. The second dissent, however, attempts to take a new look at the IR&D problem and find a new solution. The majority recommendation and Dissent 1 accept the premise that IR&D/B&P efforts are in the Nation's best interests to promote competition, advance technology and foster economic growth. Both recognize IR&D/B&P costs as necessary costs of doing business in a high technology environment.

(c) *Use of contractor weighted average share (CWAS)*

It would appear that the Majority Recommendation and the discussion supporting it would include all fixed-price contracts in the CWAS computation at the same weight regardless of whether the contracts were firm fixed-price or a form of fixed price which provides for adjustment to reflect actual costs incurred. These flexibly priced contracts include most of the fixed-price defense contract dollars. Such an approach to CNAS computation would eliminate control over 85 percent of all major defense contractors. Since these major contractors expend over 85% of all IR&D/B&P recovered through DoD contracts, application of a 50% "CWAS" rule under such circumstances would not provide what is considered an acceptable level of control over the amounts expended for IR&D. A review of 167 divisions or operating groups of 77 major defense contractors reveals that, based on 1972 sales and the apparent approach of the Majority Recommendation, 65 contractors (122 divisions or operating groups) would not have been subject to any limitations. This would have increased DoD costs by $110 million over those actually paid in 1972.

Alternatively, if the intent of the Commission was to use the concept of CWAS as it is presently implemented in ASPR, but merely lower to 50% the automatic acceptance threshold, the committee found that insufficient data exists to determine what impact such action would have on the number of IR&D evaluations and negotiations. Both the laborious data collection and CWAS rating calculation requirements and the number of non-CWAS applicable cost principles have worked against the wide spread use of CWAS. Therefore, few major contractors have had sufficient incentive to become CWAS qualified.

(d) *Relevancy requirements*

Relevancy is seen as an attempt to gain assurance that the indirect effort supported by Government agencies, through reimbursement of allocable share of the cost of those efforts, are of benefit to the agencies. This puts added weight on close tie-in to projects of current interest to the agencies and increases the preference for projects with prospects for reasonably prompt payback. It undoubtedly has caused DoD to classify as nonrelevant some IR&D projects which will lead to products that will be used at a later date for military functions or operations. So far, statistics indicate that DoD has judged only a very small portion of IR&D proposed projects nonrelevant. Nevertheless, sufficient anomalies exist that it must be upsetting to a company to learn that such things as satellite air traffic control, earth resources, advanced deep space communications and planetary probe technology are not relevant to a military function or operation. It must have startled the aerospace company that was told that its space shuttle-related work was not relevant. The requirement for IR&D to be relevant to an agency's area of specific interest (defense, nuclear energy, environmental protection, etc.) is presently included in the policies of two agencies, the Department of Defense, and the Atomic Energy Commission. In the case of AEC, the requirement is self-imposed and the policy requires that IR&D relate to the specific work of a contract before it can be allowed as a cost of that contract. In the DoD case, the requirement is imposed by legislation and requires that the IR&D have a potential relationship to a military function or operation in order to be allowed.

The legislation imposing a relevancy requirement on the DoD seems to result from the belief that it is unreasonable to use fuuds appropriated for defense to support R&D in other areas, and a congressional concern that the DoD would use IR&D to foster research in areas where it should not be operating, for example, in behavior control. This cautious attitude is understandable, but does not reflect a complete understanding of the subject.

The concept that funds appropriated for defense needs should be limited to defense type items overlooks the fact that the operation of the defense establish-

ment involves far more than the purchase and use of weapons. The DoD is a major employer of people, both military and civilian. Its inventory includes a wide variety of real and personal property. It purchases and uses thousands of items found on the civilian market from nuts and bolts to family dwellings. Under these circumstances, it is difficult to find anything not potentially relevant to a military function or operation.

The DoD implementation has been publication of a guideline which excludes, as nonrelevant, items DoD is legally precluded from funding, items for which DoD has little or no use, and items for which other agencies have primary responsibility. Notwithstanding these guidelines, which may be more restrictive than the law requires, the few nonrelevant items that have been identified have had no appreciable effect on the dollars of IR&D allowed by the DoD. This may be partly attributed to the fact that defense contractors are reluctant to undertake projects for which costs cannot be recovered, or it may simply mean that the relevancy review is a costly administrative exercise that produces no meaningful result. It is not possible to determine the full impact of the relevancy requirement on defense contractors' IR&D programs. If there were no such restriction, it seems certain that some contractors would be looking toward other fields as defense business phases down. They probably would be considering IR&D projects in these areas. This could be of great value to the Nation.

Defense contractors lead in many areas of technology. They are virtually the only industry group with extensive experience in developing, building and putting into service, large systems. They have the manpower and facilities necessary to do such work. With this background, they might make substantial contributions to resolving such national problems as public transportation, the energy shortage, pollution and the like. However, if they are not able to do IR&D work in these areas, they may have great difficulty interesting state, local and Federal agencies as well as other customers in placing contracts with them for this type of work. Thus, it appears that strict requirements for relevancy works against the best interest of the Nation by prohibiting the development of needed technology by those most capable of development of such technology.

(*e*) *I.R. & D./B. & P. and the AEC*

Over 80% of AEC expenditures are in its Government-owned, contractor-operated (GOCO) laboratories and enrichment plants. AEC directs all activities of these organizations. IR&D/B&P costs, as such as defined by DoD, are nonexistent at GOCO plants because the R&D program of the GOCO laboratory or plant is totally directed and reimbursed by AEC and is not independent in the usual definition of the term. The preparation of budget proposals for operation from year to year are reimbursable costs borne solely by the AEC as direct contract costs

For work not performed in GOCO plants independent research and development (IR&D) and bid and proposal (B&P) costs in 1972 represented 1.8% of AEC's contract costs whereas the DoD reported 3.65% as its costs for that year.

V. CONCLUSIONS

(*a*) *Relevancy requirement*

The relevancy requirement erodes independence and tends to conform the mix of R&D projects to the present short term interests of a company's current customers. As such, it inhibits diversification and development of innovative new products. The reaction of contractors to strict adherence to agency mission relevancy requirements can only be to conform and thus relinquish some degree of independence in structuring their IR&D programs. Further, IR&D relevancy to a single agency's mission limits a contractor's ability to reorient programs to new national needs and is contrary to the best interest of the idividual agencies and of the Nation since IR&D is one of the prime vehicles for technological transfer from one application to another. In summary, it is the view of the majority of the Committee that the legislative requirement for relevancy which has been placed on the DoD is vague in concept, difficult to administer, and works against the best interests of the Nation.

(*b*) *Excessive control over small contractors*

The majority of the Commission recommended negotiated ceilings for IR&D/B&P with all contractors whose sales under cost-type Government contracts

exceeded 50%. A number of small contractors would be included in this group. The administrative cost to these small contractors and to the Government would far exceed the benefit from negotiating ceilings for these companies. The Committee concluded that determination of a reasonable level for IR&D/B&P for small contractors should be in the form of a formula but with access to negotiation at the contractor's request. This is the current provision in the ASPR.

(c) Formula determination and negotiated ceilings

The majority recommendation provides that "Reasonableness of costs for other contractors should be determined by the present DoD formula with individual ceilings for IR&D and B&P negotiated . . ." This would appear to require negotiation as well as use of the formula to determine a ceiling for a single contractor. This would not be appropriate. Any policy requiring use of the formula as a guide would effectively eliminate most of the negotiation range. For major defense contractors many factors other than sales and IR&D/B&P expenditures should be considered.

(d) I.R. & D. and the AEC

The Committee majority agrees with the AEC that IR&D/B&P is inappropriate for their GOCO laboratory/plant contractors who are serving under long-term, renewable contracts. The operating contractor who has had a long-term contractual relationship with the AEC has not had to expand IR&D to maintain or advance his technological base in order to retain his contractual relationship. At the same time, the majority of the Committee believes that, when AEC contracts for work to be performed by competitive industry in those companies' own facilities, the AEC should follow the same cost allowance practices as the other Federal agencies.

(e) Reasonableness determination and technical evaluation

The COGP recommendation concerning the determination of reasonableness for major (over $2 million IR&D/B&P) contractors with CWAS ratings under 50% does not in the Committee's view provide either an acceptable level of control over the amount expended for IR&D/B&P or an acceptable level of technical dialogue between peers within Government and industry. The present ASPR provision for negotiation of major contractors' levels of IR&D/B&P expenditures would appear to offer a more equitable approach than the automatic application of a universal formula. Similarly, the current technical evaluation of IR&D plans and progress of these major contractors offers technical benefits to both Government and industry.

(f) Government-wide uniformity of treatment of I.R. & D./B. & P.

It is the Committee's conclusion that Government-wide uniformity in the treatment of the costs of IR&D/B&P would assure equitable treatment of all contractors to the Government regardless of the contracting agency. Further, providing for necessary agency exception appeal through the Office of Federal Procurement Policy would permit any needed Executive Branch flexibility but at an appropriate policy level.

(g) Annual criteria for I.R. & D./B. & P. allowance

The Committee believed that the proposed requirement of Dissent 1 regarding the forwarding with the agency budget request of the agency's annual criteria for the allowance of IR&D/B&P establishes a non-uniformity of Government-wide IR&D/B&P policy and procedure which is inconsistent with paragraph (a) of the Dissent. Further, the Committee felt that annual change in criteria of this nature by each agency would be catastrophic. It should be recognized that DoD who has been heavily and continuously involved in the development and refinement of equitable policy and procedures for IR&D/B&P has made significant changes only in 1959 and in 1971 and then only after years of study and consultation with all parties involved.

(h) Annual reporting of I.R. & D./B. & P. allowances

DoD currently reports annually, through the Defense Contract Audit Agency (DCAA), the amount of allowances for the past year as proposed by Dissent 1, paragraph (c). The Committee felt that similar reporting requirements from other agencies might serve a useful purpose in analyzing the maintenance and growth of this aspect of the national technological base.

VI. MEMBERS OF THE INTERAGENCY COMMITTEE

C. E. DEARDORFF,
Chairman, Office of the Assistant Secretary of Defense.
JAMES W. ROACH,
Office of the Director, Defense Research and Engineering.
JOHN W. FORD, Jr.,
Department of the Navy.
JOHN H. LYNSKEY,
Headquarters, Air Force Systems Command.
HOWARD BOWERS,
Office of the Assistant Secretary of Defense.
JAMES E. CARPENTER,
National Science Foundation.
JOSEPH GARCIA,
National Aeronautics Space Administration.
ANDREW F. MASTRONARDY,
U.S. Atomic Energy Commission.
ROGER W. WALKER,
General Services Administration.
JOHN W. PAULACHAK,
Defense Contract Audit Agency.
DELBERT E. TRAEGER,
Defense Contract Administration Services.
JOHN E. WENGER, Jr.,
Environmental Protection Agency.

Attachment.

POSITION OF AEC MEMBER ON THE PROPOSED EXECUTIVE BRANCH POSITION FOR RECOMMENDATION B–10 OF THE REPORT OF THE COMMISSION ON GOVERNMENT PROCUREMENT

AEC has followed the policy of requiring a finding of direct or indirect benefit to the contract or to the AEC program by our technical staff before reimbursing IR&D/B&P costs respectively. This principle continues to be supported strongly by the AEC because it rests upon valid and reasonable grounds. Moreover, AEC does not subscribe to the CWAS approach since it necessarily avoids the benefit test.

The argument that all IR&D/B&P costs are of general benefit may have some merit where the procurements of an agency extend across almost the entire national economy. However, this is not true of AEC's procurements which are concentrated in a highly technical field. The AEC initially had a monopoly on the available information in the atomic energy field. It contracted directly for the research and development it considered necessary either in its GOCO facilities or under other contracts. There was little or no independent research and development in this field. Direct support of research and development has continued and been expanded over the years. Currently independent research and development costs in this field are primarily for civilian power applications, and it is felt that the commercial market should absorb the costs of such effort.

AEC work fits into a relatively narrow, cohesive and distinguishable range. This means that, as a practical matter, the existence of benefit to AEC contract work can be established rather simply. The benefit tests can be met for atomic work so long as a research or development project can be shown to be pointed toward increasing knowledge regarding atomic or atomic related matters.

It is attractive to say that undirected R&D leads to more imaginative and advanced work, that the Government should support such work, and that recognition of independent R&D in connection with Government contract work is a convenient way to do this. We do not agree that this is a desirable mechanism for AEC work. We have an adequate charter and precedent for support of advanced work through direct AEC contracts in response to presentation of ideas through unsolicited proposals. We have made continuing and wide use of this mechanism to encourage not only work of a basic nature but also work on the application of of advanced ideas. We feel that, with limited funds available, the country can get a better emphasis on utilization of people of competence in imaginative work through that mechanism than through funding a general

allocation of undirected R&D effort across the entire spectrum of AEC contractors without regard to the nature of the work and the competence of those performing the work.

The argument that IR&D is a necessary cost of doing business in today's environment and should be allocated to all contracts ignores the IR&D of those companies that do not have Government contracts. Such companies would never be reimbursed in whole or in part by the Government for their IR&D. We do not see why the performance of Government-sponsored R&D under contract should lead to the need in the company for more independent R&D by that company than they would find it desirable to support in the absence of the Government work. Quite to the contrary, it is usually the case that our R&D with an industrial concern acts to a substantial degree to place the company in a better position to do business than it would have enjoyed had we not supported R&D with it. To a very real extent, we have been helping out the nuclear energy industry with their needs for industrial R&D through the very device of Government R&D contracts which have helped to build and maintain the industry's capability for both further Government work and private work.

A major mission of the AEC has been the development of a competitive private nuclear industry. Industrial application of the peaceful uses of atomic energy is an ever-growing phenomenon and is leading to new industries, new products and new markets. It is also pertinent that the major investment in nuclear research and development leading to the successful development of this promising technology has been made by the Federal Government. Therefore, in addition to the usual reasons for industrial firms seeking Government contracts, contractors who do work under our research and development contracts improve their capacity to qualify for future business in the nuclear field.

AEC has a very active program of disseminating the technology and patents developed both in AEC laboratories and by other contractors in order to assure that industry has available for its use all unclassified technical information. Thus AEC sponsored research and development serves to assist industry to meet its needs for industrial research and development and to exploit the peaceful uses of the atom.

ANDREW F. MASTRONARDY,
U.S. Atomic Energy Commission.

Re 5100.66.

JANUARY 7, 1975.

DEPARTMENT OF DEFENSE INSTRUCTION

Subject: Establishment of Policy for, and Administration of, Independent Research and Development Programs (I.R. & D.).

Reference: (a) Armed Services Procurement Regulation (ASPR); (b) DoD Instruction 5100.66, subject as above, February 29, 1972 (hereby cancelled); (c) DoD Manual 7110.1–M, DoD Budget Guidance Manual, June 15, 1973, authorized by DoD Instruction 7110.1, August 23, 1968.

I. REISSUANCE AND PURPOSE

This Instruction reissues reference (b) to state the Department of Defense Policy for the recovery of the costs of contractors' IR&D programs; prescribes the role, mission, and composition of the Independent Research and Development (IR&D) Policy Council; assigns responsibilities; and outlines procedures for the administration of contractor Independent Research and Development (IR&D) programs, as defined and promulgated in reference (a). Reference (b) is hereby superseded and cancelled.

II. APPLICABILITY

The provisions of this Instruction apply to the elements of the Office of the Secretary of Defense and to the Military Departments.

III. DEFINITIONS

A. *The IR &D Policy Council* is an organization charged with developing, securing Secretary of Defense approval, and disseminating DoD policy and guidance essential to the administration of the DoD IR&D program, and related Bid and Proposal (B&P) activities.

B. *Relevant IR&D/B&P projects* are those that are considered to have a potential relationship to a military function or operation. Relevancy determination is part of the evaluation process.

C. *A Lead Department* is the Military Department responsible for arranging and conducting on-site reviews and for coordinating and summarizing technical evaluations of project descriptions in a contractor's IR&D technical plan.

IV. PRINCIPLES

A. IR&D/B&P is recognized by the DoD as a necessary cost of doing business particularly in a high technology environment. Through support, consistent with the cost principles established in reference (a), of contractor's IR&D/B&P programs, DoD seeks to:

1. Assure the creation of an environment which encourages development of innovative concepts for Defense systems and equipment which complement and broaden the spectrum of concepts developed internally to DoD.

2. Develop technical competence in two or more contractors who can then respond competitively to any one requirement DoD seeks from Industry.

3. Contribute as appropriate to the economic stability of its contractors by allowing each contractor the technical latitude to develop a broad base of technical products.

B. The basic purpose of the IR&D technical evaluation, and consequently the contractor technical plan, is to assist in the determination of IR&D projects' potential relationship to a military function or operation (PMR) and to assist in the evaluation of reasonableness and technical quality of the contractor IR&D program.

C. To assist the DoD Components in coordinating the DoD contract R&D and in-house-R&D programs with the IR&D program, a computer-based, IR&D data bank will be established at the Defense Documentation Center and will contain information on each IR&D project described in each contractor's IR&D technical plan. Personnel involved in planning and initiating new in-house or contract IR&D projects are strongly encouraged to query the IR&D Data Bank in order to be aware of similar efforts already underway through contractor IR&D.

D. The IR&D Data Bank is to be a centralized body of information useful in identifying what IR&D is being pursued by whom and for identifying the contacts in the performing organization for obtaining additional information. The Data Bank is not a real time reporting mechanism and it generally contains data only on those projects for which work has started.

E. Tri-Service participation in technical plan evaluation, on-site review and IR&D/B&P advance agreement prenegotiation is strongly encouraged in order to foster technical interchange and uniformity of treatment of contractors by the various DoD Components.

F. The objective of the on-site review is twofold: (1) to permit face to face technical dialogue between Government and Industry peers; and (2) to confirm, through on-site evaluation of a sample of the company's IR&D projects, the technical plan evaluation rating.

G. IR&D projects that lead to reduction in acquisition and support costs of defense systems and equipment shall be given the same consideration as is given to projects exploring the solution of critical performance deficiencies in our military capability.

V. RESPONSIBILITIES AND PROCEDURES

A. *The Director of Defense Research and Engineering (DDR&E)*, as Chairman of the IR&D Policy Council, shall be responsible for convening the Council and for taking such actions as may be appropriate in carrying out the mission of the Council in accordance with its Charter (enclosure 1).

B. *The Secretaries of the Military Departments* shall be responsible for the following:

1. *Evaluation of Project Descriptions.*—Evaluate the written descriptions of IR&D projects furnished by companies, and submit to lead Department either a written evaluation report of each company's submitted IR&D programs or a statement of the reason it was not evaluated. The lead Department shall verify that the overall evaluation has been sufficiently comprehensive to permit the formation of a reasonable conclusion concerning the technical quality of the con-

tractor's program. Further, the determination of potential relationship of IR&D projects to a military function or operation must consider enough projects that the dollar value of these projects equals or exceeds the dollar value of IR&D to be recovered in DoD contracts.

2. *On-Site Review of Projects.*—Conduct, when assigned lead Department responsibility, an on-site review at least once every 3 years of those companies with whom the Government negotiates advance agreements for IR&D.

C. *Defense Supply Agency,* shall establish, and maintain and operate through the Defense Documentation Center the IR&D Data Bank.

D. *IR &D Technical Evaluation Group*

1. *Membership*

(*a*) Each Military Department shall designate a Departmental IR&D Manager to carry out the functions set forth in VI.D.2.

(*b*) The DDR&E shall appoint a chairman who, with the three Departmental IR&D Managers, will constitute the IR&D Technical Evaluation Group.

2. *Responsibilities.*—The IR&D Technical Evaluation Group shall:

(*a*) Establish, subject to the approval of the IR&D Policy Council, criteria and methodology that will be used uniformly by the Military Departments for performing the technical evaluations and establishing quality ratings of company IR&D programs.

(*b*) Designate the lead Department for each company.

(*c*) Establish uniform procedures for debriefing companies whose IR&D programs have been reviewed.

(*d*) Provide guidance on the content and format for submitting companies' IR&D technical plans and on the conduct of onsite reviews.

(*e*) Establish a schedule for submission of cmpanies' IR&D technical plans.

(*f*) Establish procedures for providing the Defense Contract Administration Services with technical evaluations of company-submitted IR&D project descriptions to support their negotiation of advance agreements required by law.

(*g*) Establish, prior to the start of each calendar year, the annual schedule for on-site IR&D reviews.

(*h*) Establish procedures for providing the Department-designated negotiator with a technical evaluation of each IR&D program for use in determining the IR&D advance agreement with each company.

(*i*) Provide assistance to the contracting officers on an as needed basis in determining the relevance of B&P effort.

(*j*) Provide assistance to DCAA and contracting officers as requested in resolving costs classification questions involving IR&D and B&P.

(*k*) Establish the content and format of the IR&D Data Bank, subject to Policy Council approval.

E. *Departmental IR&D Managers' Responsibilities.*—Each Departmental IR&D Manager shall:

1. Designate the organizations within his Department that are responsible for evaluating each company's IR&D projects.

2. Ensure an effective evaluation of the company-submitted IR&D project descriptions.

3. Arrange for, and participate in, on-site IR&D reviews as required.

4. Assure the maintenance of an up-to-date distribution list for IR&D brochures.

F. *Funding for Technical Evaluations.* Each year the Military Departments shall submit, in their RDT&E budgets, estimates of the expenses required to support the technical evaluations of companies' IR&D programs. Details regarding the format for submittal shall be as prescribed in the DoD Budget Manual 7110.1–M (reference (c)).

VI. EFFECTIVE DATE AND IMPLEMENTATION

A. This Instruction is effective immediately.

B. Names of the Military Departments' IR&D Managers shall be forwarded to the Director, Defense Research and Engineering (DDR&E) within 30 days.

C. Two copies of implementing instructions shall be forwarded to the DDR&E within 60 days.

MALCOLM R. CURRIE,
Director of Defense Research and Engineering.

Charter of the DoD Independent Research and Development Policy Council

I. PURPOSE

This charter prescribes the mission, composition, and administration of the DoD Independent Research and Development (IR&D) Policy Council.

II. MISSION

The mission of the DoD IR&D Policy Council is to develop, secure Secretary of Defense approval, and disseminate DoD policy and guidance essential to the efficient administration of the DoD IR&D program, and related Bid and Proposal (B&P) activities. This policy and guidance shall encompass such facets of the program as: the proper level of DoD support required; an outline of the goals of IR&D and B&P; the mechanisms to be employed to increase or decrease the overall level of effort; guidance necessary to assure valid potential relevancy determinations; appropriate negotiation policies; and response to Congressional inquiries.

III. COMPOSITION

The members of the DoD IR&D Policy Council will be the Director of Defense Research and Engineering, who will serve as Chairman; the Assistant Secretaries of Defense (I&L) and (C); the Assistant Secretaries for (R&D) and (I&L) from the Army, the Navy, and the Air Force. A NASA representative and an AEC representative will participate as observers.

IV. OPERATION

A. The Director of Defense Research and Engineering will designate an individual to act as Secretary to the Council.

B. The Secretary to the Council will receive from members any items for discussion; prepare the agenda and minutes of each meeting; obtain the Chairman's approval of the agenda and minutes prior to issuance.

C. The Council will meet before the end of each calendar year for the purpose of establishing the IR&D/B&P objectives and guidelines for the next calendar year. Other meetings of the Council will be held at the call of the Chairman.

D. The Council may establish such ad hoc working groups as may be required for the accomplishment of matters which come before it.

E. The Council decisions will be implemented through official channels including that of the Technical Evaluation Group and its evaluation network.

V. DURATION

The Council will automatically terminate upon completion of its missisn or not later than 2 years following its date of reaffirmation in accordance with committee management directives.

VI. DATE OF REAFFIRMATION

January 1, 1975.

IR&D Policy Council

Dr. Malcom R. Currie, Chairman.

Mr. James W. Roach, Secretary.

OSD

Honorable A. I. Bennett (Dr)[1]
Assistant Secretary of Defense (I&L)
Rm 3E 808
The Pentagon

Mr. Dale R. Babione
OSD (I&L)
Rm 3E 760

Mr. Charles E. Deardorff
OSD (I&L)
Rm 3D 823 (Action Officer)

Honorable Terence E. McClary[1]
Assistant Secretary of Defense (Comp)
Rm 3E 854
The Pentagon

Mr. James Dietz (Action Officer)
Rm 3A 862

[1] Policy Council Members.

ARMY

Honorable Harold L. Brownman [1]
Assistant Secretary of the Army (I&L)
Rm 3E 606
The Pentagon

B/Gen Louis Rachmeler
Deputy for Materiel Acq
OASA(I&L)
Rm 3E 588

Mr. H. A. Stohlman (Action Officer)
Office of Assistant Secretary of the Army (I&L)
Rm 2# 569

Honorable [1]
Assistant Secretary of the Army (R&D)
Rm 3E 736
The Pentagon

Mr. Charles L. Poor
IASA(R&D)
RM 3E 390
The Pentagon
(Doesn't need to be on distr list)

Mr. Charles R. Woodside
OASA(R&D)
Rm 3D 390
The Pentagon

Mr. John Crellin, AMCRD–TE
Army Materiel Command
Rm 8549
5001 Eisenhower Avenue
Alexandria, Virginia 22314

NAVY

Honorable Jack L. Bowers [1]
Assistant Secretary of the Navy (I&L)
Room 266, Crystal Plaza #5
Washington, D.C. 20360

Honorable H. Tyler Marcy [1]
Assistant Secretary of the Navy (R&D)
Rm 4E 736
The Pentagon

Dr. Peter Waterman
OASN(R&D)
Rm 4E 741
The Pentagon

Dr. Elliot H. Weinberg
Office of Naval Research (Code 400)
Department of the Navy
Ballston Tower #1
800 N. Quincy Street
Arlington, Virginia 22217

Adm Kenneth Woodfin
Assistant Administrator for Procurement
NASA Headquarters
Washington, D.C. 20546

AIR FORCE

Honorable Frank A. Shrontz [1]
Assistant Secretary of the Air Force (I&L)
Rm 4E 856
The Pentagon

Dr. John Martin
Deputy Assistant Secretary (R&D)
Rm 4E 973
The Pentagon

Maj H. E. Bethel
AFRDM
Rm 4D 326
The Pentagon

Brig General Dewey K. K. Lowe
Deputy Chief of Staff Procurement & Production (PP)
Headquarters, AFSC
Andrews AFB
Washington, D.C. 20331

Capt William Lewandowski
Hq AFSC/DLXB
Andrews AFB
Washington, D.C. 20331

OBSERVERS

Mr. Vito J. Ciminello
Energy Research Development Administration
Rm C–279, Germantown
Washington, D.C. 20545

Mr. Albert Trakowski
Environmental Protection Agency
401 M. Street S.W. Rm 3100
Washington, D.C. 20460

IR&D Technical Evaluation Group

Mr. James W. Roach
Chairman

Mr. John W. Crellin
U.S. Army Materiel Command (AMCRD)
Room 8S49, 5001 Eisenhower Avenue
Alexandria, Virginia 22314

Dr. Elliot H. Weinberg
Office of Naval Research/Code 400A1
Ballston Tower #1, 800 North Quincy St.
Arlington, Virginia 22217

[1] Policy Council Members.

Mrs. Evelyn Richards (Alternate)
Office of Naval Research/Code 400A1
Ballston Tower #1, 800 North Qunicy St.
Arlington, Virginia 22217

Capt. William Lewandowski
Hq. AFSC/DLXB
Andrews Air Force Base
Washington, D.C. 20331

Dr. Ralph R. Nash
NASA Hq/Code RXI
Washington, D.C. 20546

MILITARY DEPARTMENT IR&D MANAGERS

Dr. Walter B. LaBerge
Assistant Secretary of the AF(R&D), SAFRD
Room 4E 968, The Pentagon

Major Howard E. Bethel
Department of the Air Force
Room 4D 326, The Pentagon

Mr. John W. Crellin
AMCRD, Room 8S49
(Address on this page)

RADM Merton D. Van Orden
Office of Naval Research
Ballston Tower #1, 800 North Quincy St.
Arlington, Virginia 22217

NEGOTIATORS

Mr. Charles E. Deardorff
OSD (I&L)
Room 3D 823, The Pentagon

Mr. Donn Aaby
Hq. AFSC PPEN
Andrews Air Force Base
Washington, D.C. 20331

Mr. Leonard Muse
Hq. Naval Materiel Command
NAVMAT 02D
632 Crystal Plaza 5
Washington, D.C. 20360

Mr. David F. Calder
AMC, Room 9N50
5001 Eisenhower Avenue
Alexandria, Virginia 22314

Mr. Clarence C. Milborne
NASA Hq/Code HP-2
Washington, D.C. 20546

AEC CONTACT

Dr. Ralph R. Boyer

CONTRACT COST PRINCIPLES AND PROCEDURES

* * * * * * *

15-204 APPLICATION OF PRINCIPLES AND PROCEDURES.

(a) Deviations from the cost principles in this Part 2 shall be processed in accordance with the procedures in 1-109.3.

(b) Costs shall be allowed to the extent that they are reasonable (see 15-201.3), allocable (see 15-201.4), and determined to be allowable in view of the other factors set forth in 15-201.2 and 15-205. These criteria apply to all of the selected items of cost which follow, notwithstanding that particular guidance is provided in connection with certain specific items for emphasis or clarity.

(c) Costs incurred as reimbursements or payments to a subcontractor under a cost-reimbursement, fixed-price incentive, or price redeterminable type subcontract of any tier above the first firm fixed-price or fixed price escalation subcontract are allowable to the extent that allowance is consistent with the Part of this Section XV which is appropriate to the subcontract involved. Thus, if the subcontract is for supplies, such costs are allowable to the extent that the subcontractor's costs would be allowable if this Part 2 were incorporated in the subcontract; if the subcontract is for construction, such costs are allowable to the extent that the subcontractor's costs would be allowable if Part 4 of this Section XV were incorporated in the subcontract. Similarly, costs incurred as payments under firm fixed-price of fixed price escalation subcontracts or modifications thereto, when cost analysis was performed pursuant to 3-807.10(b), shall be allowable only to the extent that the price was negotiated in accordance with the principles in 15-106.

(d) Selected items of cost are treated in 15–205. However, 15–205 does not cover every element of cost and every situation that might arise in a particular case. Failure to treat any item of cost in 15–205 is not intended to imply that it is either allowable or unallowable. With respect to all items, whether or not specifically covered, determination of allowability shall be based on the principles and standards set forth in this Part and, where appropriate, the treatment of similar or related selected items.

15–205 SELECTED COSTS

15–205.1 *Advertising Costs.* (a) (CWAS) Advertising costs mean the costs of advertising media and corollary administrative costs. Advertising media and corollary administrative costs. Advertising media include magazines, newspapers, radio and television programs, direct mail, trade papers, outdoor advertising, dealer cards and window displays, conventions, exhibits, free goods and samples, and the like.

(b)(CWAS) The only advertising costs allowable are those which are solely for (i) recruitment of personnel required for the performance by the contractor of obligations arising under the contract, when considered in conjunction with all other recruitment costs, as set forth in 15–205.33, (ii) the procurement of scarce items for the performance of the contract, or (iii) the disposal of scrap or surplus materials acquired in the performance of the contract. Costs of this nature, if incurred for more than one defense contract or for both defense work and other work of the contractor, are allowable to the extent that the principles in 15–201.3, 15–201.4, and 15–203 are observed.

(c)(CWAS–NA) Advertising costs other than those specified above are not allowable.

15–205.2 *Bad Debts.* (CWAS–NA) Bad debts, including losses (whether actual or estimated) arising from uncollectible customers' accounts and other claim related collections costs, and related legal costs, are unallowable.

15–205.3 *Bid and Proposed Costs.*

(a) *Definitions.*

(1) *Bid and proposal (B&P) costs* are the costs incurred in preparing, submitting, and supporting bids and proposals (whether or not solicited) on potential Government or non-Government contracts which fall within the following:

(A) *Administrative costs* including the cost of the nontechnical effort for the physical preparation of the technical proposal documents and also the cost of the technical and nontechnical effort for the preparation and publication of the cost data and other administrative data necessary to support the contractor's bids and proposals, and

(B) *Technical costs* incurred to specifically support a contractor's bid or proposal, including the costs of system and concept formulation studies and the development of engineering and production engineering data.

(2) *Company* as used in this paragraph includes all divisions, subsidiaries, and affiliates of the contractor under common control.

(b) *Composition of Costs.* B&P costs shall include not only all direct costs but also all allocable indirect costs except that general and administrative (G&A) costs shall not be considered allocable to B&P. Both direct and indirect costs shall be determined on the same basis as if each B&P project were under contract.

(c) *Allocation.* As a general rule, B&P costs shall be allocated to contracts on the same basis as the general and administrative expense grouping of the profit center (see 3–1003.3) in which such costs are incurred. However, where B&P costs clearly benefit other profit centers, or the entire company, such costs shall be allocated through the G&A of such other profit centers or through the corporate G&A, as appropriate. In those instances when allocation of B&P through the G&A base does not provide equitable cost allocation, the contracting officer may approve use of a different base. Where allowable B&P is established by advance agreement pursuant to (d)(2)(A) below, the advance agreement shall specify the allocation procedures.

(d) *Allowability.*

(1) B&P administrative costs, when not separately identified and classified as B&P costs in accordance with the contractor's normal accounting practice, are allowable in accordance with the general principles of this Part 2 and are not subject to (2) (A) and (B) below.

(2) All other B&P costs (including all technical costs and any administrative costs separately identified and classified as B&P costs in accordance with the

contractor's normal accounting practice) are allowable only in accordance with the following:

(A) *Companies Required to Negotiate Advance Agreements (CWASNA)*

(i) Any company which received payments, either as a prime contractor or subcontractor, in excess of $2 million from the DoD for IR&D and B&P in a fiscal year, is required to negotiate an advance agreement with the Government which establishes a ceiling for allowability of B&P costs for the following fiscal year. Computation of the amount of IR&D and B&P costs to determine whether the $2 million criterion was reached will include only those recoverable IR&D and B&P costs allocated during the company's previous fiscal year to all DoD prime contracts and subcontracts for which the submission and certification of cost or pricing data was required in accordance with Section 2306(f) of Title 10, United States Code. The computation shall include full burdening in the same manner as if the IR&D and B&P projects were contracted for except that G&A will not be applied.

(ii) When a company meets the criterion in (i) above, required advance agreements may be negotiated at the corporate level and/or with those profit centers (see 3-1003.3) which contract directly with the DoD and which in the preceding year allocated recoverable IR&D and B&P costs in excess of $250,000 including burdening as in (i) above, to DoD contracts and subcontracts for which the submission and certification of cost or pricing data was required in accordance with Section 2306(f) of Title 10, United States Code. When ceilings are negotiated for separate profit centers of the company, the allowability of B&P costs for any center which, in its previous fiscal year, allocated less than $250,000 of IR&D and B&P costs to such DoD contracts and subcontracts may be determined in accordance with (B) below.

(iii) Companies which meet the threshold in (i) above shall submit information to support their proposed B&P program in accordance with guidance furnished by the cognizant Tri-Service Departmental Office.

(iv) Ceilings are the maximum dollar amounts of total costs for B&P work that will be allowable for allocation to all work of that part of the company's operation covered by an advance agreement. Within the ceiling limitations contractors will not be required to share B&P costs. In negotiating a ceiling, in addition to other considerations, particular attention must be paid to such factors as:

A. The determination of the potential relationship of B&P projects to a military function or operation (see (v) below).

B. Comparison with previous year's programs including the level of the Government's participation.

C. Changes in the company business activities.

D. The extent to which the contractor's B&P program is well planned and managed.

(v) The total amount of B&P costs allocated to DoD contracts pursuant to this subparagraph (A) shall not exceed the total of expenditures for B&P projects with a potential relationship to a military function or operation. For contracts which do not provide for cost determinations on a historical basis, this requirement will be considered to have been met if the estimated B&P costs allocated to the contract do not exceed its proportionate share of the total estimated costs of B&P with a potential relationship to a military function or operation. B&P costs will be considered to satisfy the potential relationship requirement when the contractor can demonstrate that the effort under a proposed contract or grant would have a potential relationship to a military function or operation. The potential relationship of B&P will be determined by the contracting officer, and he will make the results of his determination available to the contractor.

(vi) No B&P costs shall be allowable if a company fails to initiate negotiations of a required advance agreement prior to the end of the fiscal year for which the agreement is required.

(vii) When negotiations are held with a company meeting the $2 million criterion or with separate profit centers (when negotiations are held at that level under (ii) above) and an advance agreement is not reached, payment for B&P costs is required to be reduced substantially below that which the company or profit center would otherwise have received. The amount of such reduced payment shall not exceed 75% of the amount which, in the opinion of the contracting officer, the company or profit center would be entitled to receive under an advance agreement. Written notification of the contracting officer's determination of a reduced amount shall be provided the contractor. In the event that an advance agreement is not reached prior to the end of the contractor's fiscal year for which such agreement is to apply, negotiations shall immediately be terminated and the contracting officer's determination of the reduced amount shall be furnished.

(viii) Contractors may appeal decisions of the contracting officer to reduce payments. Such appeal shall be filed with the contracting officer within 30 days of receipt of a decision. For the purpose of hearing and deciding such appeals, each Department will establish an appeals hearing group consisting of the following:

A. A representative to be designated by the Assistant Secretary (Installations and Logistics) or the Director, DSA, who shall be Chairman;

B. A representative to be designated by the Assistant Secretary (Research and Development), or ODDR&E in the case of DSA; and

C. A representative to be designated by the General Counsel, Judge Advocate General of the Department, or Counsel of DSA. Determinations of the appeals group shall be the final and conclusive determination of the Department of Defense.

(ix) Advance agreements negotiated shall include at least the following:

A. A separate dollar ceiling for B&P. However, provision shall be made permitting the company to recover costs for B&P above the negotiated ceiling, provided that recovery of IR&D costs (see 15–205.35) covered by the same agreement is decreased below its ceiling by a like amount.

B. A provision stating how B&P costs are to be allocated (see (c) above).

C. A statement that the costs for B&P work recoverable under contracts citing DoD funds subject to Section 203, P.L. 91–441 limitations shall not exceed (i) such contracts allocable share of the ceiling, and (ii) the total costs of the contractor's B&P determined to have a potential relationship to a military function or operation.

D. A statement that estimated costs or actual costs incurred, as appropriate, not in excess of the ceilings negotiated shall be used in the pricing of all contractual actions when negotiations are based on elements of cost and in final price determinations.

(x) Prior to the execution of an advance agreement, the B&P factor to be used for forward pricing and interim billing will be developed by and obtained from the cognizant central office of the Department responsible for negotiating B&P advance agreements. The B&P factor shall exclude estimated or actual costs for projects considered unrelated to a military function or operation.

(B) *Companies Not Required to Negotiate Advance Agreements (CWAS).* Allowable B&P costs for companies not required to negotiate advance agreements in accordance with (A) above shall be established by a formula, either on a company-wide basis or by profit centers, computed as follows:

(i) Determine the ratio of B&P costs to total sales (or other base acceptable to the contracting officer) for each of the preceding three years and average the two highest of these ratios; this average is the B&P historical ratio;

(ii) Compute the average annual B&P costs (hereafter called average), using the two highest of the preceding three years;

(iii) B&P costs for the center for the current year which are not in excess of the product of the center's actual total sales (or other accepted base) for the current year and the B&P historical ratio computed under (i) above (hereafter called product) shall be considered allowable only to the extent the product does not exceed 120% of the average. If the product is less than 80% of the average, costs up to 80% of the average shall be allowable.

(iv) Costs which are in excess of the ceiling computed in (iii) above are not allowable except where the ceiling computed for IR&D cost under 15–205.35 is reduced in an amount identical to the amount of any increase over the B&P ceiling computed in (iii) above. However, at the discretion of the contracting officer, an advance agreement may be negotiated when the contractor can demonstrate that the formula would produce a clearly inequitable cost recovery. The requirements of (d)(2)(A) above are not mandatory for such agreements.

15–205.4 *Bonding Costs.* (CWAS)

(a) Bonding costs arise when the Government requires assurance against financial loss to itself or others by reason of the act or default of the contractor. They arise also in instances where the contractor requires similar assurance. Included are such bonds as bid, performance, payment, advance payment, infringement, and fidelity bonds.

(b) Costs of bonding required pursuant to the terms of the contract are allowable.

(c) Costs of bonding required by the contractor in the general conduct of his business are allowable to the extent that such bonding is in accordance with sound business practice and the rates and premiums are reasonable under the circumstances.

15–205.5 *Civil and Defense Costs.*

(a) (CWAS) Civil defense costs are those incurred in planning for, and the protection of life and property against, the possible effects of enemy attack. Reasonable costs of civil defense measures (including costs in excess of normal plant protection costs, first-aid training and supplies, fire fighting training and equipment, posting of additional exit notices and directions, and other approved civil defense measures) undertaken on the contractor's premises pursuant to suggestions or requirements of civil defense authorities are allowable when allocated to all work of the contractor.

(b) (CWAS) Costs of capital assets under (a) above are allowable through depreciation in accordance with 15–205.9.

(c) (CWAS–NA) Contributions to local civil defense funds and projects are unallowable.

* * * * * * *

15–205.35 *Independent Research and Development Costs.*

(a) *Definitions.* A contractor's independent research and development effort (IR&D) is that technical effort which is not sponsored by, or required in per formance of, a contract or grant and which consists of projects falling within the following three areas: (i) basic and applied research, (ii) development, and (iii) systems and other concept formulation studies, IR&D effort shall not include technical effort expended in the development and preparation of technical data specifically to support the submission of a bid or proposal. For the purposes of this paragraph:

(1) *Basic research* is that research which is directed toward increase of knowledge in science. The primary aim of basic research is a fuller knowledge or understanding of the subject under study, rather than any practical application thereof.

(2) *Applied research* is that effort which (A) normally follows basic research, but may not be severable from the related basic research, (B) attempts to determine and exploit the potential of scientific discoveries or improvements in technology, materials, processes, methods, devices, or techniques, and (C) attempts to advance the state of the art. Applied research does not include efforts whose principal aim is design, development, or test of specific items or services to be considered for sale; these efforts are within the definition of the term "development," defined below.

(3) *Development* is the systematic use, under whatever name, of scientific and technical knowledge in the design, development, test, or evaluation of a potential new product or service (or of an improvement in an existing product or service) for the purpose of meeting specific performance requirements or objectives. Development shall include the functions of design engineering, prototyping, and engineering testing.

(4) *Systems and other concept formulation studies* are analyses and study efforts either related to specific IR&D efforts or directed toward the identification of desirable new systems, equipments or components, or desirable modifications and improvements to existing systems, equipments, or components.

(5) *Company* includes all divisions, subsidiaries, and affiliates of the contractor under common control.

(b) *Composition of Costs.* IR&D costs shall include not only all direct costs, but also all allocable indirect costs except that general and administrative costs shall not be considered allocable to IR&D. Both direct and indirect costs shall be determined on the same basis as if the IR&D project were under contract.

(c) *Allocation.* As a general rule, IR&D costs shall be allocated to contracts on the same basis as the general and administrative expense grouping of the profit center (see 3–1003.3) in which such costs are incurred. However, where IR&D costs clearly benefit other profit centers, or the entire company, such costs shall be allocated through the G&A of such other profit centers or through the corporate G&A, as appropriate. In those instances when allocation of IR&D through the G&A base does not provide equitable cost allocation, the contracting officer may approve use of a different base. Where allowable IR&D is established by advance agreement pursuant to (d)(1) below, the advance agreement shall specify the allocation procedures.

(d) *Allowability.* Except as provided in (e) below, costs for IR&D are allowable only in accordance with the following:

(1) *Companies Required to Negotiate Advance Agreements (CWAS-NA).*

(A) Any company which received payments, either as a prime contractor or subcontractor, in excess of $2 million from the DoD for IR&D and B&P in

a fiscal year, is required to negotiate an advance agreement with the Government which establishes a ceiling for allowability of IR&D costs for the following fiscal year. Computation of the amount of IR&D and B&P costs to determine whether the $2 million criterion was reached will include only those recoverable IR&D and B&P costs allocated during the company's previous fiscal year to all DoD prime contracts and subcontracts for which the submission and certification of cost or pricing data was required in accordance with Section 230(f) of Title 10, United States Code. The computation shall include full burdening in the same manner as if the IR&D and B&P projects were contracted for except that G&A will not be applied.

(B) When a company meets the criterion in (A) above, required advance agreements may be negotiated at the corporate level and/or with those profit centers (see 3-1003.3) which contract directly with the DoD and which in the preceding year allocated recoverable IR&D and B&P costs in excess of $250,000 including burdening as in (A) above, to DoD contracts and subcontracts for which the submission and certification of cost or pricing data was required in accordance with Section 2306(f) of Title 10, United States Code. When ceilings are negotiated for separate profit centers of the company, the allowability of IR&D costs for any center which, in its previous fiscal year, allocated less than $250,000 of IR&D and B&P costs to such DoD contracts and subcontracts may be determined in accordance with (d)(2) below.

(C) Companies which meet the threshold in (A) above shall submit technical and financial information to support their proposed IR&D program in accordance with guidance furnished by the Armed Services Research Specialists Committee. Results of the technical evaluation performed by the Armed Services Research Specialists Committee, including determination of potential relationship, will be made available to the contractor by the cognizant Department central office.

(D) Ceilings are the maximum dollar amounts of total costs for IR&D work that will be allowable for allocation to all work of that part of the company's operation covered by an advance agreement. Within the ceiling limitations contractors will not be required to share IR&D costs. In negotiating a ceiling, in addition to other considerations, particular attention must be paid to such factors as:

(i) The technical evaluation of the Armed Services Research Specialists Committee including the potential relationship of IR&D projects to a military function or operation.

(ii) Comparison with previous year's programs including the level of the Government's participation.

(iii) Changes in the Company's business activities.

(E) The total amount of IR&D costs allocated to DoD contracts pursuant to this subparagraph (1) shall not exceed the total of expenditures for IR&D projects with a potential relationship to a military function or operation. For contracts which do not provide for cost determinations on a historical basis, this requirement will be considered to have been met if the estimated IR&D costs allocated to the contract do not exceed its proportionate share of the total estimated costs of IR&D with a potential relationship to a military function or operation.

(F) No IR&D costs shall be allowable if a company fails to initiate negotiation of a required advance agreement prior to the end of the fiscal year for which the agreement is required.

(G) When negotiations are held with a company meeting the $2 million criterion or with separate profit centers (when negotiations are held at that level under (B) above) and an advance agreement is not reached, payment for IR&D costs is required to be reduced substantially below that which the company or profit center would otherwise have received. The amount of such reduced payment shall not exceed 75% of the amount which, in the opinion of the contracting officer, the company or profit center would be entitled to receive under an advance agreement. Written notification of the contracting officer's determination of a reduced amount shall be provided the contractor. In the event that an advance agreement is not reached prior to the end of the contractor's fiscal year for which such agreement is to apply, negotiations shall immediately be terminated and the contracting officer's determination of the reduced amount shall be furnished.

(H) Contractors may appeal decisions of the contracting officer to reduce payments. Such appeal shall be filed with that contracting officer within 30 days of receipt of a decision. For the purpose of hearing and deciding such appeals, each department will establish an appeals hearing group consisting of the following:

(i) A representative to be designated by the Assistant Secretary (Installations and Logistics) or the Director, DSA, who shall be Chairman;

(ii) A representative to be designated by the Assistant Secretary (Research and Development) or ODDR&E in the case of DSA; and

(iii) A representative to be designated by the General Counsel, Judge Advocate General of the Department or Counsel of DSA. Determinations of the appeals group shall be the final and conclusive determination of the Department of Defense.

(I) Advance agreements negotiated shall include at least the following:

(i) A separate dollar ceiling for IR&D. However, provision shall be made permitting the contractor to recover costs for IR&D above the negotiated ceiling, provided that recovery of B&P costs covered by the same agreement is decreased below its ceiling by a like amount.

(ii) A provision stating how IR&D costs are to be allocated (see (c) above).

(iii) A statement that the costs for IR&D work recoverable under contracts citing DoD funds subject to Section 203, P.L. 91-441 limitations shall not exceed A such contracts' allocable share of the ceiling, and B the total costs of the contractor's IR&D determined to have a potential relationship to a military function or operation.

(iv) A statement that estimated costs or actual costs incurred, as appropriate, not in excess of the ceilings negotiated shall be used in the pricing of all contractual actions when negotiations are based on elements of cost and in final price determinations.

(J) Prior to the execution of an advance agreement, the IR&D factor to be used for forward pricing and interim billing will be developed by and obtained from the cognizant central office of the Department responsible for negotiating IR&D advance agreements. The IR&D factor shall exclude estimated or actual costs for projects considered unrelated to a military function or operation.

(2) *Companies Not required to Negotiate Advance Agreements (CWAS).* Allowable IR&D costs for companies not required to negotiate advance agreements in accordance with (1) above shall be established by a formula, either on a company-wide basis or by profit centers, computed as follows:

(i) Determine the ratio of IR&D costs to total sales (or other base acceptable to the contracting officer) for each of the preceding three years and average the two highest of these ratios; this average is the IR&D historical ratio;

(ii) Compute the average annual IR&D costs (hereafter called average), using the two highest of the preceding three years;

(iii) IR&D costs for the center for the current year which are not in excess of the product of the center's actual total sales (or other accepted base) for the current year and the IR&D historical ratio computed under (i) above (hereafter called product) shall be considered allowable only to the extent the product does not exceed 120% of the average. If the product is less than 80% of the average, costs up to 80% of the average shall be allowable.

(iv) Costs which are in excess of the ceiling computed in (iii) above are not allowable except where the ceiling computed for bid and proposal cost under 15-205.3 is reduced in an amount identical to the amount of any increase over the IR&D ceiling computed in (iii) above.

However, at the discretion of the contracting officer, an advance agreement may be negotiated when the contractor can demonstrate that the formula would produce a clearly inequitable cost recovery. The requirements of (d)(1) above are not mandatory for such agreements.

(e) *Deferred Costs (CWAS-NA).* IR&D costs which were incurred in previous accounting periods are unallowable, except when a contractor has developed a specific product at his own risk in anticipation of recovering the development costs in the sale price of the product provided that:

(1) The total amount of IR&D costs applicable to the product can be identified,

(2) The proration of such costs to sales of the product is reasonable,

(3) The contractor had no Government business during the time that the costs were incurred or he did not allocate IR&D costs to Government contracts except to prorate the cost of developing a specific product to the sales of that product, and

(4) No costs of current IR&D programs are allocated to Government work except to prorate the costs of developing a specific product to the sales of that product.

When deferred costs are recognized, the contract (except firm fixed-price and fixed-price with escalation) will include a specific provision setting forth the amount of deferred IR&D costs that are allocable to the contract. The negotiation memorandum will state the circumstances pertaining to the case and the reason for accepting the deferred costs.

15–205.36 *Royalties and Other Costs for Use of Patents.*

(a) (CWAS) Royalties on a patent or amortization of the cost of acquiring by purchase a patent or rights thereto, necessary for the proper performance of the contract and applicable to contract products or processes, are allowable unless—

(i) the Government has a license or the right to free use of the patent; (CWAS-NA)

(ii) the patent has been adjudicated to be invalid, or has been administratively determined to be invalid; (CWAS-NA)

(iii) the patent is considered to be unenforceable; (CWAS-NA) or

(iv) the patent is expired. (CWAS-NA)

GUIDELINES FOR CONTRACTOR PRESENTATION OF INDEPENDENT RESEARCH AND DEVELOPMENT INFORMATION

A contractor desiring to negotiate an advance agreement for costs of independent research and development (IR&D) projects in accordance with the provisions of ASPR 15–205.35 is required to prepare an annual Technical Plan setting forth the scope and costs of such projects. The Technical Plan assists in determining the potential military relevancy (PMR) and in evaluating the reasonableness and the technical quality of the contractor's IR&D program in accordance with existing law and the ASPR. The Technical Plan shall be submitted no later than 90 days after the beginning of a company's fiscal year. Separate copies of the Technical Plan (hereinafter called the Plan) will be distributed to DoD and NASA organizations for evaluation in accordance with a distribution list provided by the IR&D Technical Evaluation Group.

A. GENERAL GUIDANCE

1. Compiling the Plan.—To obtain a timely review of the contractor's proposed IR&D program for the year, a Plan is often separated into group of projects or into individual projects so that the various group or individual projects may be evaluated by several people at the same time. The plan should, therefore, be compiled in such a manner that it is easily separated and reassembled. Binders which are convenient to use yet inexpensive are suggested. Spiral binders should not be used. For ease in locating the Plan when filed, the name of the company, the title and the company fiscal year covered by the Plan, should appear on the bound edge of the document.

2. Organization of the Plan.—The Plan should generally contain the following sections and information:

a. Technical Evaluation Group Cover Letter and Distribution List
b. Title Page
c. Table of Contents
d. Introduction
e. Summary of Financial Data
f. Project Descriptions

a. Technicl Evaluation Group Cover Letter and Distribution List.—These items are provided to you by the Lead Military Department. The cover letter identifies the IR&D focal point to whom IR&D project evaluation forms completed by Government evaluators are to be sent.

b. Title Page.—A title page should give the title of the Plan, the company/division name and mailing address, the IR&D contact with telephone number, the company fiscal year covered by the Plan, the date of issuance of the Plan by month and year, the volume number and the total number of volumes if the Plan requires more than one volume.

c. Table of Contents.—The information should be displayed under the following headings:

TABLE OF CONTENTS

Project No.
Project Title
COSATI Code [1]
Category [2]
Page

[1] COSATI Field/Group.
[2] Research, Development, System Studies (research projects should be separately identified into basic and applied if possible).

d. Introduction.—This section should briefly explain the compilation of the various volumes of the Plan and, further, should explain the relationship of the individual volumes to particular organizational elements by highlighting on a corporate organization chart the pertinent elements involved. Included in this section should also be a discussion of where IR&D is performed and how its costs are allocated within the corporate structure.

e. Summary of Financial Data.—A table of pertinent project financial data should be included in the following format for projects that are new or continuing and that were completed or canceled in the prior year:

FINANCIAL DATA SUMMARY

Project No. & Title
Tech Plan Page No.
COSATI Code
Category
Prior Year Proposed Program ($K)
Prior Year Actual Program ($K)
Current Yr Proposed Program ($K)

f. Project Descriptions.—The project descriptions should be compiled by a convenient or useful compilation such as technological or system areas or by project number. Explain the rationale for the compilation.

3. Classified Projects.—Project descriptions discussing technology with established military security classification should be compiled separately in a properly classified volume and distributed using proper Industrial Security Procedures. Each Service will provide the company a separate list for distribution of the classified volume within that Service when that Service's IR&D Technical Manager is made aware of the existence of the classified volume.

4. Company Proprietary Projects.—Highly sensitive company projects can be separately compiled and can be handled by the Government in a manner similar to classified projects if requested by the company. All volumes of the Plan should be marked "Company Proprietary" if appropriate, not "Company Confidential" or "Company Secret." Such "Confidential" or "Secret" markings may be misinterpreted by DoD mail handlers. Any page within a volume should be marked "Company Proprietary" if appropriate so that any page separated from the volume will still be controlled.

B. PROJECT DESCRIPTIONS

1. A writeup should be prepared for each IR&D project the company is planning to conduct during the company fiscal year of the Plan and for each project completed or cancelled in the previous fiscal year. In this context a project is defined as the smallest segment into which research and development efforts are normally divided for purposes of company administration. A project is usually technically distinguishable in scope and objective from other efforts with which it may be aggregated for financial and administrative purposes. For example, a system study or development effort (which could be a project of itself) could include several potential subsystems each of which could have distinct technical problems for which projects are established. In general, an IR&D project will not be determined by size or funding level but by technical considerations. However, a project will usually involve at least one man-year of effort.

2. Each project writeup should begin on a right hand page to ease separation of the writeup for project evaluation.

3. Each project writeup shall begin with a one page partial synposis of key project information as required by DDC Form 271 dated 4 October 1974. When the DDC Form is used as the project synopsis in the technical plan, the narrative concerning technical approach and progress *shall be blanked out.* The complete synposis shall be the input to the IR&D Data Bank and shall therefore be completed in accordance with the instructions of Section IV of DSAM 4185.9, *Independent Research and Development Data Bank Input Manual.* To minimize the input software requirements at DDC, no deviation in the format of DDC Form 271 can be permitted.

4. Following the synopsis, the complete project narrative should be organized under the following subject headings: Problem; Objective; Approach; Progress; Costs; Resumes.

While the project narratives are the key parts of the Plan, every effort should be made to keep these writeups brief and factual. As a guide, experience has shown that three to five pages including the synopsis are often sufficient to describe a one to five man-year effort.

a. Problem.—The problem which the project is or was addressing should be identified and described from a technical or operational standpoint. The background surrounding the problem should be briefly summarized. Current technology state-of-the-art or current equipment subsystem or system capability could be described and the deficiency that this level of the state-of-the-art or capability produces should be identified. The relationship of the project to DoD requirements, objectives or needs should be cited by identifying pertinent DoD planning or requirement documents as well as interested DoD organizations.

b. Objective.—Within the context of the problem, the project's technical objectives should be identified and described. If the project is run over several years, the overall objective should be described as well as the objective of the current fiscal year or immediate past year in the case of a completed or cancelled project. Quantitative terms should be used if possible and appropriate.

c. Approach.—The overall technical approach to be used to achieve the overall objective should be described as should this year's specific technical approach for achieving the current year's objective. Emphasis should be on the method, technique and design approach rather than schedules or milestone. The specific tests and equipments, theoretical work being conducted, and factors which may tend to accelerate or decelerate the work should be outlined. In the case of a completed or cancelled project, the approach which was taken should be explained.

d. Progress.—The progress made during the immediate past year should be summarized. The technical objective of the past year should be indicated followed by a discussion of progress made during the past year in achieving that objective. The implication of the results both to the overall project objective (see section on Objective) and to the technical approach utilized for the project should be described. Facts and data should be presented whenever possible. Charts, tables and photographs which aid in the explanation of the progress made should be used. Significant reports generated within the reporting period should be identified by number, title and date at the end of this section.

e. Costs.—Provide a table of cost data including all direct costs and also all allocable indirect costs except general and administrative costs, broken in the following manner:

Project No.	Fiscal year—	Labor dollars	Material dollars	Other dollars	Total dollars
Prior					
Current					

Explanations may be offered, following the table, of situations which may appear unusual. For example, a project requiring a high amount of computer or other facility time might cause the dollar amount in "Other $'s" to appear high in comparison to the dollars of labor. Similarly, a project utilizing a large amount of subcontracting might reflect unusual ratios of dollars among the cost classes which would be worthy of explanation. The costs to be entered here are for the purposes of technical evaluation and not project cost audit. Average burden rates, if more than one burden pool charges to an IR&D project, are acceptable.

f. *Resumes of Principal Investigators.* Resumes of the principal investigators of each basic research project should be included as the last section of the project description of that basic research project. Each resume should not exceed one page and should contain the following: Full Name; Job Title; Formal Education: Field; Degrees; Years Received; University; Work Experience: What; With Whom; and When; Significant Work, Papers, Reports and Patents.

If an investigator is responsible for more than one basic research project, his resume should be repeated in each project to facilitate separation of the projects for individual evaluation.

C. DOD CONTACTS

Any questions concerning these guidelines should be referred to the IR&D Technical Evaluation Group member noted below representing the Military Service responsible for negotiating the IR&D Advance Agreement with the company.

ARMY

Commander
Army Materiel Command
AMCRD-T
Washington, D.C. 20315

NAVY

Office of Naval Research
Code 400A
Ballston Tower #1, 800 Quincy Street
Arlington, Virginia 22217

AIR FORCE

Headquarters AFSC/DLXB
Andrews Air Force Base
Washington, D.C. 20334

OFFICE OF THE DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING,
Washington, D.C., March 18, 1973.

MEMORANDUM FOR IR&D TECHNICAL EVALUATION GROUP

Subject: Equitable Treatment of Contractors Relative to Potential Military Relationship (PMR) Determination.

It has been recognized for some time that the meaning and intent of the law with regard to potential military relevancy is not as clear as we would like it to be. However, we must adopt and apply a consistent policy so that all contractors will be treated equitably in the PMR determination.

The point has been raised, and confirmed by the GAO in a report about to be released (GAO Report No. B-167034) that a further step needs to be taken to provide contractors with equal and consistent treatment under the law. To take such a step, I am requesting that each Military Department apply the guidelines set forth in Enclosure 1.

Application of this approach—originally tested by the Air Force—should bring about a more consistent determination of the PMR for the varied technologies represented in IR&D projects. Those projects not adaptable to screening in accordance with the guidelines will have to be dealt with on a case-by-case basis.

ELLIOTT B. HARWOOD,
Chairman, I.R. & D. Technical Evaluation Group.

GUIDELINES FOR DETERMINATION OF THE POTENTIAL RELATIONSHIP OF I.R. & D. PROJECTS TO MILITARY FUNCTIONS OR OPERATIONS

I. THE REQUIREMENT

Section 203 of the DOD Military Procurement Authorization Act of 1971 (PL 91-441) requires that IR&D payments by the DOD be made only for work which has a "potential relationship to a military function or operation". Obviously if "potential relationship" is taken in its broadest sense, almost any R&D effort could qualify, since military functions and operations involve (at least incidentally) almost every aspect of human life. It seems clear that Congress intended to eliminate DOD payment for those IR&D efforts whose relationship to military functions or operations is remote or incidental.

These guidelines define the degree to which a "potential relationship" must exist to be considered within the intent of the law.

II. CRITERIA

The criteria to be used for determining whether a project has a sufficient potential relationship are shown in this chart:

a. Is the DOD precluded, by law or otherwise, from funding such R. & D.?	b. What is the nature of the military requirement for the end product?	c. What will be the application of the end product?	d. Is another Government agency responsible for this field of R. & D.?	Conclusion—Is the I.R. & D. project potentially relevant?
Yes				No.
No	Urgent			Yes.
	None (not used by military).			No.
	Routine	Primarily military		Yes.
		Primarily nonmilitary	Yes	No.
		But with substantial military application.	No	Yes.
		Only incidental military application.		No.

The following is a discussion of the four basic considerations in determining the potential relationship:

a. If the DOD is precluded by law, policy, or otherwise from directly funding research and development in a given area, then IR&D in that area will not be considered relevant to the DOD; i.e., chemical or biological weapons research could be stopped by law.

b. The nature of the military requirement for the end product of the R&D effort, and of the requirement for R&D in that field must be considered. The "end product" is that class of products that would directly result from this R&D effort if carried forward to a conclusion. Thus, for research (such as aerodynamics), a wide class of end products should be considered (all aircraft); whereas for a development project (for a specific wing, for instance), only the specific item to be developed can be considered. If there is an urgent requirement for the end product, the IR&D project must be considered relevant automatically. If there is no military requirement for the end product, the IR&D project must be considered not relevant automatically. If there is a requirement for the end product, but it is not an urgent one (i.e., routine), further analysis of the project will be necessary including review by the other Military Departments.

c. The degree of the applicability of the product to the DOD must be considered. If it is principally military, the project is definitely relevant. If the product has no urgent requirement and the application is primarily non-military, the effort must be considered not relevant; for example, consumer items such as typewriters, beds and sheets, and general research such as cancer research, should not be considered relevant. Finally, if the product has balance between non-military and military application, one more factor must be considered.

d. Does another government agency have responsibility for such R&D? If another agency is responsible for research and development in the project area, the project must be considered not relevant.

III. PROCEDURE

Prior to the beginning of its company fiscal year, each contractor shall furnish to the IR&D Technical Evaluation Group member (from the Military Department which conducts his technical evaluation), a brief description of each IR&D project planned for that year. The Military Department responsible for that company's IR&D technical evaluation will review its programs, and identify those projects which do not appear to have potential relationships to military functions or operations, using the criteria described above. Each of the other two Military Departments will then review those identified projects to determine whether they have a potential relationship to any of their military functions or operations. A project deemed relevant by any one of the Military Departments will be considered relevant by the DOD. A list of projects not considered to be potentially relevant by any of the Military Departments will be provided to the

negotiator. The negotiator/auditor will then ensure that reimbursement will not be made for these projects.

If the information provided by the contractor is insufficient to determine the relevance of a project, or if a reasonable doubt exists as to the relevancy of the project, or if the project represents an inseparable mix of tasks that are both relevant and not relevant, the project will be categorized as not relevant. The contractor should then be given an opportunity to provide additional information and to separate the relevant tasks from those that are not relevant in order to achieve a more accurate PMR determination.

DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING,
Washington, D.C., October 21, 1974.

Memorandum for Assistant Secretaries of the Military Departments (Installation and Logistics), Assistant Secretaries of the Military Departments (Research and Development), Director, Defense Supply Agency

Subject: Guidance for Negotiation of Independent Research and Development (IR&D)/Bidding and Proposal (B&P) Advance Agreements and for the Coupling of Negotiation and Technical Evaluation of IR&D/B&P.

The following guidance, as approved by the IR&D Policy Council, is to be used in the negotiation of IR&D/B&P advance agreements and for the coupling of technical evaluation results to the negotiation. This guidance supersedes that given in the joint DDRE/ASD(I&L) memo dated 18 April 1973.

1. It is essential that every effort be made to insure that all contractors are treated equitably regardless of which Military Department, including DSA, is responsible for conducting the negotiation. The four Departmental Central Offices (see DPC No. 83) shall meet together from time to time under the leadership of OASD(I&L) IR&D focal point to (a) exchange views and information necessary to achieve equitable treatment of contractors, and (b) identify issues to be submitted to the IR&D Technical Evaluation Group or the IR&D Policy Council for resolution. In addition, each Departmental Central Office shall to the extent practicable assign representatives to attend and participate in prenegotiation and negotiation meetings conducted by the other Offices.

2. Each Departmental Central Office shall maintain sufficient documentation in the advance agreement negotiation file to provide the rationale for the dollar level established and for any other provisions of the agreement.

3. The results of the technical quality evaluation of a contractor's IR&D program shall have a meaningful and traceable effect on the negotiated ceiling.

4. Three-year advance agreements, with provision for adjustment when appropriate to the second and third year, should be used to the extent practicable.

5. In negotiating IR&D and B&P ceilings, inflationary or deflationary economic factors shall be given the same consideration as is given to any other cost in a contract price negotiation.

6. A technical representative associated with the evaluation of the company concerned shall participate to the extent practicable in the prenegotiation meetings during which negotiation objectives are established by the negotiating team.

7. Departmental Central Office negotiators shall have primary responsibility for reviewing each contractor's B&P projects and making the final determination of their potential relationship to military functions or operations. Those proposals solicited by DoD activities and those unsolicited proposals that resulted in DoD contracts shall be considered "potentially related." The relationship of all other B&P projects shall be determined on a case-by-case basis.

Since IR&D and B&P ceilings are interchangeable, potential relationship determination for each non-DoD B&P project shall be made on the same basis as for the IR&D determination. Therefore, the determination for the B&P effort shall be premised on the relationship of the technical effort to a military function or operation rather than to which customer the proposal is submitted. Negotiators shall obtain the comments and recommendations of cognizant ACOs and auditors, and, when appropriate, may refer a specific proposal project to the responsible IR&D Technical Evaluation Group representative for a recommendation.

Generally, determinations of B&P relationship cannot be made until the end of the fiscal year. However, to the extent that contractors can identify B&P

projects at the time advance agreement negotiations take place, such determinations shall be made at that time. In any event, determinations shall be completed as soon after the end of each contractor's fiscal year as possible.

8. The costs of IR&D or B&P projects determined not to be potentially related may be included in the ceilings negotiated provided this procedure does not result in the allocation of a level of costs to DoD contracts that exceeds the total costs of all related projects. See ASPR 15-205.3(d)(2)(A)(v) and 15-205.35 (d)(1)(E).

MALCOLM R. CURRIE,
Director of Defense, Research, and Engineering.
ARTHUR I. MENDOLIA,
Assistant Secretary of Defense (Installations and Logistics).

INDIVIDUAL DATA ELEMENT DESCRIPTIONS

A. GENERAL

The following paragraphs contain descriptions of data elements which comprise inputs to an IR&D project record in the DoD IR&D Project Data Bank. The paragraphs also provide instructions for entering each data element on the DDC Form 271 layout shown in Appendix A.

B. DDC FORM 271, INDEPENDENT RESEARCH AND DEVELOPMENT DATA SHEET

1. The DDC Form 271 is to serve both as the project synopsis in the contractor's annual IR&D Technical Plan and as the principal source data sheet for the DoD IR&D Data Bank. The DDC Form 271 *only*, for each project described in the contractor's Technical Plan, should be forwarded to the DDC contact point at the time of distribution of the Technical Plan. The contractor may, at his option, forward at this same time only projects which have actually started. The DDC Form 271 for projects described in the Technical Plan but not actually started and for new projects started during the contractor's fiscal year may be forwarded t the time of project initiation.

2. Those contractors who wish to provide machinable inputs such as punched cards or magnetic tape are encouraged to do so and should contact the DDC contact point for specific instructions.

3. The DDC Form 271 is designed so that a minimum of effort is required of the contractor and the input process can be expedited. For the foregoing reasons, the contractor is requested not to deviate from the DDC Form 271 format or character assignment. Supplies of DDC Form 271 are maintained by DDC and may be obtained from the DDC contact point. At their discretion, companies may locally reproduce or overprint the form.

C. DATA ELEMENT DESCRIPTIONS

1. *Technical Plan Fiscal Year* (2 characters). Enter the last two digits of the fiscal year covered by the Technical Plan.

2. *DDC Form 271 Report Submission Date* (6 characters). Enter the date, in a 6 digit format, that the project report (DDC Form 271) is submitted; calendar year (two digits), month (two digits) and day (two digits), in that order. If the project is described in the Technical Plan and has started, then this date in month and year will coincide with the month and year the Technical Plan was issued.

3. *Report Type* (1 character). Enter one of the following report type codes:

A—Initial submission of any new project

B—Report describing a project continuing into the current fiscal year from the previous one

C—A correction to a previous submission. (Submission of a C-type report will not change the existing report type or date of report)

K—Report describing completion of a project

T—Report describing termination of a project

4. *IR &D. Project Number* (Up to 10 characters). Enter a specific project number for the work described. If the work was described in the Technical Plan, use the same project number as in the Technical Plan. If the work was described in the technical plan, assign a unique number to the project. Generally,

this number should be preserved throughout the life of the project. However, if the project evolves into new projects or changes in category and objective sufficiently to warrant a new project number, then traceability should be assured by identifying the old project number in Field 18, Related Projects—Previous Years.

5. *Unclassified Project Title* (Up to 122 characters). Enter an unclassified, descriptive title of the project. This title should refer to a specific system or to a technology or a general area of application of the study or effort. If there are two discrete levels of a project title, enter continuously, but separate by some appropriate punctuation as a dash, colon or semicolon.

6. *Name and Address of Performing Organization.* Enter name and address both of the parent organization and the performing organization if they differ.

Level 1—Name of the Major or Parent Organization, if applicable (Up to 61 characters)

Level 2—Name of Organizational entity actually performing the project. (Up to 61 characters)

Level 3—Performing Organization Street Address (Up to 61 characters)

Level 4—Performing Organization City, State and Zip Code. (Up to 61 characters)

7. *Name and Telephone Number of Technical Plan Focal Point*

Name (Up to 41 characters). Enter the last name, followed by a comma, the first name and middle initial, separated by spaces, of the company point of contact for the IR&D program. This is the responsible company official for the technical plan.

Telephone (Up to 20 characters). Enter the commercial phone number, including area code and extension, of the IR&D Technical Plan focal point. Enter elements of phone number separated by dashes; e.g., 203–565–4399–12345.

8. *Technical Plan Volume and Page Number* (Up to 11 characters). Enter the identification of the volume, if any, and page number(s) containing a more detailed description of the project. If the project does not relate to an item in a Technical Plan, enter one of the following 2-letter codes:

PI—Project initiated after Technical Plan was published

PC—Project substantially changed from what was originally in the Technical Plan.

9. *Category of I.R. & D. Work* (1 character). Enter one of the following single-letter codes to identify the category of the work. Definitions of IR&D categories are contained in the Armed Services Procurement Regulation, paragraph 15–205.35.

R—Research (research projects should be divided into basic (B) or applied (A) is possible)

D—Development

S—Systems and other Concept Formulation Studies

10. *Subject Category Field and Group Codes* (Up to 6 characters, each code). Enter at least one Subject Category Field and Group Code from Appendix E. Put the most relevant code in the first field, the next most relevant in the second, etc. *Only the codes listed in Appendix E are acceptable.*

11. *Project Start Date* (4 characters). Enter the last 2 digits of the calendar year and the month (01 through 12) of the date on which work on the project started for continuing or completed projects and the "will start" date for new projects.

12. *Project Completion Date* (4 characters), Enter the estimated or anticipated completion date for the project as calendar year (2-digits) and month (01 through 12), in that order. "INDF" may be entered if the project has an indefinite completion date. For completed or cancelled projects give actual completion or cancellation date.

13. *Professional Man-Years Expenditure*

Estimate for Current Fiscal Year (4 characters). Enter the estimate of the professional man-year[1] expenditure on the project for the current fiscal year to the nearest tenth of a man-year. Insert a decimal point to identify tenths. Otherwise, figure(s) will be assumed to be a whole number.

Actual Expenditures to Date (4 characters). Enter the actual expenditure of professional man-years on this specific project number to date to the nearest tenth of a man-year. Insert decimal point to identify tenths. Otherwise, figure(s) will be assumed to be whole number(s).

Security Classification. For classification authority reference Section II, paragraphs 10d (ii), and 10f in DoD 5220.22-M, Industrial Security Manual for

[1] Professional Man-Years represent all the scientific and engineering time that a scientist or technically-trained person who has received at least a bachelor's degree (or the equivalent) expends directly on the IR&D work being reported. Excluded are skilled craftsmen, laboratory assistants, programers, shop workers, secretaries, and other personnel providing nontechnical support and services.

Safeguarding Classified Information and DoD 5200.1-R, DoD Information Security Program Regulation. For classification definitions reference Section I, paragraph 3 of DoD 5220.22-M. For regrading definitions reference Appendix II to DoD 5220.22-M and DoD 5200.1-R.

14. *Security Classification Code of the Data Sheet* (Up to 3 characters). Enter one of the following codes to describe the established or tentative security classification of the data sheet. This field will reflect the security classification of the DDC Form 271. The code entered in this field must reflect an equal or higher security classification than that of the narrative—Fields 21, 22, 23 and 24:

Security Classification Codes

U—Unclassified;
C—Confidential;
S—Secret;
CRD—Confidential Restricted Data;
CFR—Confidential Formerly Restricted Data;
SRD—Secret Restricted Data;
SFR—Secret Formerly Restricted Data;
CT—Confidential-Tentative (Protect as Confidential);
ST—Secret-Tentative (Protect as Secret).

If the IR&D Data Sheet (DDC Form 271) is classified, in addition to the notation in Field 14, the sheet will be stamped as prescribed in DoD 5220.22-M, Industrial Security Manual for Safeguarding Classified Information, Section II, item 11. The security classification of the data sheet must not be lower than the highest classification of any paragraph. Classification Authority and Declassification Dates must also be written on the Data Sheet.

15. *Regrading Code* (1 character). Enter the appropriate regrading code for each classified data sheet where item 14 (Data Sheet Classification) is C, S, CRD, CFR, SRD, or SFR. If the data sheet is unclassified or has only a tentative classification (item 14=U, CT, or ST), item 15 must be blank. Enter one of the following codes:

Code	Symbol	Explanation
A	GDS	General declassification schedule.
B	ADS	Optional accelerated downgrading.
C	XGDS-1	Exempted—cat. 1 (furnished by foreign government).
D	XGDS-2	Exempted—cat. 2 (special—covered by statute).
E	XGDS-3	Exempted—cat. 3 (disclosing a system, plan, project, etc.).
F	XGDS-4	Exempted—cat. 4 (disclosure means personal jeopardy).
G	Excl	Excluded from GDS (pending originator review).
H	RD or FR	Restricted data or formerly restricted data.
M	Multi	Multiple exemption categories apply.

16. *Technical Contact:*

Name (Up to 41 characters). Enter the last name, followed by a comma, the first name and middle initial, separated by spaces, of a point of contact for additional technical information about the project.

Example: DOE, JOHN J

Telephone (Up to 20 characters). Enter the commercial phone number, including area code and extension, of the project contact point. Enter elements of phone number separated by dashes: e.g., 203–465–4399–12345.

This contact should be either the principal investigator or an individual close enough to the project to be able to answer technical questions.

17. *Related Projects in Current Fiscal Year Program* (Up to 10 characters, per project). Enter up to three project numbers from the current company fiscal year program which are directly related to the project being reported. This correlation of the project with others in the same year's program will assist in viewing it as part of the overall program rather than as a separate entity. If a "PC" was entered in Field 8, enter the project number from the technical plan from which this project evolved.

18. *Related Projects in Previous Fiscal Year Programs* (Up to 10 characters per project). Enter up to three project numbers from previous company fiscal years that contributed to or led to the present project. This Field differs from Field 17 in that Field 18 looks at a project's progression from year to year whereas Field 17 looks at parallel projects in a single year. Both Fields can help considerably in searching for technical information in the data bank.

19. *Keywords* (Up to 30 Keywords of 50 characters each). Enter at least five keywords which relate to the subject covered by the report. A keyword can be a single word or a group of words. Keywords will be used in conjunction with other elements on the record to retrieve project summaries. Do not use punctuation in the entry. All keywords must be unclassified. "Cryogenics," "lightweight radar," and "space vehicle navigation" are examples of keywords. Avoid the use of complete phrases which include prepositions and conjunctions, e.g., navigation of space vehicles. A suggestion for the first keywords would be systems, subsystems, or application-oriented words. The title and text may describe work on a guidance or a signal processing project but could fail to mention that it was missile guidance not aircraft guidance or that it was signal processing of sonar signals and not radar signals. It would be of great help to be able to distinguish the application. Many research projects may not have a specific application but could have an area of application. For example, materials research could have applications to structures, coatings, electronics, optics, lubricants, etc. Also, select a group of words which are technically descriptive of the project. For example, if there were a project on a miniature stereoscopic display for a space application involving the use of laser holography, a keyword chain could be maser, laser, spacecraft display, three dimensional display, Argon, holography, optics, miniaturization, navigation, reliability, high intensity Military Standard—847A, 31 January 1973, Format Requirements for Scientific and Technical Reports Prepared by or for the Department of Defense, page 19, paragraph 20.20 implement format standards, including selection of terms, for the Department of Defense. The DDC Retrieval and Indexing Terminology, Preliminary Edition, AD–773 300, can also be helpful. These will not guarantee ideal indexing, but they offer an inexpensive step in that direction.

20. *Related DoD Technical Planning and Requirement Documents & Interested DoD Organization* (Up to 10 of 60 characters each). The purpose of these entries is twofold. First, to give contractors the opportunity to identify any DoD techical planning or requirements documents to which this project is responsive in order to assist in the determination that the project meets the basic tests of relevancy. Second, to assist the Government individual responsible for distributing the IR&D projects to direct the project to the appropriate evaluators. This should help assure the contractor the most appropriate technical evaluation by having the contractor identify organizations or people who know of this IR&D work; or those who have expressed an interest in the project. Typical examples of DoD technical planning or requirements documents are: Required Operational Capabilities (ROC), Technology Needs (TN), Technical Objective Documents (TOD). In identifying interested DoD organizations, the organization's abbreviation or symbols may be used. Where an individual is identified, his organization should also be identified.

Fields 21, 22, 23 and 24. The narrative portions of the project record comprises 4 data element abstracts—Problem (Field 21), Objective (Field 22), Approach (Field 23) and Progress (Field 24). These paragraphs should provide a technical description of the work, its purpose and progress. While these narratives should be brief, they should be sufficient to identify the project and the technology or system/equipment involved.

A maximum of 3600 characters is allowed for the entire narrative portion. This allowance may be divided among the 4 narrative fields in any way desired as long as the combined length of the 4 fields does not exceed 3600 characters. Include security classification at the beginning of each narrative field.

Problem (Field 21)—The problem which the project is or was addressing should be identified and described from a technical or operational standpoint. The background surrounding the problem should be briefly summarized. Current technology state-of-the-art or current equipment, subsystem or system capability could be described and the deficiency that this level of the state-of-the-art or capability produces should be identified.

Objective (Field 22)—Within the context of the problem, the project's technical objectives should be identified and described. If the project is to run over several years, the overall objective should be described as well as the objective of the current fiscal year or immediate past year in the case of a completed or cancelled project. Quantitative terms should be used if possible and appropriate.

Approach (Field 23)—The overall technical approach to be used to achieve the overall objective should be described as should this year's specific technical approach for achieving the current year's objective. Emphasis should be on the method, technique and design approach rather than schedules or milestone. The specific tests and equipments, theoretical work being conducted, and factors which may tend to accelerate or decelerate the work should be outlined. In the

case of a completed or cancelled project, the approach which was taken should be explained.

Progress (Field 24)—The progress made during the immediate past year should be summarized. The technical objective of the past year should be indicated followed by a discussion of progress made during the past year in achieving that objective. The implication of the results both to the overall project objective (see section on Problem/Objective) and to the technical approach utilized for the project should be described. Facts and data should be presented whenever possible. Significant reports generated within the reporting period should be identified by number, title and date at the end of this section.

APPENDIX A
27 November 1974

INDEPENDENT RESEARCH AND EVELOPMENT DATA SHEET	1.TECH PLAN FY	2.REPORT DATE	3.REPORT TYPE	4.PROJECT NO.

Furnished in confidence and subject to exemption under Subsection b of 5 USC 552. The information contained herein is the property of the company indicated in Item 6 below is furnished for the sole purpose of identifying the subject program and shall not be disclosed other than to duly authorized Government personnel. Any authorized reproduction or disclosure of the information contained herein, in whole, or in part, shall include this notice.

5. PROJECT TITLE (UNCLASSIFIED)				
6.ORGANIZATION NAME AND ADDRESS				
7. TECHNICAL PLAN FOCAL POINT NAME			TELEPHONE	
8.PLAN VOL/PG NO.	9.CATEGORY	10.SUBJECT CATEGORY FIELDS & GROUPS		11.PROJECT START DATE
12.COMPLETION DATE	13.PROF MAN YEAR EST THIS YR	CUM TO DATE	SECURITY CLASSIFICATION 14.DATA SHEET	15.REGRADE CODE
16.TECHNICAL CONTACT			TELEPHONE	

RELATED PROJECTS	17. CURRENT YEAR		18. PREVIOUS YEARS		

19.KEYWORDS

20.RELATED DOD TECHNICAL PLANNING & REQUIREMENTS DOCUMENTS & INTERESTED DOD ORGAN.

21.PROBLEM/22.OBJECTIVE/23.APPROACH/24.PROGRESS

(Use Reverse Side for Continuation of any Item)

DDC FORM 271

Form Approved: Office Mgmt
& Budget Approval No. 22-R0290

Appendix B

NAVY INDEPENDENT RESEARCH & DEVELOPMENT (IR&D) PROGRAM FOCAL POINTS

ORGANIZATION AND FOCAL POINT

Naval Sea Systems Command, Dr. John H. Huth, Chief Scientists for R. & D., Naval Sea Systems Command (031), 11E08 National Center No. 3, Washington, D.C. 20362.

Naval Sea Systems Command (08), Mr. R. M. Forssell, Naval Sea Systems Command (08), 2N22 National Center No. 2, Washington, D.C. 20360.

SUBJECT FIELD AND GROUP STRUCTURE

01 Aeronautics
- 01 Aerodynamics
- 02 Aeronautics
- 03 Aircraft
- 04 Aircraft flight instrumentation
- 05 Air facilities

02 Agriculture
- 01 Agricultural chemistry
- 02 Agricultural economics
- 03 Agricultural engineering
- 04 Agronomy and horticulture
- 05 Animal husbandry
- 06 Forestry

03 Astronomy and Astrophysics
- 01 Astronomy
- 02 Astrophysics
- 03 Celestial mechanics

04 Atmospheric Sciences
- 01 Atmospheric physics
- 02 Meteorology

05 Behavioral and Social Sciences
- 01 Administration and management
- 02 Documentation and information technology
- 03 Economics
- 04 History, law and political science
- 05 Human factors engineering
- 06 Humanities
- 07 Linguistics
- 08 Man-machine relations
- 09 Personnel selection, training and evaluation
- 10 Psychology *(Individual and group behavior)*
- 11 Sociology

06 Biological and Medical Sciences
- 01 Biochemistry
- 02 Bioengineering
- 03 Biology
- 04 Bionics
- 05 Clinical medicine
- 06 Environmental biology
- 07 Escape, rescue and survival
- 08 Food
- 09 Hygiene and sanitation
- 10 Industrial *(Occupational)* medicine
- 11 Life support
- 12 Medical and hospital equipment and supplies
- 13 Microbiology
- 14 Personnel selection and maintenance *(Medical)*
- 15 Pharmacology
- 16 Physiology
- 17 Protective equipment
- 18 Radiobiology
- 19 Stress physiology
- 20 Toxicology
- 21 Weapon effects

07 Chemistry
- 01 Chemical engineering
- 02 Inorganic chemistry
- 03 Organic chemistry
- 04 Physical chemistry
- 05 Radio and radiation chemistry

08 Earth Sciences and Oceanography
- 01 Biological oceanography
- 02 Cartography
- 03 Dynamic oceanography
- 04 Geochemistry
- 05 Geodesy
- 06 Geography
- 07 Geology and mineralogy
- 08 Hydrology and limnology
- 09 Mining engineering
- 10 Physical oceanography
- 11 Seismology
- 12 Snow, ice and permafrost
- 13 Soil mechanics
- 14 Terrestrial magnetism

09 Electronics and Electrical Engineering
- 01 Components
- 02 Computers
- 03 Electronic and electrical engineering
- 04 Information theory
- 05 Subsystems
- 06 Telemetry

10 Energy Conversion *(Non-propulsive)*
- 01 Conversion techniques
- 02 Power sources
- 03 Energy storage

11 Materials
- 01 Adhesives and seals
- 02 Ceramics, refractories and glasses
- 03 Coatings, colorants and finishes
- 04 Composite materials
- 05 Fibers and textiles
- 06 Metallurgy and metallography
- 07 Miscellaneous materials
- 08 Oils, lubricants, and hydraulic fluids
- 09 Plastics
- 10 Rubbers
- 11 Solvents, cleaners and abrasives
- 12 Wood and paper products

12 Mathematical Sciences
- 01 Mathematics and statistics
- 02 Operations research

13 Mechanical, Industrial, Civil and Marine Engineering
- 01 Air conditioning, heating, lighting and ventilating
- 02 Civil engineering
- 03 Construction equipment, materials and supplies
- 04 Containers and packaging
- 05 Couplings, fasteners and joints
- 06 Ground transportation equipment
- 07 Hydraulic and pneumatic equipment
- 08 Industrial processes
- 09 Machinery and tools
- 10 Marine engineering
- 10.1 Submarine engineering
- 11 Pumps, filters, pipes, tubing and valves
- 12 Safety engineering
- 13 Structural engineering

14 Methods and Equipment
- 01 Cost effectiveness
- 02 Laboratories, test facilities, and test equipment
- 03 Recording devices
- 04 Reliability
- 05 Reprography

15 Military Sciences
- 01 Antisubmarine warfare
- 02 Chemical, biological, and radiological warfare
- 03 Defense
- 03.1 Antimissile defense
- 04 Intelligence
- 05 Logistics
- 06 Nuclear warfare
- 07 Operations, strategy, and tactics

16 Missile Technology
- 01 Missile launching and [illegible] support
- 02 Missile trajectories
- 03 Missile warheads and fuzes
- 04 Missiles
- 04.1 Air and space launched missiles
- 04.2 Surface launched missiles
- 04.3 Underwater launched missiles

17 Navigation, Communications, Detection and Countermeasures
- 01 Acoustic detection
- 02 Communications
- 02.1 Radio communications
- 03 Direction finding
- 04 Electromagnetic and acoustic countermeasures
- 05 Infrared and ultraviolet detection
- 06 Magnetic detection
- 07 Navigation and guidance
- 08 Optical detection
- 09 Radar detection
- 10 Seismic detection

18 Nuclear Science and Technology
- 01 Fusion devices *(Thermonuclear)*
- 02 Isotopes
- 03 Nuclear explosions
- 04 Nuclear instrumentation
- 05 Nuclear power plants
- 06 Radiation shielding and protection
- 07 Radioactive wastes and fission products
- 08 Radioactivity
- 09 Reactor engineering and operation
- 10 Reactor materials
- 11 Reactor physics
- 12 Reactors *(Power)*
- 13 Reactors *(Non-power)*
- 14 SNAP technology

19 Ordnance
- 01 Ammunition, explosives and pyrotechnics
- 02 Bombs
- 03 Combat vehicles
- 04 Explosions, ballistics and armor
- 05 Fire control and bombing systems
- 06 Guns
- 07 Rockets
- 08 Underwater ordnance

20 Physics
- 01 Acoustics
- 02 Crystallography
- 03 Electricity and magnetism
- 04 Fluid mechanics
- 05 Masers and lasers
- 06 Optics
- 07 Particle accelerators
- 08 Particle physics
- 09 Plasma physics
- 10 Quantum theory
- 11 Solid mechanics
- 12 Solid state physics
- 13 Thermodynamics
- 14 Wave propagation

21 Propulsion and Fuels
- 01 Air breathing engines
- 02 Combustion and ignition
- 03 Electric propulsion
- 04 Fuels
- 05 Jet and gas turbine engines
- 06 Nuclear propulsion
- 07 Reciprocating engines
- 08 Rocket motors and engines
- 08.1 Liquid rocket motors
- 08.2 Solid rocket motors
- 09 Rocket propellants
- 09.1 Liquid rocket propellants
- 09.2 Solid rocket propellants

22 Space Technology
- 01 Astronautics
- 02 Spacecraft
- 03 Spacecraft trajectories and reentry
- 04 Spacecraft launch vehicles and ground support

Naval Ship Research & Development Center (Includes NSRDC Annapolis), Dr. Basil V. Nakonechny, Naval Ship Research and Development Center (1102.1) Bethesda, Md. 20084.

Naval Supply Systems Command, Mr. M. R. O'Reagan, Naval Supply Systems Command (043), CM No. 3, Washington, D.C. 20376.

Naval Surface Weapons Center, Dr. Wayne W. Scanlon, Naval Surface Weapons Center Hdqtrs (020), White Oak, Silver Spring, Md. 20910.

Naval Training Equipment Center, Mr. Franklin E. Wolf, Jr., Naval Training Equipment Center, Orlando, Fla. 32813.

Naval Undersea Center, Dr. Eugene P. Cooper, Naval Undersea Center (Code 0101), San Diego, Calif. 92132.

Naval Underwater Systems Center, Dr. Edward S. Eby, New London Laboratory, Naval Underwater Systems Center (TD111), New London, Conn. 06320.

Naval Weapons Center, Dr. Gilbert J. Plain, Naval Weapons Center (Code 6009), Research Department, China Lake, Calif. 93555.

Naval Weapons Evaluation Facility, Mr. Lawrence R. Oliver, Naval Weapons Evaluating Facility (Code AT), Kirtland Air Force Base, Albuquerque, N. Mex. 87717.

ARMY I.R. & D. FOCAL POINTS

Director, US Army Air Mobility Research, and Development Laboratories (SAVDL–AS), AMES Research Center, Moffett Field, Calif. 94035.

Director, Eustis Directorate, US Army Air Mobility R&D Lab., ATTN: SAVDL–EU–AD—Mr. Bechtel, Fort Eustis, Va. 3604.

Commander, US Army Aviation Systems Command, ATTN: AMSAV–ER—Mr. H. Dunkel,[1] P.O. Box 209, Main Office, St Louis, Mo. 63166.

Director, U.S. Army Ballistic Research Labs, ATTN: AMXBR–XA—Mr. Edward Bryant, Aberdeen Proving Ground, Md. 21005.

Commander and Director, US Army Coastal Engineer Research Center, ATTN: Mr. R. Saville, Jr., Kingman Building, Fort Belvoir, Va. 22060.

Commander and Director, US Army Cold Regions, Research and Engineering Laboratory, ATTN: Mr. Allan Wilson P.O. Box 282, Hanover, N.H. 03755.

Commander, US Army Communications Command, ATTN: Mr. Wm. F. Ryan, CCOPS–SM, Fort Hauchuca, AZ 85603.

Commander and Director, US Army Construction Engineering Research Laboratory, ATTN: Mr. Victor Marty P.O. Box 4005, Champaign, IL 61820.

Commander, Edgewood Arsenal, ATTN: SAREA–PL–S—Mr. F. Couch, Aberdeen Proving Ground, Md. 21010.

Commander, US Army Electronics Command, ATTN: AMSEL–RD–PB—Mr. R. Lauttman,[1] Ft. Monmouth, N.J. 07703.

Commander and Director, U.S. Army Engineer Topographic Labs, Attn: Mr. R. F. Macchia, Fort Belvoir, Va. 22060.

Commander and Director, U.S. Army Engineer Waterways Experiment, Station—Attn: Mr. F. R. Brown, P.O. Box 631, Vicksburg, Miss. 39180:

Commander, Frankford Arsenal, Attn. SMUFA–A2100—Mr. Walters, Bridge-Tacony Streets, Philadelphia, Pa. 19137.

Commander, Harry Diamond Laboratories, Attn: AMXDO–PP—Mr. D. P. Rovis, 2800 Powder Mill Road, Adelphi, Md. 20783.

Director, U.S. Army Human Engineering Lab, Attn: Dr. L. Katchman, Aberdeen Proving Ground, Md. 21005.

Commander, U.S. Army Materials and Mechanics Research Center, Attn: AMXMR–MX—Mr. Valencia, Watertown, Massachusetts 02172.

Commander, U.S. Army Missile Command, Attn: AMSMI–RGN/ASC—Ms. V. Kobler[1], Redstone Arsenal, Alabama 35809.

Commander, U.S. Army Mobility Equipment, Research and Development Center, Attn: AMXFB–BP Mr. J. Ammlung (Doner)[1], Fort Belvoir, Va. 22060.

Commander, U.S. Army Mobility Equipment R&D Center, Attn: AMXFB–BP—Mr. Gil Rhodes, Ft. Belvoir, Va. 22060.

Commander, U.S. Army Mobility Equipment R&D Center, Attn: AMXFB–EA—Mr. Williams,[1] Ft. Belvoir, Va. 22060.

Commander, U.S. Army Mobility Equipment R&D Center, Attn: AMXFB–ND—Mr. McConnell,[1] Ft. Belvoir, Va. 22060.

Director, U.S. Army Night Vision Lab, Attn: Mr. John Burgess, Ft. Belvoir, Va. 22060.

[1] Army IR&D Coordinators.

ARMY I.R. & D. FOCAL POINTS—Continued

Commander, Picatinny Arsenal, Attn: SARPA-PA-F—Mr. S. Tyler,[1] Feltman Research Laboratory, Dover, N.J. 07801.

Commander, Rock Island Arsenal, Attn: SARRI-LR—Mr. D. Skyberg, Rock Island, Ill. 61201.

Commander, U.S. Army Tank-Automotive Command, Attn: AMSTA-CL—Dr. E. Petrick,[1] Warren, Mich. 48090.

Commander, U.S. Army Tank-Automotive Command, Attn: AMSTA-RET—Mr. Olson,[1] Warren, Mich. 48090.

Commander, U.S. Army Tank-Automotive Command, Attn: AMSTA-RGT—Mr. Hamparian,[1] Warren, Mich. 48090.

Commander, U.S. Army Training Device Agency, Code N2A—Dr. Bernard Rashis, Naval Training Equipment Center, Orlando, Florida 32813.

Commander, Watervliet Arsenal, Attn: Mr. A. Muzicka, Benet Weapons Laboratory, Watervliet, N.Y. 12189.

Commander, U.S. Army White Sands Missile Range, Attn: STEWS-ID-R—Dr. A. Gilbert, White Sands, New Mexico 88002.

Dr. Robert Mace, Deputy Chief Scientist, U.S. Army Research Office, P.O. Box 12211, Research Triangle, Park N.C. 27709.

[1] Army I.R. & D. Coordinators.

NAVY INDEPENDENT RESEARCH & DEVELOPMENT (IR&D) PROGRAM FOCAL POINTS

ORGANIZATION AND FOCAL POINT

Naval Aerospace Recovery Facility, Mr. Donald Dirian, Naval Aerospace Recovery Facility (Code PC), El Centro, Calif. 92243.

Naval Air Development Center, Mr. H. D. Huey, Naval Air Development Center (02), Warminster, Pa 18974.

Naval Air Engineering Center, Mr. Frederick C. Robinson, Naval Air Engineering Center (9016), Plans and Programs Office, Lakehurst, N.J. 08733.

Naval Air Propulsion Test Center, Mr. D. F. Brunda, Naval Air Propulsion Test Center (PE 43), Trenton, N.J. 08628.

Naval Air Systems Command, Mr. John A. Johnson, Naval Air Systems Command (AIR 30212A), Department of the Navy, Washington, D.C. 20361.

Naval Air Test Center, Dr. A. R. Matthews, Chief Scientist, Naval Air Test Center (CT03), Patuxent River, MD 20670.

Naval Air Test Facility, Mr. Nicholas Ivanovic, Naval Air Station (Code 100), Lakehurst, N.J. 08733.

Naval Anti-Submarine Warfare Systems, Mr. H. Magid, Anti-Submarine Warfare Systems Project Office (ASW-114) (PM-4) ,Washington, D.C. 20360

Naval Civil Engineering Laboratory, Dr. Robert N. Storer, Head, Plans and Analysis Office, Naval Civil Engineering Laboratory (Code L03B), Port Hueneme Calif. 93043.

Naval Coastal Systems Laboratory, Dr. F. C. W. Olson, Naval Coastal Systems Laboratory (Code 101S), Panama City, Fla. 32401.

Naval Electronics Laboratory Center, Dr. Ellen E. Kuhns, Naval Electronics Laboratory Center, Planning Office (Code 220), 271 Catalina Boulevard, San Diego, Calif. 92152.

Naval Electronic Systems Command, Ms. Carolyn Chewning, Naval Electronic Systems Command (ELEX 3011), Washington, D.C. 20360.

Naval Explosive Ordnance Disposal Facility, Mrs. F. I. Ritchey, Naval Explosive Ordnance Disposal, Facility (Code DS), Indian Head, Md. 20640.

Headquarters, U.S. Marine Corps, Commandant of the Marine Corps (RD), Headquarters, U.S. Marine Corps, Washington, D.C. 20380.

Headquarters, Naval Material Command, Mr. I. Fox, Headquarters, Naval Material Command (MAT 03T2), Washington, D.C. 20360.

Headquarters, Naval Material Command (Coordinated Negotiation Staff), Mr. L. T. Muse, Naval Material Command (NMAT-02D), Washington, D.C. 20360.

Naval Ordnance Missile Test Facility, R. C. Spencer, LCDR., USN, Technical Officer, Naval Ordnance Missile Test Facility (50C), White Sands, N. Mex. 88002.

Pacific Missile Test Center, Mr. John G. Fredenburg, D&A Development and Acquisition Dept. (4400), Pacific Missile Test Center, Point Mugu, Calif. 93042.

Bureau of Naval Personnel, R. R. Worchesek, Capt., USAN, Bureau of Naval Personnel (PERS-A3), Washington, D.C. 20370.

Office of Naval Research, Mrs. Evelyn O. Richards, Office of Naval Research (Code 400A), Arlington, Va. 22217.

Office of Naval Research, Branch Office, Boston, Mr. T. B. Dowd, ONR Branch Office, 495 Summer Street, Boston, Mass. 02210.

Office of Naval Research, Branch Office, Chicago, Mr. M. A. Chaszeyka, ONR Branch Office, 536 S. Clark Street, Chicago, Ill. 60605

Office of Naval Research, Branch Office, Pasadena, CDR. R. R. Levin, USN, ONR Branch Office, 1030 E. Green Street, Pasadena, Calif. 91106

Naval Research Laboratory, Mr. A. Hollings, Head, Research Program Office, Naval Research Laboratory (Code 4010) Washington, D.C. 20375

AIR FORCE I. R. & D. FOCAL POINTS

AFSC/DLXB
Capt. William J. Lewandowski
Air Force IR&D Technical Manager
Andrews AFB DC 20334

AFOSR/XOP
Mr. Matthew Kerper
1400 Wilson Blvd.
Arlington VA 22209

AFAPL/DOY
Mr. Anthony Molisse
Wright-Patterson AFB OH 45433

AFFDL/TSI
Mr. Carl China
Wright-Patterson AFB OH 45433

AFAL/DO
Mr. Yale Jacobs
Wright-Patterson AFB OH 45433

AFML/DOY
Mr. Sam Bakanauskas
Wright-Patterson AFB OH 45433

ASD/ENO
Dr. John Dreher
Wright-Patterson AFB OH 45433

AFATL/DLOU
Capt. Charles E. Hughes
Eglin AFB FL 32542

AFCRL/XOP
Mr. Mario Liberatore
Hanscom AVB
Bedford MA 01731

RADC/DOT
Mr. William Kelley
Griffiss AFB NY 13441

AFWL/PRI
Lt. Col. Keith W. Matson
Kirtland AFB NM 87117

AFRPL/XP
Lt. Col. Gerald W. Stewart
Edwards AFB CA 93523

SAMSO/DYVE
Lt. Jean Bogert
P.O. Box 92960
Worldway Postal Center
Los Angeles CA 90009

AFHRL/XP
Dr. Herbert J. Clark
Brooks AFB TX 78235

FTD/PDXP
Mr. R. Boehme
Wright-Patterson AFB OH 45433

ESD/XRE
Mr. Keith Handsaker
Hanscom AFB
Bedford MA 01730

FJSRL/NA
Lt. Col. Thomas Tomaskovic
USAF Academy CO 80840

AMD/RDOP
Miss Betty J. Evans
Brooks AFB TX 78235

ETR/RML
Mr. E. R. H. Theodorson
Bldg. 981
Patrick AFB FL 32931

NATIONAL AERONAUTICS & SPACE ADMINISTRATION CONTACTS FOR I. R. & D. TECHNICAL EVALUATION

NASA CENTER/PROGRAM OFFICE, INDIVIDUAL, AND TITLE

Ames Research Center, Moffett Field, Calif. 94035; Dr. Al Chambers, Technical Assistant to Director.

Flight Research Center, P.O. Box 273, Edwards, Calif. 93523; Melvin E. Burke, Advanced Planning Office.

Langley Research Center, Langley Station, Hampton, Va. 23665; Dr. Wayne D. Erickson Senior Scientist and Dr. Harry D. Orr.

Lewis Research Center, 21000 Brookpark Road, Cleveland, Ohio 44135; Edward A. Richley, Chief, Office of Operations, Analysis and Planning, and Robert F. Wagner.

Johnson Space Center, Houston, Tex. 77058; Joseph P. Loftus, Chief, Technical Planning Office and Alfred P. Sanders.

Marshall Space Flight Center, Ala. 35812; Dr. James Dozier, Director, Research and Technology Office and Dr. L. S. Yarbrough.

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Kennedy Space Center Fla. 32899; Raymond J. Cerrato, Advanced Technology and Technology Applications Office and Frederick B. Schoenbereer.
Goddard Space Flight Center, Greenbelt, Md. 20771, H. J. Peake, Chief, Office of AST/SRT and National Needs.
Wallops Flight Center Wallops Island, Va. 23337, Gilmore H. Trafford, Research Assistant to Director.
Aeronautics and Space Technology, Dr. R. R. Nash, Manager, IR&D Office.
Applications, Forrest E. Waller, Resources Management.
Manned Space Flight, J. L. Roberts, Advanced Development Division.
Manned Space Flight, R. M. Farrell, Bioengineering Division.
Space Science, Jay A. Salmanson, Technical Assistant, Launch Vehicle and Propulsion Program.
Office of Procurement, Joseph Garcia, Pricing Division, Procurement Policy and Management (IR&D and B&P Policy).
Office of Procurement, Clarence C. Milbourn, Pricing Division, Procurement Policy and Management (IR&D and B&P Negotiation).

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ARMY

1. HQ US Army Materiel Command, AMCRD-T/Mr. J. W. Crellin, 5001 Eisenhower Avenue, Alexandria, Va. 22333.
2. Director, US Army Air Mobility R&D Lab, Ames Research Center (SAVDL-AS), Moffett Field, Calif. 94035.
3. Commander, Rock Island Arsenal, ATTN: Mr. D. Skyberg (SARRI-LR), Rock Island, Ill., 61201.
4. Commander (AMMRC), US Army Materiels and Mechanics Research Center, Mr. Valencia (AMXMR-MX), Watertown, Mass. 02172.
5. Commander, Picatinny Arsenal, Mr. S. W. Tyler (SMUPA-PAF), Feltman Research Labs, Dover, N.J. 07801.
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8. Commander, U.S. Army Human Engineering Laboratories, Dr. L. T. Katchmar, Aberdeen Proving Ground, Md. 21005.
9. Benet Weapons Laboratory, Mr. A. Muzicka, Watervliet, N.Y. 12189.
10. Commander, U.S. Army Aviation Systems Command, Mr. H. Dunkel (AMSAV-ERR), P.O. Box 209, Main Office, St. Louis, Mo. 63166.
11. Commander (ECOM). U.S. Army Electronics Command, Mr. R. G. Lauttman (AMSEL/RD/PB), Fort Monmouth, N.J. 07703
12. Commander (MICOM), Dr. J. S. Kobler (AMSMI-RBI), Director, Redstone Scientific Information Center, Redstone Arsenal, Ala. 35809.
13. Director, U.S. Army Ballistic Research Labs; Mr. E. J. Bryant (AMXBR-XAA), Aberdeen Proving Ground, Md. 21005.
14. U.S. Army Frankford Arsenal, D. E. Walters (SMUFA-A2100), Philadelphia, Pa. 19137.
15. Commander, Harry Diamond Laboratory, Mr. D. P. Rovis (AMXDO-PP), Connecticut Ave. and Van Ness, NW., Washington, D.C. 20438.
16. Commander, Mobility Equipment, R&D Center (MERDC), Mr. G. A. Rhodes (STSFB-BP), Fort Belvoir, Va. 22060.
17. Commander, U.S. Army Mobility Equipment R. & D. Center (MERDC), Mr. H. Ammlung (STSFB-CL), Fort Belvoir, Va. 22060.

NAVY

18. Office of Naval Research, Ms. E. Richards (Code 400A), Ballston Tower No. 1, 800 N. Quincy St., Arlington, Va. 22217.

19. Director, Office of Naval Research, Branch Office, Mr. M. A. Chaszeyka, 536 S. Clark St., Chicago, Ill. 60605.
20. Director, Office of Naval Research, Branch Office, Commander R. R. Levin, 1030 Green St., Pasadena, Calif. 91106.
21. Department of the Navy, Naval Air Test Facility, Naval Air Station, Lakehurst, N.J. 08733.
22. Director, Office of Naval Research, Branch Office, Mr. T. B. Dowd, 495 Summer St., Boston, Mass. 02210.
23. Director, U.S. Naval Research Laboratory (Code 4010), Washington, D.C. 20390.
24. Chief of Naval Material NAVMAT, Mr. Muse (02D), Rm 632, Crystal Plaza No. 5, Washington, D.C. 20360.
25. Commander (NAVAIRDEVCEN), Mr. R. I. Mason (OIB), Naval Air Development Center, Warminster, Pa. 18974.
26. Commander, Naval Weapons Center, Dr. G. F. Plain (Code 6009), China Lake, Calif. 93555.
27. Naval Electronics Laboratory Center, Dr. E. S. Stewart (Code 210) 271 Catalina Boulevard, San Diego, Calif. 92152.
28. Commanding Officer, Mr. F. E. Wolf, Naval Training Equipment Center, Orlando, Fla. 32813.
29. Commanding Officer, Naval Ordnance Missile Test Facility, White Sands Missile Range, N. Mex. 88022.
30. Naval Personnel and Training, San Diego, Calif. 92152.
31. Commanding Officer, Naval Air Propulsion Test Center, Trenton, N.J. 08628.
32. Commander, Naval Air Test Center, Patuxent River, Md. 20670.
33. Commander, Naval Air Systems Command, AIR-30212A, Room 400, Jefferson Plaza No. 1, Washington, D.C. 20361.
34. Consultant Office (530), Naval Missile Center, Point Mugu, Calif. 93042.
35. Naval Sea Research and Development Center, Dr. B. V. Nakonechny (Code 1173), Bethesda, Md. 20034.
36. Naval Air Engineering Center (NAEC), Mr. F. Robinson (R1PA2), Philadelphia, Pa. 19112.
37. Navy Submarine Support Facility, New London, H. Dubicki, Groton, Conn. 06340.
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39. Commanding Officer, Naval Avionics Facility, 21st & Arlington Ave., Indianapolis, Ind. 46318.
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41. Commanding Officer, Naval Underwater Systems Center, Newport, R.I. 02840.
42. Officer-in-Charge, Dr. Edward S. Eby, New London Laboratory, Naval Underwater Systems Center, New London, Conn. 06320.
43. Commandant of the Marine Corps, Room 2004, Arlington Naval Annex, Washington, D.C. 20380.
44. Commanding Officer, Mrs. F. I. Ritchey (Code DA), Naval Explosive Ordnance Disposal Facility, Indian Head, Md. 20640.
45. Commanding Officer, Naval Station (Code 18), Key West, Fla. 33040.
46. Commander, Naval Facilities Engineering Command, NAVFAC (03), 200 Stovall St., Alexandria, Va. 22332.
47. Commander, Naval Supply Systems Command, Mr. M. R. O'Reagon (CM-3), Washington, D.C. 20390.
48. Commanding Officer, Naval Coastal Systems Laboratory, ATTN: Research Director, Dr. E. A. Hogge (Code 101S), Panama City, Fla. 32401.
49. Commander, Naval Surface Weapons Center, Dahlgren, Va. 22448.
50. Commander, Naval Surface Weapons Center, Attn: Dr. Wineland, White Oak, Silver Spring, Md. 20910.
51. Commander, Naval Undersea Research and Development Center, San Diego, Calif. 92132.
52. Officer-in-Charge, Pasadena Laboratory, Naval Undersea Research and Development Center, 3202 E. Foothill Boulevard, Pasadena, Calif. 91107.
53. Commander, Naval Electronic Systems Command (NAVELEX), (3011) Room 7S20, National Center No. 1, Washington, D.C. 20360.
54. Commander, Naval Sea Systems Command NAVSEA (02), Room 5N18, National Center No. 2, Washington, D.C. 20360.

55. Commander, Naval Sea Systems Command, NAVSEA (02), Room 5E58, National Center No. 3, Washington, D.C. 20360.
56. Commander, Naval Sea Systems Command, Dr. John H. Huth, Chief Scientist for R. & D. (Code 031), NAVSEA (03), Room 11E08, National Center No. 3, Washington, D.C. 20360.
57. Commander, Naval Sea Engineering Center, Attn: Mr. P. Hawkins (Code 6146), Center Bldg., Prince Georges Center, Hyattsville, Md. 20782.
58. Naval Strategic Systems Navigation Facility, Flushing and Washington Avenues, Brooklyn, New York 11251.
59. Strategic Systems Project Office, Department of the Navy, Washington, D.C. 20390.
60. Bureau of Naval Personnel, Captain R. R. Worchesch (PERS–A3) Washington, D.C. 20370.
61. Naval Civil Engineering Laboratory, E. S. Witherspoon (Code L20), Port Huenewe, Calif. 93043.
62. Headquarters, Naval Material Command, Mr. J. E. Buhl, Jr. (MAT 03P2), Washington, D.C. 20360.

AIR FORCE

63. AFSC/DLXB, Capt. William J. Lewandowski, Andrews AFB, Washington, D.C. 20334.
64. AFOSR/XP, Mr. M. Kerper, 1400 Wilson Blvd., Arlington, Va. 22209.
65. AFAPL/DOY, Mr. Anthony Molisse, Wright-Patterson AFB, Ohio 45433.
66. AFFDL/TSI, Mr. Carl China, Wright-Patterson AFB, Ohio 45433.
67. AFAL/DO, Mr. Yale Jacobs, Wright-Patterson AFB, Ohio 45433.
68. AFML/DOY, Mr. Sam Bakanauskas, Wright-Patterson AFB, Ohio 45433.
69. ASD/ENO, Mr. Harry L. Kreitzburg, Jr., Wright-Patterson AFB, Ohio 45433.
70. AFATL/DLXP, Capt. Charles E. Hughes, Eglin AFB, Fla. 32542.
71. AFCRL/XOP, Mr. Mario Liberatore, Hanscom Air Force Base, Bedford, Mass. 01731.
72. RADC/DOT, Mr. William Kelly, Griffiss AFB, N.Y. 13441.
73. AFWL/PRT, Lt. Col. Robert B. Anderson, Jr., Kirtland AFB, N. Mex. 87117.
74. AFRPL/XP, Lt. Col. Gerald W. Stewart, Edwards AFB, Calif. 93523.
75. SAMSO/DYAE, Capt. Cecil Rose, Jr., P.O. Box 92960, Worldway Postal Center, Los Angeles, Calif. 90009.
76. AFHRL/XP, Lt. Col. C. E. Waggoner, Brooks AFB, Tex. 78235.
77. FTD/PDXP, Mr. R. Boehme, Wright-Patterson AFB, Ohio 45433.
78. ESD/XRE, Mr. Keith Handsaker, Hanscom Air Force Base, Bedford, Mass. 01730.
79. FJSRL/NA, Lt. Col. Thomas Tomaskovic, USAF Academy, Colo. 80840.
80. AMD/RDOP Miss Betty J. Evans, Brooks AFB, Tex. 78235.
81. ETR/RML, Mr. E.R.H. Theodorson, Building 981, Patrick AFB, Fla. 32931.

NASA

82. Ames Research Center, Dr. Al. Chambers, Technical Asst. to Director, Code D, Moffett Field, Calif 94035.
83. Flight Research Center, Dr. T. L. K. Smull, Special Research Assistant, Code R, P.O. Box 273 Edwards, Calif. 93523.
84. Langley Reserch Center, Dr. Wayne D. Erickson, Senior Scientist, Mail Stop 102A, Langley Station, Hampton, Va. 23365.
85. Lewis Research Center, Edward A. Richley, Chief, Office of Operations Analysis and Planning, Code 1003, 2100 Brookpark Rd. Cleveland, Ohio 44135.
86. Johnson Space Center, Joseph P. Loftus, Chief, Technical Planning Office, Code AT, Houston, Tex. 77058.
87. Marshall Space Flight Center, Dr. James Dozier, Director, Research and Technology Office, Code ER01, Marshall Space Flight Center, Ala. 35812.
88. Kennedy Space Center, Raymond J. Cerrato, Advanced Technology and Technology Applications Office, Code AA–STA–1, Kennedy Space Center, Fla. 32899.
89. Goddard Space Flight Center, H. J. Peake, Chief, Office of AST/SRT and National Needs, Code 110, Greenbelt, Md. 20771.
90. Wallops Flight Center, Gilmore H. Trafford, Research Assistant to Director, Code OD, Wallops Island, Va. 23337.
91. National Aeronautics and Space Administration, Office of Aeronautics and Space Technology, Dr. R. R. Nash, Manager, I.R. & D. Office, Code RI, Washington, D.C. 20546.

CONTRACTORS IN I.R. & D./B. & P. ADVANCED AGREEMENT AND TECHNICAL EVALUATION PROCESS

	Term	Negotiations		Evaluation	
		Lead service	Level of agreement	Lead service	Level of evaluation
Aerojet-General Corp., Azuza, Calif.:					
Aerojet Liquid Rocket Co., Sacramento, Calif	November	N	X	AF	X
Aerojet Solid Propulsion Co., Sacramento, Calif	do	N	X	AF	X
Aerojet Electrosystems Co., Azuza, Calif	do	N	X	N	X
Aerojet Manufacturing Co., Fullerton, Calif	do	N	X	N	X
Aerojet Ordnance & Manufacturing Co., Downey, Calif	do	N	X	N	X
Surface Effects Ships Division, Tacoma, Wash	do	N	X	N	X
Actron Industries, Monrovia, Calif	December	AF	X	AF	X
AMF, New York City, N.Y	do	D	X	N	X
Atlantic Research Corp., Alexandria, Va	do	AF	X	AF	X
Avco Corp., Greenwich, Conn.:					
Corporate G & A	November	AF	X	AF	X
Aerostructures Division, Nashville, Tenn	do	AF	X	AF	X
Everett Research Lab., Everett, Mass	do	AF	X	AF	X
International Services Division, Evendale, Ohio	do	AF	(*)	AF	
Lycoming Stratford Division, Stratford, Conn	do	AF	X	A	X
Systems Division, Wilmington, Mass.:					
Wilmington Operation, Wilmington, Mass	do	AF	X	AF	X
Lowell Operation, Lowell, Mass	do	AF	X	AF	X
Boron Operation, Boron, Mass	do	AF	X	AF	X
Precision Products Division:					
Huntsville Operation, Huntsville, Ala	do	AF	X	AF	X
Tulsa Operation, Tulsa, Okla	do	AF	X	AF	X
Baird Atomics, Inc., Bedford, Mass	September	AF	(*)	N	X
Bendix Corp., Detroit, Mich	do	N	X		
Aerospace Systems Division, Ann Arbor, Mich	do			N	X
Communications Division, Towson, Md	do			N	X
Electrodynamics, North Hollywood, Calif	do			N	X
Energy Controls Division, South Bend, Ind	do			N	X
Navigation & Control Division, Teterboro, N.J	do			N	X
Research Labs, Southfield, Mich	do			N	X
Electric Power	do			N	X
Environmental Science Division, Towson, Md	do			N	X
Fluid Power Division	do			N	X
Boeing Co.:					
Boeing Aerospace Co., Seattle, Wash	December	AF	X	AF	X
Boeing Commercial Airplane Co., Renton, Wash	do	AF	X	AF	X
Vertol Division, Philadelphia, Pa	do	AF	X	A	X
Wichita Division, Wichita, Kans	do	AF	X	AF	X
Field Operations & Support Division, Seattle, Wash	do	AF	X	AF	X
Burroughs Corp., Federal & Special Systems Group, Paoli, Pa	do	AF	(*)	AF	X
CCI Corp., Marquardt Co., Van Nuys, Calif	April	AF	(*)	AF	
Celesco Ind., Inc., Costa Mesa, Calif	December	AF	X	AF	X
Chrysler Corp.: Defense/Space & Diversified Products Group	do	D	X	A	X
Collins Radio Co., Richardson, Tex	July	N	X	N	X
Control Data Corp., Minneapolis, Minn		AF	X		
Minneapolis Military Products Division				N	X
Corporate Research				N	X
Aerospace System Division					X
Curtiss Wright Corp., Wood-ridge N.J.:					
Caldwell Facility, Caldwell, N.J	December	AF	(*)	AF	
Wood-ridge Facility, Wood-ridge, N.J	do	AF	X	N	X
Cutler-Hammer, AIL Division, Deer Park, Long Island, N.Y		N	X	N	X
Draper Laboratory, Cambridge, Mass		N	X		
EG & E Co		AF	(*)	AF	
Emerson Electric Co., HFG, St. Louis, Mo	September	AF	X	AF	X
E Systems, Inc	December	N	X	N	X
Fairchild Industries, Inc., Germantown, Md.:					
Fairchild Republic Co., Farmingdale, N.Y	do	AF	X	AF	X
Fairchild Space & Electronics Division Germantown, Md	do	AF	X	AF	X
Farrand Optical Co., Valhalla, N.Y	September	AF	(*)	AF	
FMC Corp:					
Northern Ordnance Division, Minneapolis, Minn		N	X	N	X
Ordnance Division, San Jose, Calif		A	X	A	X
Engineered Systems Division, Santa Clara, Calif		A	X		
Garrett Corp., Los Angeles, Calif.:					
Airesearch Manufacturing Co., Los Angeles Division	December	AF	X	AF	X
Airesearch Manufacturing Co. of Arizona, Phoenix	do	AF	X	AF	X
General Dynamics Corp., St. Louis, Mo.:					
San Diego Division, San Diego, Calif	do	AF	X	AF	X
Fort Worth Division, Fort Worth, Tex	do	AF	X	AF	X
Pomona Division, Pomona, Calif	do	AF	X	AF	X
Electronics Division, San Diego, Calif	do	AF	X	AF	X
Electric Boat Division, Groton, Conn	do	AF	X	N	X
Stromberg Datagraphix, Inc., San Diego, Calif	do	AF	X	AF	X
Electro-Dynamic Division, Avenel, N.Y	do	AF	(*)	AF	
Quincy Shipbuilding Division, Quincy, Mass	do	AF	(*)	N	

See footnote at end of table.

CONTRACTORS IN I.R. & D./B. & P. ADVANCED AGREEMENT AND TECHNICAL EVALUATION PROCESS—Con.

	Term	Negotiations		Evaluation	
		Lead service	Level of agreement	Lead service	Level of evaluation
General Electric Co.:					
Aerospace Electronics Systems, Utica, N.Y.	December	AF	X	AF	X
Aerospace Controls & Electrical Systems Dept., Binghamton, N.Y.	do	AF	X	AF	X
Aircraft Engine Group, Evendale, Ohio	do	AF	X	AF	X
Armament Dept., Burlington, Vt	do	AF	X	AF	X
Direct Energy Programs, West Lynn, Mass	do	AF	X	AF	X
Electronics Systems Division, Syracuse, N.Y.	do	AF	X	A	X
Ordnance Systems, Pittsfield, Mass	do	AF	X	N	X
Re-entry and Environment Systems Division, Philadelphia, Pa.	do	AF	X	AF	X
Research & Development Center, Schenectady, N.Y.	do	AF	X	AF	X
TEMPO, Santa Barbara, Calif	do	AF	X	AF	X
Valley Forge Space Center, Valley Forge, Pa	do	AF	X	AF	X
Electronics Labortaory (B. & P.) only	do	AF	X	AF	
General Motors Corp., Detroit, Mich.:					
Central Office, Detroit, Mich	August	AF	X	A	X
Indianapolis Operations, Indianapolis, Ind.: Gas Turbine Operations, Indianapolis, Ind.	December	AF	X	AF	X
Delco Electronics Division: Santa Barbara Operations, Santa Barbara, Calif.	August	AF	X	A	X
Goodyear Aerospace Corp., Akron, Ohio	December	N	X		
Akron Division, Akron, Ohio	do			N	X
Arizona Division, Litchfield Park, Ariz	do			N	X
Grumman Aerospace Corp., Bethpage, N.Y.	do	N	X	N	X
GTE Sylvania, Inc., New York City	do	N	X	N	X
Harris-Intertype Corp., Cleveland, Ohio	June	N	X	N	X
Hazeltine Corp., Little Neck, N.Y.	December	AF	(*)	AF	
Hercules, Inc	do	N	X	N	X
Honeywell, Inc., Minneapolis, Minn.:					
North American Operations, Waltham, Mass.: Data Systems Operations, McLean, Va.	do	AF	(*)	AF	
Tampa Operations, Peripheral Devices Division, Tampa, Fla.	do	AF	(*)	AF	
Aerospace & Defense Group, Minneapolis, Minn	do	AF	X	AF	X
Marine Systems Division				N	X
Hughes Aircraft Co., Culver City	December	AF	X	AF	X
Hughes Helicopter	do	A	X	A	X
IMB Corp.: Federal Systems Division	do	AF	X	N	X
International Harvester, Solar Division, San Diego, Calif	do			N	X
International Telephone & Telegraph Corp., N.Y., N.Y.:					
Corporate G & A	do	AF	X	AF	X
ITT Defense Communications, Division, Nutley, N.J.	do	AF	X	AF	X
ITT Avionics Division, Nutley, N.J	do	AF	X	AF	X
ITT Aerospace Optical Division, Fort Wayne, Ind	do	AF	X	AF	X
ITT Gilfillan Division, Van Nuys, Calif	do	AF	X	AF	X
ITT Federal Electric Co., Paramus, N.J	do	AF	X	AF	X
ITT Defense Space Group/G & A, Nutley, N.J	do	AF	X	AF	X
ITT Cable Hydrospace Division, San Diego, Calif	do	AF	X	AF	X
ITT Electro-Physics Lab., Inc., Columbia, Md	do	AF	X	AF	X
ITT Electron Tube Division, Easton, Pa	do	AF	X	AF	X
ITT Space Communications, Inc., Ramsey, N.J	do	AF	X	AF	X
Laboratory for Electronics, Waltham, Mass	April	AF	(*)	AF	
Lear Siegler, Inc, Instrument Division, Grand Rapids, Mich	June	AF	X	AF	X
Litton Systems, Inc	July	N	X	N	X
Lockheed Aircraft Corp.:					
Lockheed-California Co., Burbank, Calif	December	AF	X	N	X
Lockheed Electronics Co., Plainfield, N.J	do	AF	X	N	X
Lockheed Aircraft Services Co., Ontario, Calif	do	AF	X	AF	X
Lockheed-Georgia Co., Marietta, Ga	do	AF	X	AF	X
Lockheed Missiles & Space Co., Sunnyvale, Calif	do	AF	X	AF	X
Lockheed Propulsion Co., Redlands, Calif	do	AF	X	AF	X
Corporate Office Expense, Burbank, Calif	do	AF			
Loral Electronics, New York City	March			AF	X
LTV, Dallas, Tex	December	N	X	N	X
Technology Center	do	N	X	N	X
McDonnell-Douglas Corp., St. Louis, Mo.:					
Corporate Office G/A	do	AF	X	AF	X
Douglas Aircraft Co., Long Beach, Calif	do	AF	X	AF	X
McDonnell-Douglas Research Lab., St. Louis, Mo	do	AF	X	AF	X
McDonnell Aircraft Co., St. Louis, Mo	do	AF	X	AF	X
McDonnell-Douglas Astronautics Co.:					
Western Division, Huntington Beach, Calif	do	AF	X	AF	X
Eastern Division, St. Louis, Mo	do	AF	X	AF	X
Houston Division, Houston, Tex	do	AF	X	AF	X
McDonnell-Douglas—Tulsa Division, Tulsa, Ariz	do	AF	X	AF	X
McDonnell Douglas Electronics Co., St. Charles, Mo	do	AF	X	AF	X
Magnovox Co., Fort Wayne, Ind	do	N	X	N	X

See footnote at end of table.

CONTRACTORS IN I.R. & D./B. & P. ADVANCED AGREEMENT AND TECHNICAL EVALUATION PROCESS—Con.

	Term	Negotiations		Evaluation	
		Lead service	Level of agreement	Lead service	Level of evaluation
Martin-Marietta Corp.:					
Aerospace Group, Washington, D.C.	December	AF	X	AF	X
Denver Division, Waterton, Colo.	do.	AF	X	AF	X
Orlando Division, Orlando, Fla.	do.	AF	X	A	X
Baltimore Division, Baltimore, Md.	do.	AF	X	AF	X
Motorolc, Inc.—Government Electronics Division, Scottsdale, Ariz.	do.	D	X	A	X
Northrop Corporation, Los Angeles, Calif.:					
Corporate G/A	do.	AF	X	AF	X
Aircraft Division, Hawthorne, Calif.	do.	AF	X	AF	X
Electronics Division, Palos Verdes, Calif.	do.	AF	X	AF	X
Electro-Mechanical Division, Anaheim, Calif.	do.	AF	X	AF	X
Ventura Division, Newbury Park, Calif.	do.	AF	X	AF	X
Research & Technology Center, Hawthorne, Calif.	do.	AF	X	AF	X
Page Communications Engineers, Inc., Vienna, Va.	July	AF	(*)	AF	
Perkin-Elmer Corp.—Optical Group, Norwalk, Conn.	do.	AF	X	AF	X
Philco-Ford Corp.	December	N	X	N	X
Raytheon Co.	do.	A	X	A	X
RCA Corp., New York City				N	X
Electronic Products Division, Harrison, N.J.	December	N	X	----------	
Government & Commercial Systems Division, Camden, N.J.	do.	N	X	----------	
Laboratories Division Princeton, N.J.	do.	N	X	----------	
Rockwell International:					
Corporate Office, Pittsburgh, Pa.					
Aerospace Group Hq, El Segundo, Calif.:					
Tulsa Division, Tulsa, Okla.	September	AF	X	AF	X
B-1 Division, El Segundo, Calif.	do.	AF	X	AF	X
Los Angeles Division, El Segundo, Calif.	do.	AF	X	AF	X
Science Center, Thousand Oaks, Calif.	do.	AF	X	AF	X
Columbus Division, Columbus, Ohio.	do.	AF	X	N	X
Space Group, El Segundo, Calif.:					
Space Division, Downey, Calif.	do.	AF	X	AF	X
Rocketdyne Division, Canoga Park, Calif.	do.	AF	X	AF	X
Electronics Group Headquarters, Anaheim, Calif.:					
Autonetics Division, Anaheim, Calif.	do.	AF	X	AF	
West Virginia Plan Princeton, W. Va.					
Maine Electronics Division, Lisbon, Maine					
Missile Systems Division, Columbus, Ohio.	September	AF	X	N	X
Sanders Associates, Inc., Nashua, N.H.	July	N	X	N	X
Santa Barbara Research Center, Santa Barbara, Calif.	December	AF	X	AF	X
Singer Co., New York, N.Y.:					
Corporate Laboratory, New York, N.Y.	do.	AF	X	AF	X
Kearfott Division, Little Falls, N.Y.	do.	AF	X	AF	X
HRB-Singer Inc. Division, State College, Pa.	do.	AF	X	AF	X
Simulation Products Division, Binghamton, N.Y.	do.	AF	X	AF	X
Librascope Division, Glendale, Calif.	do.	AF	X	N	X
Sperry Rand Corp., New York, N.Y.:					
Gyroscope Division, Great Neck, N.Y.	March	AF	X	N	X
Marine Systems Division, Charlottesville, Va.	do.	AF	X	N	X
Microwave Components, Gainesville, Fla.	do.	AF	X	AF	X
Microwave Electronics Division, Clearwater, Fla.	do.	AF	X	AF	X
Support Services Division, Huntsville, Ala.	do.	AF	(*)	----------	
Sperry Flight Systems Division, Phoenix, Ariz.	do.	AF	(*)	AF	
Sperry Rand Research Center, Sudbury, Mass.	do.	AF	X	N	X
Sperry Univac Division, Minneapolis, Minn.:					
Defense Systems Division, Minn.	do.	AF	X	N	X
Technical Services Division, Minn.	do.	AF	(*)	N	
Sperry Vickers, Aero Ordnance Marine Division, Troy, Mich.	do.	AF	(*)	N	
Stanford Research Institute	December	A	X	A	X
Sunstrand Corp., Rockford, Ill.	do.	AF	(*)	AF	
Susquehanna Corp.:					
Atlantic Research Corp.		AF	X	AF	X
Celesco (B. & P. Only)		AF	X	AF	
Systems Development Corp., Santa Monica, Calif.	June	AF	X	AF	X
Teledyne, Inc., Los Angeles, Calif.:					
Continental Motors	October	A	X	A	X
Teledyne CAE, Toledo, Ohio	December	AF	X	AF	X
Teledyne Ryan Aeronautical, San Diego, Calif.	do.	AF	X	AF	X
Teledyne MEC, Palo Alto, Calif.	do.	AF	X	AF	X
Teledyne McCormick-Selph, Hollister, Calif.	do.	AF	X	AF	X
Teledyne Geotech Division	do.	D	----------	AF	X
Texas Instruments, Inc.	do.	N	X	N	X

See footnote at end of table.

CONTRACTORS IN I.R. & D./B. & P. ADVANCED AGREEMENT AND TECHNICAL EVALUATION PROCESS—Con.

	Term	Negotiations		Evaluation	
		Lead service	Level of agreement	Lead service	Level of evaluation
Textron, Inc.:					
Bell Aerospace Co., Whitefield, N.Y.	December	AF	X	AF	X
Dalmo Victor Co. (included in Bell Aerospace).					
Bell Helicopter Co., Fort Worth, Tex.	do	A	X	A	X
Thiokol Chemical Corp., Bristol, Pa.	do	AF	X	AF	X
TRW, Inc.:					
TRW Equipment Group, Cleveland, Ohio	do	AF	X	N	X
TRW Systems Group, Redondo Beach, Calif.	do	AF	X	AF	X
United Aircraft Corp.:					
Hamilton Standard Division, Windsor Locks, Conn.	do	N	X	N	X
Norden Division, Norwalk, Conn.	do	N	X	N	X
Pratt & Whitney Aircraft Division (Hartford)	do	N	X	N	X
Pratt & Whitney Aircraft Division (West Palm Beach)	do	N	X	N	X
Sikorsky Aircraft Division, Stratford, Conn.	do	N	X	N	X
United Technology Center, Sunnyvale, Calif.	do	AF	X	AF	X
Varian Assoc Palo Alto, Calif.	September	AF	(*)	AF	X
Western Electric Co., Inc—Bell Telephone Labs, Murray Hill, N.J.	December	A	X	A	X
Westinghouse Electric Corp.	do	N	X	N	X
Zerox Corp.—Electro-Optical Systems Division, Pasadena, Calif.	do	AF	X	AF	X

* Inactive—does not meet criteria for negotiation.
Key: A—Army; N—Navy; AF—Air Force; D—DCAS.

STATISTICS RELATING TO I. R. & D., B. & P., FOR MAJOR DEFENSE CONTRACTORS

[Dollar amounts in millions]

	1964	1965	1966	1967	1968	1969	1970	[1] 1971	[2] 1972	[3] 1973	[4] 1974
Sales:											
Total Government and commercial	$23,470	$24,054	$28,438	$34,167	$36,954	$36,430	$32,519	$32,065	$30,577	$37,635	$40,405
Total DOD only	$16,442	$15,644	$17,889	$21,371	$22,275	$22,692	$21,315	$19,568	$19,117	$21,148	$21,690
Percent DOD sales to total sales	70	65	63	63	61	62	65	61	63	56	54
I.R. & D.:											
Total industry cost incurred	$419	$439	$502	$591	$752	$808	$753	$703	$936	$1,164	$1,148
Total reimbursed on DOD contracts	$199	$198	$224	$277	$333	$389	$376	$354	$392	$441	$457
Amount reimbursed on DOD contracts:											
As a percent of total incurred	47	45	45	47	44	48	50	50	42	38	40
As of percent of DOD sales	1.21	1.26	1.25	1.30	1.46	1.73	1.76	1.86	2.05	2.09	2.17
B. & P.:											
Total industry cost incurred	$252	$277	$315	$338	$387	$426	$414	$428	$469	$553	$546
Total reimbursed on DOD contracts	$182	$186	$202	$230	$275	$286	$278	$265	$306	$360	$351
Amount reimbursed on DOD contracts:											
As a percent of total incurred	72	67	64	68	71	67	67	62	65	65	64
As a percent of DOD sales	1.11	1.19	1.13	1.08	1.23	1.26	1.30	1.35	1.60	1.70	1.62
OTE:											
Total industry cost incurred	$182	$237	$238	$292	$252	$178	$151	0	0	0	0
Total reimbursed on DOD contracts	$71	$76	$91	$92	$77	$79	$60	0	0	0	0
Amount reimbursed on DOD contracts:											
As a percent of total incurred	39	32	38	32	31	44	40	----------			
As a percent of DOD sales	0.43	0.49	0.51	0.43	0.35	0.35	0.28	----------			
Grand total:											
I.R. & D., B. & P., OTE incurred	$853	$953	$1,055	$1,221	$1,391	$1,412	$1,318	$1,131	$1,405	$1,717	$1,694
Total reimbursed by DOD	$452	$460	$517	$599	$685	$754	$714	$619	$698	$801	$808
Amount reimbursed by DOD:											
As of percent of total incurred	53	48	49	49	49	53	54	55	50	47	48
As of percent of DOD sales	2.75	2.94	2.89	2.80	3.07	3.32	3.35	3.16	3.65	3.79	3.73
Total incurred as a percent of total sales	3.63	3.96	3.71	3.57	3.76	3.88	4.05	3.52	4.59	4.56	4.19

[1] The data represents that for 84 contractors comprising 175 profit centers. The cost principles in ASPR have been revised to include in their definitions of I.R. & D. and B. & P. certain technical costs not previously included. These changes have become effective and therefore separate data for these "other technical effort" will not be included in this and subsequent reports.

[2] The data represents that for 77 contractors comprising 167 profit centers. $32,000,000 of the costs is burden applied to I.R. & D. and B. & P. for the 1st time by those contractors who had not previously burdened I.R. & D./B. & P. $13,800,000 is the amount of I.R. & D./B. & P. applicable to foreign military sales reimbursed to the DOD.

[3] The data represents that for 83 contractors comprising 182 profit centers. Included in the data are sales of $1,027.3 to foreign governments placed under DOD contracts but reimbursed to DOD by such foreign governments. The applicable I.R. & D./B. & P. recovered in these sales is $38,200,000. $55,000,000 in the data represents burden applied to I.R. & D./B. & P. by the list of those contractors implementing the overhead requirement of DPC 90 dated Sept. 1, 1971.

[4] The data represents that for 90 contractors comprising 336 profit centers—an increase of 7 contractors and 54 profit centers due primarily to the addition of contractors with advanced agreement who previously were below audit thresholds. Included are the foreign Government sales of $1,353,500,000 with $42,000,000 of applicable I.R. & D./B. & P. allocable to these sales. There was little or no impact due to increased burdening in 1974 because full implementation of burdening as required by DPC 90 was completed by most contractors in 1973.

Source: Annual DCAA report, "Summary of I.R. & D. and B. & P. Costs Incurred by Major Defense Contractors".

AIR FORCE

TECHNICAL EVALUATIONS

OF

INDEPENDENT RESEARCH AND DEVELOPMENT

SUMMARY OF CFY 1974

JUNE 1975

LABORATORY PROGRAMS DIVISION
DIRECTOR OF SCIENCE AND TECHNOLOGY
HEADQUARTERS AIR FORCE SYSTEMS COMMAND
ANDREWS AIR FORCE BASE, DC 20334

FOREWORD

This document was prepared to provide management information on the adequacy of Air Force participation in the IR&D technical evaluation process. The participation of Air Force evaluation organizations in technical plan and on-site review evaluations is highlighted. The performance of Air Force lead organizations is summarized and information on each evaluation given. The data used to generate this report were taken from HQ AFSC files. If there are any questions, comments, or suggestions for improvement, please contact me.

William J. Lewandowski

WILLIAM J. LEWANDOWSKI, Capt, USAF
Air Force IR&D Technical Manager
Director of Science & Technology

TABLE OF CONTENTS

SECTION 1

EXECUTIVE SUMMARY

This section provides a brief summary of the Air Force IR&D technical evaluation activities in Contractor Fiscal Year (CFY) 1974, with a comparison to CFY 1973 when possible and meaningful. Air Force responsibilities, evaluation organization participation, lead organization performance, support provided by the other services and NASA, the overall quality of Air Force evaluations, and cost of the technical evaluation process are summarized in the following paragraphs.

In 1974, the Air Force was directly responsible for 90 technical plan evaluations and 34 on-site reviews. Headquarters Air Force Systems Command (DLXB) also was responsible for the validation of 24 technical plan evaluations and 7 on-site reviews done by the Army and Navy for Air Force negotiated contractors (Table 1). Of the 90 evaluations for which the Air Force was lead service, 84 were for Air Force negotiators, 2 for Navy and 4 for Defense Contract Administration Service (DCAS) (Table 2). The number of technical plan evaluations totally decreased by 4 from 1973 (1 addition, 3 transferred to Navy, 2 not requiring Advanced Agreements). Four more on-site reviews were conducted in 1974 than in 1973.

Participation of individual Air Force organizations in technical plan evaluations is summarized in Table 3. The "participation" column gives the number of company evaluations in which a particular organization participated. Aeronautical Systems Division (ASD) participated in 75 company evaluations in 1974 (58 company evaluations in 1973). The project evaluations columns give the number of individual project evaluations done in support of Air Force lead organizations, the number in support of Army and Navy lead organizations, and the total number of project evaluations. For example, ASD provided 1117 project evaluations for Air Force companies in 1974 (851 project evaluations for Air Force companies in 1973) and 703 for Army and Navy companies in 1974 (93 in 1973) for a total of 1820 evaluations in 1974 (944 in 1973). The next column gives the percent of the project evaluations with technical comments. Fifteen percent of the ASD

project evaluations in 1974 (52 percent in 1973) had technical comments. The next two columns reflect the average duration from receipt of technical plan to submission of evaluations to the lead organization and the percent of these submissions which were sent in less than 60 days. The average support evaluation duration for ASD was 82 in 1974 (72 in 1973) and 35 percent in 1974 (52 percent in 1973) of their evaluations were sent in less than 60 days. The Air Force organization participation in technical plan evaluations in total increased from 1973 to 1974. The number of companies reviewed by Air Force organizations and the number of individual evaluations increased, while the time taken to perform these company evaluations was shorter. The percent of the project evaluations with technical comments decreased from 1973 to 1974.

The lead organization is responsible for collecting, summarizing, scoring and following-up with support organizations to accomplish high quality evaluations. The responsibility and performance of lead organizations are summarized in Table 4. The first three columns summarize the responsibility of the lead organizations in terms of the number of companies, submitted funds and number of projects. For instance, ASD was responsible for one company evaluation with funding of $.3M and 14 individual projects in 1974 (1 company, $.3M, 13 projects in 1973). The lead organization responsibility for the Air Force decreased in the number of companies and the number of projects submitted by those companies, but increased in the funds for those projects from 1973 to 1974. The next three columns reflect the extent to which the submitted evaluations met the standards in the three areas identified in AFSC Sup 1 to AFR 80-53. The scope standard calls for evaluation of 90 percent of the contractor funds; the quality standard calls for eight evaluator qualification points per project (DD Form 1855, Block 7, with d = 6 points, c = 4 points, b = 2 points and a = 1 point) for 75 percent of the projects evaluated; and the breadth standard requests that no single organization account for more than 50 percent of the individual project evaluations. Aeronautical Systems Division met these standards 100, 0, 100 percent of the time in 1974 (100, 85, 100 in 1973) respectively. Any organization with percentages less than 100 in scope or breadth or less than 80 percent in quality has room for improvement. The quality standard is especially important since the results of these evaluations have a direct impact on the contractor's negotiated ceiling. Significant improvement is necessary in this area at several organizations. More detailed information is given in Section 2.

The participation of Air Force organizations in on-site reviews is summarized in Table 5. The table is divided into two sections indicating participation as lead organization and in support of other organizations. The number of reviews conducted or supported and the number of attendees sent to these reviews is given. Thus, ASD was not a lead organization for any on-site review in 1974 (0 in 1973), but sent 86 attendees to 19 reviews conducted by other Air Force organizations in 1974 (21 attendees to 8 reviews in 1973) and 2 attendees to 2 Army or Navy reviews in 1974 (18 attendees to 6 reviews in 1973). The Air Force sent a total of 633 attendees to 34 Air Force reviews as compared with 365 attendees to 30 Air Force reviews in 1973. This is a substantial increase in participation. The Air Force only sent 24 attendees to 22 Army or Navy reviews in 1974, as compared with 139 attendees to 21 Army or Navy reviews in 1973. This is a substantial decrease in participation in 1974.

The performance of lead organizations in organizing and conducting on-site reviews is summarized in Table 6. Responsibilities data are the same as in Table 4. The quality is the same as for technical plan evaluations whereas the scope requirement is to review more than 30 percent of the contractor's programs, and the breadth standard is to have no more than 50 percent of the attendees at a review from a single organization. Improvements can be made in the area of breadth which should normally be very close to 100 percent. Because of the restricted scope permitted for on-site reviews, the quality should be over 90 percent for most reviews. Significant improvement could be made at several organizations in the quality area. More detailed information is given in Section 3. In comparison with 1973, the Air Force had a greater responsibility in 1974 and improved in quality and breadth.

The support received from the other services and NASA is summarized in Table 7. Army technical plan support decreased by two percent, whereas the Navy support increased by eight percent which means about a 73 percent increase from 1973 to 1974 for the Navy. Support by NASA decreased 50 percent to two percent of the total in 1974. Air Force participation decreased by four percent. The Army on-site review support increased by one percent and the Navy increased by eight percent. Support by NASA decreased by 40 percent to three percent of the total. The Air Force participation decreased by 12 percent. "Other" refers to ODDR&E and other government agencies (like the Coast Guard) whose personnel participated in a few evaluations.

The overall quality of Air Force evaluations as well as participation is summarized in Table 8. Overall, there has been increased participation and improved quality of technical evaluations in 1974 compared to 1972 and 1973. This means increased coupling with industry and a better product for the triservice negotiation teams.

The timing of receipt of technical plans (input) and submittal of composite scores to the negotiators (output) is given in Table 9. All scores were transmitted prior to 1 October 1974, which is a one-month improvement over 1973. The goal for next year is to have all scores to the negotiators by 1 October 1975.

An estimate of the manpower invested in the IR&D technical evaluation process for CFY 1974 evaluations is given in Table 10. The assumptions for the estimate are: one hour per technical plan project evaluation; 1730 hours per manyear; 3 days per on-site review; estimates of focal point management time mainly provided by the focal points; and $35K/manyear.

In summary, there were significant increases in Air Force organization participation in the technical evaluation process during CFY 1974. Further, the quality of the evaluations improved. However, there is still room for further improvement in 1975. Organizations should continue to increase support in their overall effort to provide meaningful technical evaluations to the Triservice negotiation teams and stimulate enhanced coupling with the contractors.

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TABLE 1

AIR FORCE RESPONSIBILITIES

	CFY 73	CFY 74
AS LEAD SERVICE		
Technical Plan Evaluations	94	90
On-Site Review Evaluations	30	34
AFSC VALIDATED FOR AIR FORCE*		
Technical Plan Evaluations	22	24
On-Site Reviews	6	7

*Army, Navy Lead Service; Air Force Negotiation Responsibilities

TABLE 3

CFY 74 TECHNICAL PLAN EVALUATION PARTICIPATION

ORGANIZATION	PARTICIPATION	PROJECT EVALUATIONS			COMMENTS	TIMELINESS	
	COMPANIES	AIR FORCE	ARMY & NAVY	TOTAL	PERCENT	DURATION (DAYS)	PERCENT W/IN 60 DAYS
ASD	75 (58)*	1117 (851)*	703 (93)*	1820 (944)*	15 (52)*	82 (72)*	35 (52)*
ESD	38 (27)	208 (149)	92 (18)	300 (167)	20 (28)	47 (57)	63 (72)
SAMSO	75 (46)	810 (486)	403 (125)	1213 (611)	22 (33)	107 (62)	4 (75)
AFFDL	165 (154)	1542 (1585)	979 (902)	2521 (2487)	20 (36)	46 (38)	75 (89)
AFAL	121 (97)	1199 (1161)	1005 (842)	2204 (2003)	13 (23)	40 (82)	85 (28)
AFAPL	65 (66)	546 (419)	303 (296)	849 (715)	38 (41)	30 (55)	100 (75)
RADC	77 (81)	441 (447)	376 (565)	817 (1012)	10 (27)	32 (61)	96 (69)
AFML	74 (98)	486 (570)	453 (371)	939 (941)	15 (31)	40 (57)	90 (66)
AFRPL	45 (29)	322 (245)	102 (67)	424 (312)	60 (83)	45 (59)	72 (47)
AFATL	20 (34)	182 (240)	22 (99)	204 (339)	7 (42)	48 (76)	67 (33)
AFOSR	56 (31)	356 (459)	70 (20)	426 (479)	37 (25)	55 (45)	64 (89)
AFCRL	60 (53)	245 (277)	206 (125)	451 (402)	30 (35)	53 (64)	75 (39)
ARL	42 (25)	310 (206)	- -	310 (206)	24 (46)	66 (81)	63 (21)
AFWL	79 (52)	323 (191)	123 (96)	446 (287)	37 (65)	29 (49)	97 (64)
AFHRL	29 (35)	207 (77)	27 (8)	234 (85)	15 (48)	28 (22)	100 (100)
AMD	4 (12)	11 (16)	- (4)	11 (20)	73 (85)	67 (88)	67 (30)
FJSRL	12 (5)	21 (16)	4 -	25 (16)	32 (56)	121 (68)	84 (75)
TOTAL	1037 (885)	8326 (7449)	4868 (3635)	13194 (11084)	27 (36)	55 (59)	73 (61)

*(Corresponding 1973 Figure)

TABLE 4

LEAD ORGANIZATION PERFORMANCE - TECHNICAL PLANS

ORGANIZATION	RESPONSIBILITY			PERCENT MEETING STANDARD		
	COMPANIES	FUNDS ($M)	NO. PROJ.	SCOPE	QUALITY	BREADTH
ASD	1 (1)*	.3 (.3)*	14 (13)*	100 (100)*	0 (85)*	100 (100)*
ESD	1 -	1 -	28 -	100 -	100 -	100 -
SAMSO	7 (8)	51 (42)	579 (793)	72 (75)	14 (36)	100 (100)
AFFDL	16 (21)	125 (92)	804 (881)	100 (100)	100 (83)	100 (100)
AFAL	14 (18)	63 (63)	508 (596)	100 (100)	86 (71)	100 (89)
AFAPL	6 (6)	78 (79)	242 (240)	100 (100)	83 (75)	100 (100)
RADC	8 (5)	16 (12)	188 (159)	100 (80)	75 (36)	100 (80)
AFML	3 (2)	1 (1)	35 (23)	68 (100)	100 (61)	67 (100)
AFRPL	8 (8)	19 (26)	226 (248)	100 (87)	100 (73)	100 (87)
AFATL	8 (7)	11 (12)	201 (223)	100 (86)	63 (66)	100 (71)
AFOSR	7 (9)	20 (18)	224 (183)	100 (100)	72 (68)	100 (100)
AFCRL	4 (3)	8 (8)	67 (66)	75 (100)	25 (55)	100 (100)
ARL	3 (2)	19 (16)	89 (78)	100 (100)	100 (65)	100 (100)
AFWL	3 (3)	2 (2)	26 (33)	100 (100)	100 (85)	100 (100)
AFHRL	1 (1)	2 (2)	37 (36)	100 (100)	100 (80)	100 (100)
SUMMARY	90 (94)	404 (373)	3268 (3572)	94 (95)	75 (65)	98 (94)

*(Corresponding 1973 Figure)

TABLE 5

CFY 74 AIR FORCE ON-SITE PARTICIPATION

ORGANIZATION	AS LEAD ORGANIZATION		AS SUPPORT ORGANIZATION			
			AIR FORCE (34)		ARMY & NAVY (22)	
	REVIEWS	ATTENDEES	REVIEWS	ATTENDEES	REVIEWS	ATTENDEES
ASD	0 (0)*	- (-)*	19 (8)*	86 (21)*	2 (6)*	2 (18)*
SAMSO	1 (5)	17 (33)	13 (5)	32 (8)	2 (2)	2 (2)
ESD	1 (0)	4 (-)	0 (1)	0 (1)	0 (5)	0 (6)
AFFDL	8 (4)	122 (78)	9 (7)	91 (11)	4 (6)	6 (14)
AFAL	5 (9)	37 (38)	9 (5)	25 (12)	1 (5)	2 (5)
AFAPL	4 (1)	56 (3)	8 (1)	17 (3)	1 (4)	1 (18)
RADC	3 (2)	7 (11)	7 (8)	10 (21)	1 (6)	1 (13)
AFML	1 (1)	6 (10)	6 (10)	13 (21)	2 (5)	6 (12)
AFRPL	5 (2)	42 (11)	3 (3)	6 (7)	0 (0)	0 (0)
AFATL	3 (3)	8 (7)	1 (2)	2 (2)	0 (4)	0 (6)
AFOSR	0 (2)	- (8)	4 (5)	4 (7)	1 (4)	1 (6)
AFCRL	2 (0)	8 (-)	2 (4)	5 (5)	0 (3)	0 (17)
ARL	1 (1)	11 (17)	3 (4)	7 (13)	0 (1)	0 (4)
AFWL	0 (0)	- (-)	4 (6)	12 (8)	1 (2)	2 (3)
AFHRL	0 (0)	- (-)	3 (0)	3 (-)	0 (1)	0 (1)
AMD	0 (0)	- (-)	1 (0)	2 (0)	0 (0)	0 (0)
FJSRL	0 (0)	- (-)	0 (1)	0 (1)	1 (0)	1 (0)
ALL AF	34 (30)	318 (216)	92 (78)	315 (149)	16 (57)	24 (139)

*(Corresponding 1973 Figure)

TABLE 6

LEAD ORGANIZATION PERFORMANCE - ON-SITE REVIEWS

ORGANIZATION	RESPONSIBILITY						PERCENT MEETING STANDARD					
	COMPANIES		FUNDS ($M)		NO. PROJECTS		SCOPE		QUALITY		BREADTH	
ESD	1		1.1		18		100		100		100	
SAMSO	1	(5)*	6.6	(11.5)*	70	(122)*	100	(100)*	0	(54)*	100	(100)*
AFFDL	8	(4)	55.8	(14.3)	304	(150)	100	(100)	100	(98)	38	(75)
AFAL	5	(9)	17.6	(9.3)	87	(77)	100	(100)	100	(86)	100	(63)
AFAPL	4	(1)	45.2	(2.1)	144	(14)	100	(100)	75	(71)	100	(100)
RADC	3	(2)	5.0	(5.1)	38	(48)	100	(100)	100	(90)	100	(100)
AFML	1	(1)	.2	(.5)	7	(10)	100	(100)	100	(90)	0	(0)
AFRPL	5	(2)	9.0	(3.4)	74	(52)	100	(100)	100	(48)	80	(50)
AFATL	3	(3)	4.2	(2.6)	86	(44)	100	(100)	68	(82)	68	(67)
AFOSR		(2)		(5.2)		(23)		(100)		(100)		(100)
AFCRL	2		2.3		16		100		100		100	
ARL	1	(1)	.7	(14.9)	18	(59)	100	(100)	100	(88)	100	(100)
SUMMARY	34	(30)	144.1	(69.2)	862	(559)	100	(100)	86	(80)	81	(77)

*(Corresponding 1973 Figure)

TABLE 7

SUPPORT OF AIR FORCE IR&D EVALUATIONS IN CFY 74

DEPARTMENT	TECHANCIAL PLAN EVALUATIONS		ON-SITE REVIEWS	
	PROJECT EVALUATIONS (PERCENT)		NUMBER OF ATTENDEES (PERCENT)	
	CFY 73	CFY 74	CFY 73	CFY 74
AIR FORCE	7,466 (67)	8,326 (63)	363 (65)	623 (53)
ARMY	1,998 (18)	2,190 (16)	74 (13)	165 (14)
NAVY	1,202 (11)	2,590 (19)	92 (17)	301 (25)
NASA	445 (4)	317 (2)	26 (5)	39 (3)
OTHER	6	8	1	60 (5)
TOTAL	11,117 (100)	13,431 (100)	556 (100)	1,189 (100)

TABLE 8

QUALITY OF EVALUATIONS

	CFY 72	CFY 73	CFY 74
MEETING AIR FORCE STANDARD (PERCENT)	53	64	80
TWO OR MORE EXPERTS (PERCENT)	36	47	63
NO [redacted] EXPERTS PER PROJECT (PERCENT)	24	20	12
EVALUATIONS PER PROJECT	2.5	3.1	3.9
NUMBER OF EVALUATIONS	7,647	11,117	13,194

TABLE 9

TIMING OF TECHNICAL EVALUATIONS

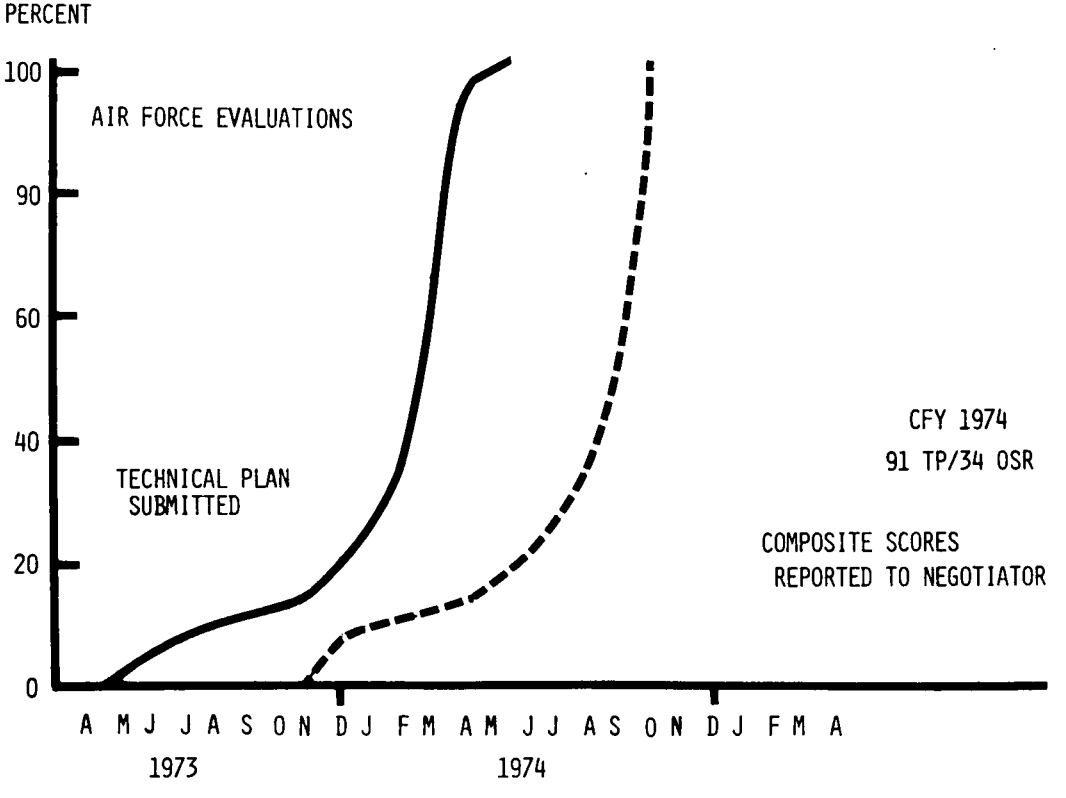

TABLE 10

CFY 74 AIR FORCE EVALUATION ORGANIZATIONS

IR&D RESOURCES ESTIMATE

	MANYEARS	COST ($K)
TECHNICAL PLAN:		
Evaluators	8.0	280
Administration (Focal points, clerical, HQ AFSC)	5.0	175
SUBTOTAL	13.0	455
ON-SITE REVIEW:		
Evaluators	7.0	245
Administration	4.0	140
Per Diem, Travel		100
SUBTOTAL	11.0	485
TOTAL	24.0	940

SECTION 2

TECHNICAL PLAN EVALUATION SUMMARIES

A summary of the evaluations done by each organization is given in Table 11. The number of evaluations the organization was responsible for is given. Then, the funds submitted and evaluated, and the percent of the submitted funds this represents and the number of projects evaluated and corresponding percent. For example, AFAL was responsible for 14 company evaluations representing $63,086K and 508 projects. The AFAL evaluated 494 of the 508 worth $61,421K. In the next three columns the number of projects and corresponding percents are given for (1) projects meeting the quality standard, (2) projects with two or more C or D evaluators and (3) projects with no C or D evaluators. For AFAL these values are respectively 450 (83 percent), 365 (68 percent) and ten (eight percent). The first two values should be as large as possible and the third as low as possible. The next column is the total number of evaluations summarized by the particular lead organization and the average number of evaluations per project. The AFAL summarized 2,221 evaluations which represented 4.05 evaluations per project. The next column is the average time from receipt of the technical plan to submittal of a summary report to AFSC. The next four columns bear upon the breadth of the evaluation. The first column is the number of technical plans distributed, the next column is the number and percent of those organizations receiving technical plans which participated in the evaluations. Then the number and percent of non-Air Force organizations which participated. Finally, the number of project evaluations from the largest contributor and the percent this represents of the total number of evaluations. For AFAL contractors there were 526 technical plans distributed; 177 organizations (or 34 percent) participated in the evaluations; of these, 76 (or 43 percent) were non-Air Force organizations. Largest contributor evaluations added up to 595 project evaluations which was 27 percent of all evaluations submitted.

A brief summary of each evaluation accomplished is given in Table 12. The evaluations are grouped by lead organization. To illustrate the meaning of the data a brief discussion of the AFAL evaluation of Lear Seigler Astronics will be given. Lear Seigler submitted a program of $1,260K and 7 projects. The AFAL obtained evaluations for $1,260K or 100 percent of the funds and 7 or 100 percent of the projects. Five or 71 percent of the projects met the AFSC quality standard. These five projects all had two or more evaluators who were "experts" (possess "specific knowledge" item C or D on block 7 of DD Form 1855). There were no experts on 1 or 14 percent of the projects.

There were 30 evaluations for 4.3 evaluations per project. The evaluation summary was submitted 110 days after receipt of the technical plan. Technical plans were submitted to 18 organizations in DOD/NASA. Nine organizations submitted evaluations (including AFAL) which represented 50 percent of the organizations receiving technical plans. Five organizations or 56 percent of the participating organizations were from the Army, Navy or NASA. Nine project evaluations came from a single organization which represented 30 percent of the evaluations.

TABLE 11

TECHNICAL PLAN EVALUATION SUMMARY

ORG	NO COMPANIES	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
		FUNDS $K		PROJECTS		MEETING STANDARD	2 + EXPERTS	NO EXPERTS	EVAL		# TP	PARTICIP	NON-AF PARTICIP	MAX ORG
		SUB	EVAL # (%)	SUB	EVAL#(%)	# (%)	# (%)	# (%)	PROJ		DIST	# (%)	# (%)	PART %
\FAL	14	63,086	61,424 (97)	508	494(97)	450 (83)	365(68)	70 (8)	2227/4.05	114	526	177(34)	76(43)	595/27
\FAPL	6	77,861	77,366 (99)	242	236(98)	231(85)	180(62)	15 (5)	1010/3.81	120	167	49(29)	22(45)	243/24
\FATL	8	11,230	10,521 (94)	201	183(91)	158(76)	154(69)	11 (4)	624/3.03	166	238	79(33)	48(61)	162/26
\FCRL	4	8,404	8,112 (97)	67	64(96)	37(55)	27(41)	21(27)	285/4.2	94	132	59(45)	25(42)	62/22
\FFDL	16	109,567	109,122(100)	804	800(100)	805(93)	664(78)	47(3)	3511/4.2	120	733	324(44)	154(48)	972/28
\FHRL	1	2,405	2,405(100)	37	37(100)	29(78)	21(67)	6(16)	139/3.8	140	48	12(25)	6(50)	54/39
\FML	3	1,388	1,303 (94)	35	34 (97)	33(82)	21(51)	5(12)	150/3.63	121	87	20(23)	10(50)	70/47
\FOSR	7	20,376	20,376(100)	224	224(100)	168(78)	132(59)	38(28)	635/3.94	68	228	68(30)	22(32)	182/ 29
\FRPL	8	19,239	18,521 (96)	226	212 (94)	213(87)	171(71)	23 (5)	923/4.82	119	245	185(76)	61(33)	233/25
\FWL	3	2,075	2,075(100)	26	26(100)	50(98)	48(97)	2 (2)	168/5.26	105	120	36(30)	19(53)	40/24
\RL	3	18,895	18,895(100)	89	89(100)	76(91)	62(77)	10 (6)	433/3.49	147	135	52(39)	24(46)	93/21
\SD	1	364	364(100)	14	14(100)	12(60)	3(14)	4(19)	63/3.0	112	28	13(46)	6(46)	23/37
\ADC	8	15,759	14,911 (95)	188	161 (86)	150(80)	90(52)	16 (9)	618/3.53	119	181	62(34)	22(35)	175/28
\AMSO	7	51,405	46,088 (90)	579	523 (90)	397(57)	287(45)	172(19)	1971/2.83	150	224	109(49)	50(46)	621/32
ESD	1	1,460	1,460(100)	28	28(100)	27(96)	14(50)	4(14)	118/4.1	102	16	8(50)	2(25)	26/ 22
TOTAL	90	463,514	392,943 (97)	3,268	3125(96)	2836(80)	2,239(63)	444(12)	12875/3.85	120	3108	1253(40)	547(44)	3555/29

TABLE 12

TECHNICAL PLAN EVALUATION SUMMARY

LEAD ORGANIZATION: AFAL — CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	2 + EXPERTS	NO EXPERTS	EVAL		# TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	SUB	EVAL # (%)	SUB	EVAL#(%)	# (%)	# (%)	# (%)	PROJ		DIST	# (%)	# (%)	PART %
Lear Siegler Astronics	1,260	1,260 (100)	7	7(100)	5 (71)	5 (71)	1 (14)	30/4.3	110	18	9 (50)	5 (56)	9/30
Sperry Microwave Electronic	300	300 (100)	5	5(100)	5(100)	3 (60)	0 (0)	20/4.0	107	22	8 (36)	3 (38)	9/45
Lear Siegler Instrument Div	1,273	1,273 (100)	13	13(100)	12 (80)	12 (80)	0 (0)	66/4.4	54	51	13 (25)	2 (15)	18/27
RI-Autonetics & Elec Res	10,090	9,730 (96)	71	69 (97)	64 (80)	55 (69)	9 (16)	347/4.3	115	49	18 (37)	9 (50)	76/22
Northrop Electronics	3,171	3,171 (100)	27	27(100)	23 (85)	20 (74)	1 (4)	88/3.26	120	43	9 (21)	4 (44)	19/22
Itek - Applied Technology	2,217	2,217 (100)	17	17(100)	32(100)	24 (75)	0 (0)	153/4.78	120	38	14 (37)	7 (50)	42/27
Santa Barbara Research Cen	780	780 (100)	9	9(100)	9 (90)	7 (70)	0 (0)	56/5.6	120	48	14 (29)	7 (50)	14/15
GE-Aerospace Elec System	2,100	2,083 (99)	47	46 (98)	37 (79)	25 (53)	5 (11)	141/3.00	120	37	16 (48)	9 (56)	48/34
Hughes Aircraft	30,142	28,972 (96)	215	207 (96)	164 (75)	129 (57)	43 (19)	857/3.81	120	50	18 (36)	7 (39)	209/24
Singer Kearfott Div	6,600	6,600 (100)	33	33(100)	37 (82)	31 (69)	3 (7)	201/4.47	120	37	12 (32)	6 (50)	64/32
General Dynamics-Electro Dynamics Div	1,250	1,170 (94)	24	22 (92)	20 (69)	16 (52)	5 (17)	84/2.90	120	35	9 (26)	3 (33)	33/29
Xerox-Electro Optical	523	488 (93)	9	8 (89)	8 (89)	6 (75)	0 (0)	35/4.38	120	43	17 (40)	6 (35)	7/20
Honeywell Aerospace	3,380	3,380 (100)	31	31(100)	34 (79)	32 (75)	3 (7)	149/3.47	131	55	20 (37)	8 (40)	47/32
SUMMARY	63,086	61,424 (97)	508	494 (97)	450 (83)	365 (68)	70 (8)	2227/4.05	114	526	177 (34)	76 (43)	595/27

TABLE 12

TECHNICAL PLAN EVALUATION SUMMARY

LEAD ORGANIZATION: AFAPL — CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	2 + EXPERTS	NO EXPERTS	EVAL		# TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	SUB	EVAL # (%)	SUB	EVAL#(%)	# (%)	# (%)	# (%)	PROJ		DIST	# (%)	# (%)	PART %
Teledyne CAE	940	940 (100)	11	11(100)	17(100)	8 (47)	0 (0)	72/4.2	80	20	8 (40)	4 (50)	18/9.4
General Elec - DEC	120	120 (100)	4	4(100)	4 (80)	3 (60)	0 (0)	12/3.0	90	24	6 (25)	2 (33)	5/21
GE Aircraft Engine Div	43,925	43,925 (100)	77	77(100)	78 (89)	69 (78)	6 (7)	305/3.5	115	45	8 (18)	4 (50)	77/25
GM-Detroit Diesel Allison	19,137	19,137 (100)	72	72(100)	83(100)	57 (69)	1 (1)	347/4.18	150	22	9 (41)	4 (44)	82/24
Garrett - LA	4,500	4,005 (90)	49	43 (88)	25 (58)	24 (56)	6 (14)	127/2.95	148	29	9 (31)	4 (44)	27/21
Garrett - P	9,239	9,239 (100)	29	29(100)	24 (83)	19 (65)	2 (7)	147/5.03	137	27	9 (33)	4 (44)	34/23
SUMMARY	77,861	77,366 (99)	242	236 (98)	231 (85)	180 (62)	15 (5)	1010/3.81	120	167	49 (29)	22 (45)	243/24

TABLE 12

TECHNICAL PLAN EVALUATION SUMMARY

LEAD ORGANIZATION: AFATL — CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	2 + EXPERTS	NO EXPERTS	EVAL		# TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	SUB	EVAL # (%)	SUB	EVAL#(%)	# (%)	# (%)	# (%)	PROJ		DIST	# (%)	# (%)	PART %
Emerson Electric	850	850 (100)	9	9(100)	14 (78)	14 (78)	3 (17)	48/2.67	113	26	9 (35)	6 (67)	10/21
Teledyne McCormick Selph	249	242 (97)	15	14 (93)	16 (76)	16 (76)	1 (04)	41/2.0	146	32	3 (10)	2 (67)	20/50
McDonnell - TICO	75	75 (100)	5	5(100)	3 (60)	1 (20)	0 (0)	15/3.0	184	21	6 (28)	4 (67)	4/27
Northrop-Electro Mech	1,002	1,002 (100)	14	14(100)	13 (93)	12 (86)	0 (0)	70/5	147	30	12 (40)	7 (58)	13/20
AVCO-Precision Products	475	430 (91)	17	15 (88)	15 (88)	14 (82)	0 (0)	52/2.7	162	38	6 (16)	3 (50)	18/36
GD - Pomona	3,000	2,755 (92)	40	36 (90)	28 (77)	28 (77)	3 (8)	142/3.8	191	30	18 (60)	10 (55)	23/18
GE - Armament	2,270	2,183 (96)	51	47 (92)	42 (72)	42 (72)	4 (7)	151/2.6	191	27	13 (48)	10 (78)	46/30
Honeywell - Ordnance	3,309	2,984 (90)	50	43 (86)	27 (63)	27 (63)	0 (0)	105/2.5	191	34	12 (36)	6 (50)	28/27
SUMMARY	11,230	10,521 (94)	201	183 (91)	158 (76)	154 (69)	11 (4)	624/3.03	166	238	79 (33)	48 (61)	162/26

TABLE 12

TECHNICAL PLAN EVALUATION SUMMARY

LEAD ORGANIZATION: AFCRL — CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	2 + EXPERTS	NO EXPERTS	EVAL		# TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	SUB	EVAL # (%)	SUB	EVAL#(%)	# (%)	# (%)	# (%)	PROJ		DIST	# (%)	# (%)	PART %
Perkin-Elmer - Optical Gp	1,995	1,845 (95)	17	16 (94)	12 (75)	10 (59)	4 (23)	99/5.8	91	35	17 (49)	6 (35)	16/16
Itek-Cen Research Labs	3,666	3,666 (100)	24	24(100)	14 (58)	7 (23)	12 (40)	87/2.9	107	28	13 (46)	6 (46)	27/31
Itek-Optical Systems	1,545	1,545 (100)	13	13(100)	7 (47)	6 (40)	1 (7)	55/3.7	81	34	17 (50)	9 (53)	10/18
Singer-Coroporate R&D	1,198	1,006 (84)	13	11 (85)	4 (40)	4 (40)	4 (40)	44/4.4	96	35	12 (34)	4 (33)	9/21
SUMMARY	8,404	8,112 (97)	67	64 (96)	37 (55)	27 (41)	21 (27)	285/ 4.20	94	132	59 (45)	25 (42)	62/22

TABLE 12

TECHNICAL PLAN EVALUATION SUMMARY

LEAD ORGANIZATION: AFFDL — CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	2 + EXPERTS	NO EXPERTS	EVAL		# TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	SUB	EVAL # (%)	SUB	EVAL#(%)	# (%)	# (%)	# (%)	PROJ		DIST	# (%)	# (%)	PART %
RI-Los Angeles & B-1 Div	4500	4450 (99)	29	28 (97)	30(100)	30(100)	0 (0)	217/7.23	113	37	17 (46)	10 (59)	62/29
Sperry Flight Systems	2509	2509 (100)	30	30(100)	39(100)	30 (77)	1 (3)	136/3.5	118	26	9 (35)	5 (56)	36/26
Northrop-Ventura Div	458	458 (100)	9	9(100)	9(100)	9(100)	0 (0)	45/5	109	45	16 (36)	11 (70)	7/16
Northrop-Aircraft Div	3400	3400 (100)	59	59(100)	57 (97)	43 (73)	0 (0)	222/3.76	120	52	24 (46)	11 (46)	60/27
McDonnell Douglas-Astro West	13360	13172 (99)	74	73 (99)	68 (75)	52 (57)	13(14)	324/3.5	119	45	31 (69)	16 (52)	39/12
Lockheed-Lockheed Georgia	5425	5425 (100)	71	71(100)	85 (97)	63 (72)	1 (1)	294/3.3	119	43	21 (49)	9 (43)	132/45
McDonnell Douglas - Astro East	4070	4070 (100)	32	32(100)	32 (82)	27 (69)	2 (5)	149/3.8	120	47	24 (51)	10 (42)	24/16
Boeing-Commercial Air	13588	13588 (100)	74	74(100)	79 (99)	71 (89)	1 (1)	324/4.1	120	37	14 (38)	6 (42)	135/41
McDonnell Douglas-MCAIR	17130	17080 (99)	68	67 (99)	77 (94)	64 (78)	1 (1)	310/3.8	120	50	23 (46)	12 (52)	81/26
Boeing Co-Wichita Div	2542	2542 (100)	53	53(100)	50(94)	40 (75)	1 (2)	180/3.4	120	35	18 (51)	4 (22)	62/34
General Dynamics- FW	4235	4235 (100)	47	47(100)	46 (98)	41 (87)	1 (2)	175/3.7	131	63	20 (32)	9 (45)	52 /30
General Dynamics- SD	3762	3762 (100)	70	70(100)	63 (90)	53 (76)	4 (6)	244/3.5	139	63	27 (43)	10 (38)	42/17
Honeywell - Flight Sys	2365	2365 (100)	19	19(100)	22 (96)	19 (83)	1 (4)	123/5.30	119	60	19 (32)	11 (58)	25/20
Boeing Aerospace	16042	15892 (99)	100	99(100)	84 (75)	67 (60)	16(14)	437/3.90	118	49	32 (65)	16 (50)	121/28
McDonnell Douglas - Air	15284	15284 (100)	63	63(100)	58 (91)	50 (78)	5 (7)	.302/4.7	119	49	20 (41)	9 (45)	89/29
GE- ACESD	890	890 (100)	6	6(100)	6(100)	5 (83)	0 (0)	29/4.8	105	32	9 (28)	5 (56)	5/17
SUMMARY	109569	109122 (100)	804	800(100)	805 (93)	664 (78)	47 (3)	3511/4.20	120	733	324 (44)	154 (48)	972/28

TABLE 12

TECHNICAL PLAN EVALUATION SUMMARY

LEAD ORGANIZATION: AFHRL — CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	2 + EXPERTS	NO EXPERTS	EVAL		# TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	SUB	EVAL # (%)	SUB	EVAL#(%)	# (%)	# (%)	# (%)	PROJ		DIST	# (%)	# (%)	PART %
Singer - Simulation	2405	2405 (100)	37	37 (100)	29 (78)	21 (67)	6 (16)	139/3.8	140	48	12 (25)	6 (50)	54/39

TABLE 12

TECHNICAL PLAN EVALUATION SUMMARY

LEAD ORGANIZATION: AFML — CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	2 + EXPERTS	NO EXPERTS	EVAL		# TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	SUB	EVAL # (%)	SUB	EVAL#(%)	# (%)	# (%)	# (%)	PROJ		DIST	# (%)	# (%)	PART %
RI - Tulsa	600	600 (100)	16	16(100)	16 (76)	11 (52)	2 (95)	86/4.1	84	25	7 (28)	3 (43)	49/56
Martin - Baltimore	388	388 (100)	11	11(100)	8 (80)	4 (36)	2 (18)	34/3.4	139	35	5 (14)	2 (40)	17/50
AVCO- Aerostructures	400	315 (78)	8	7 (88)	9 (90)	6 (66)	1 (11)	34/3.4	141	27	8 (29)	5 (62)	4/11
SUMMARY	1388	1303 (94)	35	34 (97)	33 (82)	21 (51)	5 (12)	150/3.63	121	87	20 (23)	10 (50)	70/47

TABLE 12

TECHNICAL PLAN EVALUATION SUMMARY

LEAD ORGANIZATION: AFOSR — CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	2 + EXPERTS	NO EXPERTS	EVAL		# TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	SUB	EVAL # (%)	SUB	EVAL#(%)	# (%)	# (%)	# (%)	PROJ		DIST	# (%)	# (%)	PART %
I - Science Center	3500	3500 (100)	30	30(100)	26(87)	22(73)	4(13)	137/4.57	76	36	10 (28)	3 (30)	37/37
I - ITP	1870	1870 (100)	95	95(100)	75(85)	59(67)	9(1)	163/4.51	92	32	10 (31)	3 (30)	82/50
Martin Marietta- Lab Div	607	607 (100)	12	12(100)	7(58)	7(50)	4(25)	40/3.25	65	41	12 (29)	3 (25)	11/28
Martin Marietta - Aerospace Headquarters	185	185 (100)	1	1(100)	1(100)	0(0)	1(100	5/5	65	41	2 (5)	0 (0)	4/80
Honeywell Applied Research	1835	1835 (100)	29	29(100)	26(90)	23(79)	2(7)	116/4	60	48	13 (27)	5 (37)	24/20
Honeywell Basic Research	5550	5550 (100)	38	38(100)	19(50)	15(40)	16(42)	112/3	55	46	13 (28)	5 (37)	8/21
IBM General Research	6829	6829 (100)	19	19(100)	14(74)	6(47)	2(10)	62/3.26	63	25	8 (31)	3 (37)	16/26
SUMMARY	20376	20376 (100)	224	224(100)	168(78)	132(59)	38(28)	635/3.94	68	228	68 (30)	22 (32)	182/29

TABLE 12

TECHNICAL PLAN EVALUATION SUMMARY

LEAD ORGANIZATION: AFRPL — CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	2 + EXPERTS	NO EXPERTS	EVAL		# TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	SUB	EVAL # (%)	SUB	EVAL#(%)	# (%)	# (%)	# (%)	PROJ		DIST	# (%)	# (%)	PART %
RI - Rocketdyne	3231	3231 (100)	35	35(100)	40(78)	34(67)	2(4)	168/3.3	137	32	16(50)	6 (38)	56/33
Thiokol	5858	5315 (91)	70	58(83)	48(75)	37(57)	15(23)	225/2.89	120	31	21(67)	12 (57)	53/24
Aerojet Solid	1238	1238 (100)	13	13(100)	20(95)	10(48)	1(4)	60/2.86	115	32	44(14)	9 (64)	18/30
Aerojet Liquid	1371	1371 (100)	21	21(100)	18(86)	11(52)	0(0)	62/2.95	119	34	44(15)	8 (53)	19/39
Textron/Bell Aerospace	5146	4981 (97)	34	33(97)	41(87)	36(77)	3(6)	165/3.52	117	45	18(40)	8 (44)	25/15
Lockheed Aircraft-LPC	600	600(100)	11	11(100)	10(91)	10(91)	0(0)	71/6.45	117	24	12(50)	6 (50)	17/24
Atlantic Research	225	225(100)	4	4(100)	4(100)	4(100)	0(0)	26/6.5	111	19	14(75)	5 (36)	4/15
UTC	1570	1560(99)	38	37(97)	32(87)	29(79)	2(5)	146/10.1	118	28	16(57)	7 (43)	41/28
SUMMARY	19239	18521(96)	226	212(94)	213(87)	171(71)	23(5)	923/4.82	119	245	185(76)	61 (33)	233/25

TABLE 12

TECHNICAL PLAN EVALUATION SUMMARY

LEAD ORGANIZATION: AFWL — CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	2 + EXPERTS	NO EXPERTS	EVAL		# TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	SUB	EVAL # (%)	SUB	EVAL#(%)	# (%)	# (%)	# (%)	PROJ		DIST	# (%)	# (%)	PART %
Northrop - R & Tech Center	1585	1585(100)	21	21(100)	39(95)	37(90)	2(5)	138/6.57	103	65	20(31)	11(55)	24/17
GE TEMPO	130	130(100)	4	4(100)	10(100)	10(100)	0(0)	32/3.2	126	30	10(33)	5(50)	15/47
Fairchild Republic Co	360	360(100)	1	1(100)	1(100)	1(100)	0(0)	6/6	86	25	6(24)	3(50)	1/18
SUMMARY	2075	2075(100)	26	26(100)	50(98)	48(97)	2(1.7)	168/5.26	105	120	36(30)	19(53)	40/24

TABLE 12

TECHNICAL PLAN EVALUATION SUMMARY

LEAD ORGANIZATION: ARL — CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	2 + EXPERTS	NO EXPERTS	EVAL		# TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	SUB	EVAL # (%)	SUB	EVAL#(%)	# (%)	# (%)	# (%)	PROJ		DIST	# (%)	# (%)	PART %
McDonnell Douglas Research Lab	2030	2030(100)	11	11(100)	11(100)	9(81)	0(0)	75/7	201	46	18(40)	8(44)	19/25
GE-Corporate R&D	15920	15920(100)	57	57(100)	45(79)	35(61)	10(18)	218/3.8	120	46	18(39)	10(55)	51/25
AVCO - Everett	945	945(100)	21	21(100)	20(95)	18(90)	0(0)	140/6.6	120	43	16(37)	6(37)	23/16
SUMMARY	18895	18895(100)	89	89(100)	76(91)	62(77)	10(6)	433/3.49	147	135	52(39)	24(46)	93/21

TABLE 12

TECHNICAL PLAN EVALUATION SUMMARY

LEAD ORGANIZATION: ESD — CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	2 + EXPERTS	NO EXPERTS	EVAL		# TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	SUB	EVAL # (%)	SUB	EVAL#(%)	# (%)	# (%)	# (%)	PROJ		DIST	# (%)	# (%)	PART %
ystem Dev Corp	1,460	1,460 (100)	28	28(100	27 (96)	14(50)	4 (14)	118/4.1	102	16	8 (50)	2 (25)	26/22

TABLE 12

TECHNICAL PLAN EVALUATION SUMMARY

LEAD ORGANIZATION: ASD

CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	2 + EXPERTS	NO EXPERTS	EVAL		# TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	SUB	EVAL # (%)	SUB	EVAL#(%)	# (%)	# (%)	# (%)	PROJ		DIST	# (%)	# (%)	PART %
Lockheed Aircraft Service Co	364	364 (100)	14	14 (100)	12 (60)	3 (14)	4 (19)	63/3.00	112	28	13 (46)	6 (46)	23/37

TABLE 12

TECHNICAL PLAN EVALUATION SUMMARY

LEAD ORGANIZATION: RADC — CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	2 + EXPERTS	NO EXPERTS	EVAL		# TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	SUB	EVAL # (%)	SUB	EVAL#(%)	# (%)	# (%)	# (%)	PROJ		DIST	# (%)	# (%)	PART %
Sperry-Rand Electronic Tube	420	385 (92)	12	11(92)	11(79)	10(71)	1(7)	49/3.5	121	17	6(35)	2(33)	16/33
Teledyne MEC	1322	1322(100)	22	22(100)	22(100)	13(59)	0(0)	73/3.3	101	33	6(18)	3(50)	22/30
McDonnell Douglas-Actron	1405	1289 (91)	13	11(84)	17(94)	13(72)	3(17)	65/3.09	150	26	8(30)	2(25)	13/20
Fairchild Space & Elec	140	140(100)	4	4(100)	10(91)	7(64)	0(0)	31/2.81	30	23	7(30)	1(14)	11/35
ITT Defense-Space Group	7222	6566 (91)	56	44(79)	40(71)	25(45)	5(9)	132/2.2	152	24	8(33)	3(37)	48/36
HRB Singer	596	596(100)	8	8(100)	8(100)	5(63)	0(0)	25/3.12	104	32	6(18)	1(17)	8/32
McDonnell - Electronics	3209	3168 (98)	55	46(90)	31(91)	74(25)	1(3)	161/4.7	140	26	12(46)	6(50)	29/18
GD - Stromberg	1445	1445(100)	18	15(83)	11(61)	3(20)	6(40)	82/5.5	150	23	9(39)	4(44)	28/34
SUMMARY	15759	14911(95)	188	161(86)	150(80)	90(52)	16(9)	618/3.53	119	181	62(34)	22(35)	175/28

TABLE 12

TECHNICAL PLAN EVALUATION SUMMARY

LEAD ORGANIZATION: SAMSO — CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	2 + EXPERTS	NO EXPERTS	EVAL		# TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	SUB	EVAL # (%)	SUB	EVAL#(%)	# (%)	# (%)	# (%)	PROJ		DIST	# (%)	# (%)	PART %
RI- Space Div	5530	4830(87)	60	54(90)	36(53)	27(40)	12(18)	160/2.35	190	28	10(36)	3(30)	67/42
GE - Reentry & Environmental	3730	3460 (93)	19	17(90)	21(88)	18(75)	1(4)	96/4.0	73	28	17(60)	10(59)	27/28
GE - Electric/Space Div	5491	5018(91)	58	48(83)	26(38)	14(21)	24(35)	148/21.8	150	32	9(28)	3(33)	58/39
Lockheed Missiles & Space	18,807	14983(80)	204	168(82)	94(30)	71(28)	75(30)	555/2.2	162	37	16(43)	8(50)	259/45.0
Martin Marietta/Denver Div	5807	5807(100)	67	67(100)	65(63)	49(48)	21(20)	297/2.88	172	33	20(61)	9(45)	70/24
TRW Systems	11090	11040(99)	135	133(98)	131(66)	86(44)	35(18)	602/3.10	139	42	19(45)	8(42)	102/17
AVCO Systems	950	950(100)	36	36(100)	24(64)	22(61)	4(11)	113/3.1	162	24	18(75)	9(50)	38/34
SUMMARY	51405	46088(90)	579	523(90)	397(57)	287(45)	172(19)	1971/2.83	150	224	109(49)	50(46)	621/32

SECTION 3

ON-SITE REVIEW EVALUATION SUMMARIES

Air Force organizations conducted 34 on-site reviews. The overall performance of each lead organization is given in Table 13. For purposes of illustration the Aerospace Research Laboratory (ARL) data will be briefly explained. The ARL was responsible for one review covering $710K and 18 projects. Eighteen projects or 100 percent met the quality standard. There were two or more "experts" on 18 or 100 percent of the projects. There were 159 evaluations for 8.8 evaluations per project. Technical plans were sent to 43 organizations. Representatives of 16 organizations (37 percent of technical plan recipients) participated in the reviews. Eight Army, Navy or NASA organizations (or 50 percent) participated. Forty-eight attendees (30 percent) were from the major participating organizations.

Data on individual on-site reviews is given in Table 14. The data is organized by lead organization and the same data as included in Table 13 is given.

TABLE 13

ON-SITE REVIEW EVALUATION SUMMARY

ORG	COMPANIES EVALUATED	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
		FUNDS $K		PROJECTS		MEETING STANDARD	PROJECT EVALUATIONS		EVAL		#TP	PARTICIP	NON-AF PARTICIP	MAX ORG
		EVAL. (%)	$K/HOUR	EVAL (%)	PROJ/HOUR	# (%)	2+EXPERTS	NO EXPERT	PROJ		DIST	# (%)	# (%)	PART %
ARL	1	710 (75)	-	18 (84)	-	18 (100)	18 (100)	0 (00)	159/8.8	-	43	16 (37)	8 (50)	48/30
AFATL	3	426 (73)	-	86 (70)	-	77 (82)	77 (82)	4 (4)	562/6.45	-	87	35 (40)	29 (82)	182/32
AFAL	5	17,609 (50)	-	87 (40)	-	81 (94)	80 (93)	4 (5)	728/7.7	-	203	63 (31)	37 (59)	303/42
SAMSO	1	6,666 (60)	-	70 (52)	-	41 (57)	21 (22)	20 (28)	271/3.82	-	42	17 (40)	10 (59)	100/37
AFRPL	5	9,017 (85)	-	74 (81)	-	88 (96)	87 (95)	1 (1)	618/6.3	-	193	39 (20)	22 (56)	248/40
AFAPL	4	45,258 (64)	-	144 (62)	-	123 (76)	102 (64)	20 (13)	859/4.54	-	123	36 (29)	16 (44)	214/25
RADC	3	5,050 (83)	-	38 (79)	-	31 (89)	20 (53)	5 (13)	127/4.03	-	82	18 (22)	10 (55)	19/15
AFCRL	2	2,287 (74)	-	16 (68)	-	16 (90)	15 (86)	0 (0)	81/4.9	-	70	13 (19)	2 (15)	37/45
AFML	1	240 (66)	-	7 (63)	-	7 (100)	4 (58)	1 (14)	35/5.0	-	10	2 (20)	0 (0)	28/80
ESD	1	1,110 (76)	-	18 (64)	-	18 (100)	14 (78)	0 (0)	195/10.8	-	16	8 (50)	5 (68)	49/25
AFFDL	8	55,782 (74)	-	304 (62)	-	294 (95)	285 (92)	4 (1)	1677/5.6	-	363	141 (39)	72 (51)	951/57
TOTAL	34	144,155 (70)	-	862 (66)	-	794 (89)	723 (81)	59 (6)	5312/6.2	-	1232	388 (31)	211 (54)	2179/39

TABLE 14

ON-SITE REVIEW EVALUATION SUMMARY

LEAD ORGANIZATION: ARL — CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	PROJECT EVALUATIONS		EVAL		#TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	EVAL (%)	$K/ HOUR	EVAL (%)	HOUR/ PROJ	# (%)	2+EXPERTS	NO EXPERT	PROJ		DIST	# (%)	# (%)	PART %
AVCO-Everett Res	710 (75)	-	18 (84)	-	18 (100)	18 (100)	0 (00)	159/8.8	-	43	16 (37)	8 (50)	48/30

TABLE 14

ON-SITE REVIEW EVALUATION SUMMARY

LEAD ORGANIZATION: AFATL

CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	PROJECT EVALUATIONS		EVAL		#TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	EVAL (%)	$K/ HOUR	EVAL (%)	HOUR/ PROJ	# (%)	2+EXPERTS	NO EXPERT	PROJ		DIST	# (%)	# (%)	PART %
Emerson Electric & Space	850 (100)	-	22 (100)	-	10 (59)	10 (59)	4 (24)	96/5.65	-	26	5 (19)	4 (80)	73/76
Honeywell Ordnance	2249 (68)	-	32 (62)	-	36 (90)	36(90)	0 (0)	136/3.4	-	34	9 (27)	6 (66)	47/35
GE Armament	1162 (51)	-	32 (49)	-	31 (97)	31 (97)	0 (0)	330/10.3	-	27	21 (77)	19 (90)	62/19
SUMMARY	4261 (73)	-	86 (70)	-	77 (82)	77 (82)	4 (4)	562/6.45	-	87	35 (40)	29 (82)	182/32

TABLE 14

ON-SITE REVIEW EVALUATION SUMMARY

LEAD ORGANIZATION: AFAL — CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	PROJECT EVALUATIONS		EVAL		#TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	EVAL (%)	$K/ HOUR	EVAL (%)	HOUR/ PROJ	# (%)	2+EXPERTS	NO EXPERT	PROJ		DIST	# (%)	# (%)	PART %
Lear Siegler Astronics	885 (72)	-	3 (43)	-	3 (100)	3 (100)	0 (0)	25/8.3	-	18	9 (50)	5 (56)	4/29
Hughes Aircraft	11485 (36)	-	53 (24)	-	50 (94)	50 (94)	2 (4)	496/9.36	-	50	27 (54)	18 (66)	200/40
Singer Kearfott	3051 (46)	-	13 (39)	-	12 (92)	11 (84)	1 (8)	91/7	-	37	12 (32)	6 (50)	64/32
Xerox/Electro Optical	263 (38)	-	5 (50)	-	5 (100)	5 (100)	0 (0)	39/7.8	-	43	6 (14)	4 (66)	10/25
Honeywell Aerospace	1925 (57)	-	13 (42)	-	11 (85)	11 (85)	1 (7)	77/5.9	-	55	9 (16)	4 (44)	25/33
SUMMARY	17609 (50)	-	87 (40)	-	81 (94)	80 (93)	4 (5)	728/7.7	-	203	63 (31)	37 (59)	303/42

TABLE 14

ON-SITE REVIEW EVALUATION SUMMARY

LEAD ORGANIZATION: SAMSO CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	PROJECT EVALUATIONS		EVAL		#TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	EVAL (%)	$K/ HOUR	EVAL (%)	HOUR/ PROJ	# (%)	2+EXPERTS	NO EXPERT	PROJ		DIST	# (%)	# (%)	PART %
TRW Systems	6666 (60)	-	70 (52)	-	41 (57)	21 (22)	20 (28)	271/3.82	-	42	17 (40)	10 (59)	100/37

TABLE 14

ON-SITE REVIEW EVALUATION SUMMARY

LEAD ORGANIZATION: AFML — CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	PROJECT EVALUATIONS		EVAL		#TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	EVAL (%)	$K/ HOUR	EVAL (%)	HOUR/ PROJ	# (%)	2+EXPERTS	NO EXPERT	PROJ		DIST	# (%)	# (%)	PART %
AVCO-Aerostructures	240 (66)	-	7 (63)	-	7 (100)	4 (58)	1 (14)	35/5.0	-	10	2 (20)	0 (0)	28/80

TABLE 14

ON-SITE REVIEW EVALUATION SUMMARY

LEAD ORGANIZATION: ESD — CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	PROJECT EVALUATIONS		EVAL		#TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	EVAL (%)	$K/ HOUR	EVAL (%)	HOUR/ PROJ	# (%)	2+EXPERTS	NO EXPERT	PROJ		DIST	# (%)	# (%)	PART %
SYSTEMS Development Corp	1110 (76)	-	18 (64)	-	18 (100)	14 (78)	0 (00)	195/10.8	20	16	8 (50)	5 (68)	49/25

TABLE 14

ON-SITE REVIEW EVALUATION SUMMARY

LEAD ORGANIZATION: AFRPL — CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	PROJECT EVALUATIONS		EVAL		#TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	EVAL (%)	$K/ HOUR	EVAL (%)	HOUR/ PROJ	# (%)	2+EXPERTS	NO EXPERT	PROJ		DIST	# (%)	# (%)	PART %
RI-Rocketdyne (CAN)	2187 (78)	-	18 (69)	-	26 (100)	26 (100)	0 (0)	247/6.5	-	32	9 (28)	6 (67)	84/34
RI Rocketdyne (McG)	345 (100)	-	8 (100)	-	8 (100)	8 (100)	0 (0)	73/9.1	-	32	4 (12)	3 (75)	35/47
Aerojet Solid	1017 (85)	-	12 (92)	-	17 (94)	16 (89)	1 (05)	95/5.28	-	32	6 (19)	3 (50)	30/31
Textron/Bell Aero-space	3563 (69)	-	15 (44)	-	17 (90)	17 (90)	0 (0)	58/3.05	-	45	5 (11)	2 (40)	37/64
UTC	1350 (90)	-	11 (92)	-	11 (100)	11 (100)	0 (0)	66/6.0	-	28	7 (25)	3 (43)	25/24
Lockheed - LPC	555 (93)	-	10 (91)	-	9 (90)	9 (90)	0 (0)	79/7.9	-	24	8 (33)	5 (62)	37/47
SUMMARY	9017 (85)	-	74 (81)	-	88 (96)	87 (95)	1 (1)	618/6.3	-	193	39 (20)	22 (56)	248/40

TABLE 14

ON-SITE REVIEW EVALUATION SUMMARY

LEAD ORGANIZATION: RADC — CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	PROJECT EVALUATIONS		EVAL		#TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	EVAL (%)	$K/ HOUR	EVAL (%)	HOUR/ PROJ	# (%)	2+EXPERTS	NO EXPERT	PROJ		DIST	# (%)	# (%)	PART %
GD - Stromberg	1245 (100)	-	10 (100)	-	9 (90)	2 (20)	5 (50)	52/5.2	-	23	6 (27)	3 (50)	4/50
McDonnell Elec Co	2894 (80)	-	24 (56)	-	15 (78)	13 (68)	0 (0)	42/2.2	-	26	7 (27)	4 (57)	8/19
Teledyne MEC	911 (69)	-	4(80)	-	4 (100)	5 (72)	0 (0)	33/4.7	-	33	5 (15)	3 (60)	7/21
SUMMARY	5050 (83)	-	38 (79)	-	31 (89)	20 (53)	5 (13)	127/4.03	-	82	18 (22)	10 (55)	19/15

TABLE 14

ON-SITE REVIEW EVALUATION SUMMARY

LEAD ORGANIZATION: AFCRL — CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	PROJECT EVALUATIONS		EVAL		#TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	EVAL (%)	$K/ HOUR	EVAL (%)	HOUR/ PROJ	# (%)	2+EXPERTS	NO EXPERT	PROJ		DIST	# (%)	# (%)	PART %
Perkin-Elmer Optical	1281 (64)	-	11 (65)	-	12 (100)	11 (92)	0 (00)	55/4.6	-	35	8 (23)	2 (25)	27/49
Singer Corporate R&D	1006 (84)	-	5 (71)	-	4 (80)	4 (80)	0 (00)	26/5.2	-	35	5 (14)	0 (0)	10/38
SUMMARY	2287 (74)	-	16 (68)	-	16 (90)	15 (86)	0 (00)	81/4.9	-	70	13 (19)	2 (15)	37/45

TABLE 14

ON-SITE REVIEW EVALUATION SUMMARY

LEAD ORGANIZATION: AFAPL — CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	PROJECT EVALUATIONS		EVAL		#TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	EVAL (%)	$K/ HOUR	EVAL (%)	HOUR/ PROJ	# (%)	2+EXPERTS	NO EXPERT	PROJ		DIST	# (%)	# (%)	PART %
GE-Aircraft Engine Gp	19285 (44)	1929	36 (47)	-	40 (98)	37 (90)	1 (3)	330/8	-	45	8 (18)	4 (50)	83/25
GM-Detroit Diesel Allison	18269 (96)	373	57 (79)	-	63 (98)	48 (75)	4 (6)	345/5.39	-	22	9 (41)	4 (44)	103/30
Garrett - LA	2310 (48)	-	35 (55)	-	7 (20)	5 (14)	14 (40)	58/1.657	-	29	9 (31)	4 (44)	17/29
Garrett - Pheonix	5394 (68)	-	16 (66)	-	13 (87)	12 (75)	1 (6)	47/3.13	-	27	10 (31)	4 (40)	11/23
SUMMARY	45258 (64)	-	144 (62)	-	123 (76)	102 (64)	20 (13)	859/4.54	-	123	36 (29)	16 (44)	214/25

TABLE 14

ON-SITE REVIEW EVALUATION SUMMARY

LEAD ORGANIZATION: AFFDL — CFY: 74

COMPANY	SCOPE				QUALITY OF EVALUATION				TIME	BREADTH			
	FUNDS $K		PROJECTS		MEETING STANDARD	PROJECT EVALUATIONS		EVAL		#TP	PARTICIP	NON-AF PARTICIP	MAX ORG
	EVAL (%)	$K/ HOUR	EVAL (%)	HOUR/ PROJ	# (%)	2+EXPERTS	NO EXPERT	PROJ		DIST	# (%)	# (%)	PART %
Sperry Flight Sys Div	1769 (69)	-	19 (63)	-	19 (100)	18 (95)	0 (0)	72/3.8	-	26	4 (15)	1 (25)	21/29
Honeywell Flight Sys	1900 (80)	-	14 (74)	-	14 (100)	14 (100)	0 (0)	118/8.43	-	60	10 (17)	6 (60)	32/27
Boeing Aerospace	9863 (60)	-	48 (48)	-	49 (100)	49 (100)	0 (0)	347/7.1	-	49	16 (33)	7 (44)	202/58
McDonnell Douglas - Air	7749 (67)	-	70 (69)	-	70 (99)	69 (97)	2 (3)	382/5.38	-	49	25 (51)	15 (60)	227/59
McDonnell Douglas - MDAC East	3495 (86)	-	19 (58)	-	16 (84)	16 (84)	1 (5)	93/4.9	-	47	24 (51)	10 (42)	51/55
Boeing Commercial Air	11002 (78)	-	53 (70)	-	54 (100)	54 (100)	0 (0)	309/5.7	-	37	14 (38)	6 (42)	170/55
McDonnell Douglas - MCAIR	13861 (92)	-	43 (63)	-	43 (100)	42 (98)	0 (0)	209/5.9	-	50	23 (46)	12 (52)	209/59
MAC - West	6323 (47)	-	38 (51)	-	29 (76)	23 (61)	1 (2)	146/3.8	-	45	25 (55)	15 (60)	39/12
SUMMARY	55782 (72)	-	304 (62)	-	294 (95)	285 (92)	4 (1)	1677/5.6	-	363	141 (39)	72 (51)	951/57

AN OVERVIEW OF DOD POLICY FOR AND ADMINISTRATION OF INDEPENDENT RESEARCH AND DEVELOPMENT

Study Project Report

Individual Study Program

Defense Systems Management School

Program Management Course

Class 75-1

by

Howard Emery Bethel
Major US Air Force

May 1975

Study Project Advisor
David D. Acker

EXECUTIVE SUMMARY

Independent research and development (IR&D) is contractor initiated and conducted research and development effort not sponsored by a contract or grant. The DOD recognizes IR&D as a normal cost of business and accepts its reasonable and allocable share of these costs. The major defense contractors incurred over $1 billion in IR&D costs in 1974 and recovered over $450 million of these costs from the DOD. The allowability of IR&D costs and DOD policy and administration of this area have been and are controversial.

The purpose of this report is to present an overview of DOD IR&D policy and administration. The evolution, current status, and major areas of existing controversy are highlighted. IR&D can be traced back to 1940 and has been an allowable cost in one form or another on negotiated DOD contracts since that time. The early DOD IR&D policy appears to have evolved rather naturally along with the other cost principles through about 1959. However, the IR&D cost principles which were issued in 1959 were immediately controversial. While the 1959 cost principles remained in effect for over a decade, there was continuous effort to devise better cost principles throughout the 1960s. Initially, the effort received little attention. However, in the mid-1960s the Army Audit Agency and, then, the GAO questioned some aspects of DOD policy and administration of IR&D. Finally, in the late 1960s, Congress became directly involved, and ultimately,

imposed guidelines for DOD IR&D policy.

The current DOD policy and administration is a direct outcome of the extensive activities of the 1960s and is summarized in this report. While a period of calm might be expected after the activities of the 1960s, such has not developed. IR&D is more controversial now than ever before. Senator Proxmire is suggesting additional legislative restrictions on IR&D. Further, the GAO, the Defense Science Board, the Commission on Government Procurement, Admiral Rickover, Dr. Currie, and many others have expressed their views on IR&D. The major areas of current controversy are identified and briefly discussed in the report and the positions of the major participants in the IR&D dialogue identified.

In summary, the current DOD policy appears to be a reasonable balance of the needs for good stewardship of the taxpayer's funds and the needs for a strong technological base. Major shifts in policy, whether to the more liberal extremes advocated by the industry or the more restrictive extremes advocated by Senator Proxmire and Admiral Rickover, would probably be detrimental to the best interests of the Department of Defense.

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LIST OF ACRONYMS

AD	Assistant Director
AEC	Atomic Energy Commission
AIA	Aerospace Industries Association
ASD	Assistant Secretary of Defense
ASPR	Armed Services Procurement Regulations
ASRSC	Armed Services Research Specialists Committee
BOB	Bureau of the Budget
C	Comptroller
CITE	Contractor Independent Technical Effort
CODSIA	Council of Defense and Space Industries Association
COGP	Commission on Government Procurement
COSATI	Committee on Scientific and Technical Information
CTE	Competitive Technical Effort
CWAS	Contractor Weighted Average Share
DCAA	Defense Contract Audit Agency
DCS	Deputy Chief of Staff
DDC	Defense Documentation Center
DDR&E	Director, Defense Research and Engineering
DOD	Department of Defense
DODI	DOD Instruction
DPC	Defense Procurement Circular
DSB	Defense Science Board
FY	Fiscal Year
GAO	General Accounting Office
G&A	General and Administrative

LIST OF ACRONYMS Con't

ID	Independent Development
IL or I&L	Installation and Logistics
IR	Independent Research
IR&D	Independent Research and Development
LMI	Logistics Management Institute
MICOM	Army Missile Command
NASA	National Aeronautics and Space Administration
O...	Office of ...
OMB	Office of Management and Budget
OSD	Office of the Secretary of Defense
OTE	Other Technical Effort
PMR	Potential Military Relationship
RDT&E	Research, Development, Test and Evaluation
R&D	Research and Development
TD	Treasury Decision

SECTION I

INTRODUCTION

Independent research and development (IR&D) is contractor initiated and directed research and development effort not sponsored by or required in performance of a contract or grant. It includes the full spectrum of R&D effort from basic research to development and encompasses system and concept formulation studies.

Essentially all contractors do IR&D whether or not they do business with the DOD. When you buy a car, toaster, washer, soap, and so forth, a part of the price is used by the company to support its IR&D program. Thus, IR&D is an integral element of the commercial market place. The same practice is followed for competatively-priced DOD fixed-price contracts. In this case price competition is thought to insure the reasonableness of the elements of cost, such as IR&D. However, for negotiated contracts and, especially, cost reimbursable contracts, there is a basic dilemma involving the DOD's need to ". . . stimulate innovation in an unconstrained fashion and obtain a reasonable assurance that tax dollars thus spent result in effort of broad national value as opposed to undue enrichment." (Ref. 1, p. 40) This, then, is the essence of the continuing debate on the DOD IR&D policy and administration. The debate is far from academic since substantial resources are involved.

The major defense contractors spent $1,148 million for IR&D in 1974. Of this amount about $457 million was recovered from the DOD. The rest of these costs were recovered mainly from commercial customers and a small amount from other Government agencies. Hence, this is an area of substantial DOD investment.

The DOD currently recognizes IR&D as a normal cost of doing business. Through this support the DOD seeks to:

> "1. Assure the creation of an environment which encourages development of innovative concepts for Defense systems and equipment which complement and broaden the spectrum of concepts developed internally to DOD.
>
> 2. Develop technical competence in two or more contractors who can then respond competitively to any one requirement DOD seeks from Industry.
>
> 3. Contribute as appropriate to the economic stability of its contractors by allowing each contractor the technical latitude to develop a broad base of technical products." (Ref. 2, p. 2)

Reasonable and allocable amounts of contractor incurred IR&D costs are thus accepted as indirect costs on DOD negotiated contracts.

Independent research and development is important to the DOD program manager for several reasons. First, IR&D contributes significantly to maintaining a viable technology base in the defense industry which the DOD is dependent upon for system development and production. Second, IR&D is a vital element in the process of translating military needs into technology and system needs during the conceptual phase of the system acquisition process. Third, IR&D often

provides alternate technical solutions to problems encountered during later phases of a system development. Finally, IR&D consumes on the average about two percent of every RDT&E and procurement dollar spent by the program office. Thus, while the greatest IR&D contribution occurs early in the acquisition process, it is an area which should be recognized by the program manager as a potential source of valuable technical information and a consumer of program resources.

The purpose of this report is to present an overview of the DOD policy for and administration of contractor IR&D. To understand the current DOD policy and administration requires an appreciation of the evolution of DOD policy in this area. IR&D costs, by whatever name they happened to be called, have been allowable in some form since 1940. The changes in policy were relatively evolutionary during the early years. However, there was an extensive dialogue on IR&D policy during the 1960s which ultimately led to Congressional involvement and legislative action. The current DOD policy and practice are a direct product of the dialogue of the 1960s and the legislative restrictions imposed by Congress in 1970. Notwithstanding the extensive discussion of IR&D policy in the 1960s, IR&D is more controversial now than ever before. The various phases of DOD policy on IR&D are directly related to the IR&D cost principles in use during the period. A brief summary of the evolution of the IR&D cost principles is presented in the

following paragraphs.

1.1. Treasury Decision 5000 (1940)

Independent research and development (IR&D) costs have been recognized in some form since Treasury Decision (TD) 5000 appeared in August 1940. TD 5000 was published as a consequence of the Vinson-Trammel Act and included cost principles for use in determining excess profits. These cost principles were used by the DOD as a guideline for determining the allowability of cost in some cost reimbursement contracts. These principles included language recognizing contractors' indirect engineering expense as an allowable cost. (Ref. 3 and Ref. 4, p. 1)

1.2. Green Book (1942)

In April 1942 a new set of cost principles was published in a small green booklet titled "Explanation of Principles for Determination of Costs Under Government Contracts." (Ref. 5) The principles had been prepared under Navy cognizance and generally followed TD 5000 in its treatment of allowed costs. These cost principles gradually replaced TD 5000 for most cost-type contracts that were written after April 1942.

Included in the Green Book under the heading of "Engineering and Development" was the following statement:

> "32. Distinction has previously been made between engineering services related immediately to manufacturing operations (shop engineering expense) and research, experimental and development costs not related to current manufacture but devoted to future improvement

> in and application of products. The cost of the latter research and experimental development work may be absorbed in manufacturing cost on a regular basis by means of absorption rates, on the principle that these activities are usually maintained under a consistent program independently and apart from current manufacturing operations, and that their benefit relates to products on a uniform scale over a period of years more properly than according to actual expenditures in any given year. When these costs are deferred or capitalized in conformity with a consistent plan, reasonable allocation may be treated as a cost of performing a contract.
>
> "33. Alternatively, when it is the policy to charge off actual research, experimental and development expenses currently in each year rather than to use stabilized absorption rates, a reasonable portion thereof may be allocated to the cost of performing the contract." (Ref. 5)

As the language indicates IR&D could be charged at a rate which would understate the costs in some years and overstate it in other years. On the other hand, IR&D could be charged off as a current year expense. However, both methods could not be used simultaneously. These cost principles governed the recovery of costs for IR&D until the Armed Services Procurement Regulation was issued in 1949. (Ref. 4, pp. 1-3 and Ref. 6, pp. 10-11)

1.3. Armed Service Procurement Regulation (1949)

The Green Book was superseded by the initial publication of Section XV of the ASPR in March 1949. Section XV provided standards for the determination and allowance of costs in connection with the performance of cost-reimbursement type contracts. It included examples of allowable and unallowable costs which impacted IR&D-type work:

"15-204. Examples of Items of Allowable Costs

(s) Research and development specifically applicable to the supplies or services covered by the contract.

15-205. Examples of Items of Unallowable Costs

(j) General research, unless specifically provided for elsewhere in the contract.

15-502. Examples of Subjects Requiring Special Considerations

(m) Research programs of a general nature." (Ref. 7)

In applying these cost principles several problems developed. First, difficulties were encountered in determining whether R&D costs were specifically applicable to the supplies or services covered by the contract. Some contracting officers took a narrow view of these provisions and believed the work had to be required by the contract to be allowable. Others held a broader view. Second, some contracting officers interpreted the phrase "general research" as including both independent research and independent development and only allowed IR&D costs when provided for in a contract clause. (Ref. 4, pp. 3-5; Ref. 6, p. 11)

These difficulties gave rise to a practice on the part of some contractors, who expected to be awarded numerous contracts, of negotiating separate agreements covering IR&D costs for periods of up to three years. Contracts negotiated subsequently incorporated these agreements as a contract clause. This procedure precluded repeated negotiations of

this element of cost. In return for this consideration, the contractors agreed to provide technical information for review by the Government. This practice was a precursor to the advance agreements of later years. (Ref. 4, p. 5)

Beginning in the mid-1950s there was considerable pressure on the DOD to develop a new set of cost principles which would give both more precise policy guidance and would be applicable to all types of contracting or contract settlement types. The final product required several years to develop but in November 1959 a complete revision of Section XV was published. (Ref. 8)

1.4. Revised Section XV, ASPR (1959)

This revision of the IR&D cost principles was prepared during the aftermath of Sputnik when there was a general feeling that R&D should be encouraged. Thus, the new cost principles recognized both independent research (IR) and independent development (ID) as allowable to the extent that they were reasonable and allocable. IR was to be allocated to all work of the contractor whereas ID was to be allocated to the product line to which it applied. Contractors were encouraged to include indirect and administrative costs in their IR&D pool, however, they were not required to do so. Advance agreements were encouraged, but not required, and three approaches to determining the reasonableness of IR&D costs were suggested:

"(i) Review of the contractor's proposed independent research and development program and agreement to accept the allocable costs of specific projects;

(ii) agreement on a maximum dollar limitation of costs, an allocable portion of which will be accepted by the Government;

(iii) an agreement to accept the allocable share of a percentage of the contractor's planned research and development program." (Ref. 9, para. 205.35h)

The last item came to be known as cost sharing from the first dollar. These cost principles are included as Appendix A.

Since IR&D was one of the more difficult problem areas reflected in the cost principles, DOD Instruction 4105.52, "Uniform Negotiation for Reimbursement of Independent Research and Development Cost," was issued on 28 June 1960. It provided a method for negotiation of a single agreement covering the allowance of IR&D costs for contractors performing work for more than one Service. Further the Instruction established an Armed Services Research Specialist Committee (ASRSC) to review, at the request of the negotiators, the IR&D programs of selected contractors for the purpose of (1) determining whether adequate separation had been made of research and development and (2) to determine whether the programs were reasonable in scope and well managed. The Instruction also provided for the assignment of negotiation responsibility to a single military department. (Refs. 8 and 10)

The Military Departments established a list of contractors whose IR&D costs exceeded $1 million and whose business was 50% or more with the DOD. Most of the contractors were assigned to the Navy and Air Force for negotiation of advanced agreements. The assignments were based primarily upon which Service had the predominant amount of work in the plant. In the early going two contractors assigned to the Air Force refused to negotiate agreements unless they were granted full recovery and not forced to share costs. This impasse was broken when the Director of Procurement Policy at Headquarters, Air Material Command, advised each company that until an acceptable advance agreement was negotiated no IR&D costs could be recovered from the Air Force. At this point the contractors accepted the Air Force proposal and other contractors followed suit. (Ref. 4, p. 10)

As the advance agreements evolved, DOD negotiators tended to require cost sharing from the first dollar. Originally they worked on a basis of 50/50 sharing with a contractor who was 100% DOD. However, it soon became clear that this was too much of a burden for the contractors to bear and 75/25 ratios became the norm. Contractors with less than 100% DOD business generally obtained better share ratios, however, few were granted 100/0 ratios. In addition to sharing from the first dollar, DOD negotiators also insisted upon establishing a maximum dollar ceiling above which the DOD would not recognize any costs for reimbursements. (Ref. 4, p. 10)

The National Aeronautics and Space Administration (NASA) voluntarily joined the DOD Tri-Service IR&D negotiation process in the 1963 time period. NASA has continued to participate in this process to this time with no serious problems. (Ref. 4, p. 10)

During the early 1960s, the Bureau of the Budget engaged in a project to standardize the cost principles of all Government agencies. A problem developed in the differing IR&D philosophies of the Atomic Energy Commission (AEC)* and the DOD. The AEC objected to the allowance of costs for any IR&D project not related directly or indirectly to its contract work. The DOD considered the AEC position too restrictive and thought it would result in IR&D becoming a Government directed program. The philosophical difference between the DOD and AEC and internal DOD concerns regarding the appropriateness of the 1959 ASPR cost principles, precluded adoption of a government-wide IR&D policy in the early 1960s. (Refs. 11; 12; and 4, p, 19)

The 1959 IR&D cost principles were controversial from their initial release. However, they were in force for over a decade. The extensive discussion of the problems with the principles, alternate principles, and general IR&D policy

*The AEC was recently reorganized out of existence; the R&D portions of AEC were incorporated into the Energy Research and Development Administration. However, where reference is made to events which occurred while AEC was in existence, AEC will be cited. Where the new organization is involved it will be cited.

which took place during the 1960s is summarized in Section II. The efforts of the 1960s culminated in new cost principles which were implemented in January 1971 and are still in effect today. The current policy and practices are discussed in some detail in Section III. DOD policy in the IR&D area is more controversial now than ever before. The major areas of controversy are identified and discussed in Section IV.

SECTION II

SEARCH FOR A NEW POLICY

The ink was hardly dry on the 1959 cost principles when problems began to surface in its implementation and interpretation. The first ASPR case was opened in September 1960 to consider the need to clarify the allocability language. Two more cases were opened within the next year. However, before the ASPR Committee could complete action on these cases the problems were elevated to higher levels within OSD. High level ad hoc groups worked the IR&D problem for the next eight years. Early activity was chaired by ODDR&E but in the later years it was headed-up by OASD (IL). None of the proposed cost principles were implemented because Congress ultimately became involved in 1969-1970 and the next set of cost principles implemented was responsive to legislation imposed in the Fiscal Year (FY) 1971 Military Procurement Authorization Act.

A wide variety of alternative cost principles were considered during the 1960s. Many of the ideas rejected then are once again surfacing in the current dialogue on IR&D. Consequently, the highlights of the 1960 considerations will be summarized in the following paragraphs.

2.1. Identification of Problems (1962-1963)

A small working group chaired by Dr. L. M. Hartman, ODDR&E, and including representatives from OASD(IL) and

OASD(C) was established in September 1962 to review the IR&D situation and recommend a solution. The group submitted its findings and recommendations in November 1962. (Ref. 13, a later summary is Ref. 14) The group identified five problem areas as follows:

1. Cost Sharing:

   - Government negotiators were requiring both cost sharing and a ceiling limitation; a double limitation.

   - Cost sharing was being required without a finding of unreasonableness.

2. Allowability by Specific Projects:

   - Project-by-project control placed too great a restriction on scientific freedom of choice.

3. Negotiation Procedure:

   - The DOD negotiation team did not include a technical representative and there was no formal feedback to the contractor of the technical evaluation results.

   - The Air Force and Navy were believed to be grossly understaffed for effective administration of IR&D negotiations.

   - The Army had a decentralized negotiation procedure which caused communications and control problems.

4. Technical Evaluations:

   - Undue emphasis was being placed on contractors' technical plans as the primary communication device.

   - The Armed Services Research Specialist Committee was not effective as a committee.

   - Only Navy evaluators had made on-site reviews at contractors' plants.

- Evaluation reports were tardy (3-8 months after receipt of technical plans), uninformative, and frequently devoted to trivia. The feeling existed that reports were not being used in establishing negotiation objectives and some of the evaluation shortcomings was due to this.

- Benefit of technical evaluation process was that contractors have to be explicitly concerned about their technical planning and this had resulted in improved technical management of certain corporations.

- Technical evaluators had been spending too much time trying to draw a line through the gray area between IR and ID.

- IR&D negotiations were being completed 8-10 months after the beginning of the contractor's fiscal year largely as result of lateness in obtaining technical plans and completing technical evaluations.

5. Allocation:

   - Allocation of costs (IR vs ID) was mainly a function of the skill of the technical writer.

   - IR&D-type work had been found in many accounts called something other than IR&D and not subject to the controls applied to IR&D (hereafter referred to as the cost classification problem).

   - The rigid procedure of the ASPR XV-205.35 allocation procedure frequently did not fit the circumstance, especially for decentralized corporations. (Ref. 13, pp. 1-5)

These were the underlying problems which to a greater or lesser extent were attacked by all subsequent efforts to devise new cost principles. The emphasis on the technical evaluation process appears to have been due to Dr. Hartman's presence in the group. When he ceased to be involved, emphasis shifted away from this area.

The group concluded that the 1959 IR&D cost principles could not be fixed and that a completely new policy should be developed. To aid in developing a new policy the group identified nine objectives to be considered in its development:

1. Encourage a balanced program of industrial research and development in support of both long-range and short-range national security.

2. Contribute to the establishment and adoption of standards of good management of industrial research and development.

3. Promote the independence and the free enterprise character of American industry.

4. Encourage quality programs in industrial research and development.

5. Provide for the allowance of the reasonable and allocable "costs of doing business" of Government contractors.

6. Achieve equity among contractors in handling cost allowance.

7. Minimize administrative complexities and inconsistencies.

8. Adhere to the extent possible to the traditions of commercial practice.

9. Cooperate with other Government agencies with a view to the adoption of uniform cost principles. (Ref. 13, pp. 6-8)

This is a rather complete listing of goals which most people who have considered the IR&D problem have addressed with varying degrees of emphasis on particular items. As we will see, there are a wide variety of alternatives which meet the above objectives to one degree or another.

Finally, the group recommended new cost principles which encompassed the following key ideas:

1. Distinctions between types of technical costs should be discontinued.

   - IR&D definition should be broadened to include all scientific and engineering work which is not sponsored by contract, grant or other arrangement except manufacturing and production engineering.

   - Bid and proposal (B&P) costs* should be limited to administrative costs only.

   - Full overhead and general and administrative costs should be included in IR&D.

2. Cost sharing from the first dollar and control by project-by-project approval should be eliminated; control of reimbursement should be accomplished by ceilings only.

3. Allocation of costs should be flexible in principle and not predetermined by definitions.

   - No longer a distinction between IR and ID to use as basis for allocation.

4. An evaluation should be made of the total technical management of a contractor in order to determine reasonable costs and allocation prior to negotiations.

   - Review should be done on-site at the contractor's facility every two years.

   - Team should include technical, audit, and procurement personnel.

   - Evaluation process should be the responsibility of an individual in ODDR&E.

   - Technical personnel should participate in negotiations. (Ref. 13, pp. 11-15)

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*Bid and proposal costs are the costs of preparing, submitting and supporting a bid or proposal. These costs are also allowable indirect costs per ASPR 15-205.3.

These principles were reviewed by the military departments, other government agencies, and, in a slightly broadened form, by industry. The most controversial issue within the DOD was the proposal to eliminate cost sharing. However, the factor which led to the abandonment of the proposal was the projected high cost (manpower and funding) of accomplishing the management reviews. Further, there was a lack of an objective criteria for evaluating contractors' programs and difficulties in trying to insure that subjective evaluations performed by one group were comparable to those performed by other groups for other contractors. (Ref. 4, p. 21; 15, pp. 433-435)

Up to this time there had been few Congressional or other inquiries. The only major inquiry occurred in June 1961 when Senator H. Humphrey, Chairman, Subcommittee on Reorganization and International Organizations, Senate Committee on Government Operations, had questioned Mr. G. Bannerman, Deputy Assistant Secretary of Defense (Procurement) regarding IR&D. After the hearings Mr. Bannerman wrote a six-page letter to Senator Humphrey providing a history of the allowability of IR&D as a cost of doing business, the present policy, the administrative structure for negotiating the costs, and an estimate of the costs to the DOD for 1960. (Ref. 8) As the time goes on there will be a significant increase in outside review of IR&D.

2.2. DOD IR&D Steering Group Activities (1964-1966)

2.2.1. Evolution of the Cost Principles

In late 1963 leadership in the effort to devise new cost principles was elevated to the Assistant Director (AD) level in ODDR&E (Mr. James Roach, AD (Engineering Policy)). The DOD IR&D Steering Group under his direction undertook to devise a new approach to the cost principles.

In late 1964 the DOD IR&D Steering Group evolved a two-phase plan of attack for generating the revised cost principles. First, the IR&D cost principles were to be modified to combine IR&D and B&P into a single category of cost called Contractor Independent Technical Effort (CITE), eliminate cost sharing, improve the IR&D definition and state a specific policy on application of indirect and administrative costs to CITE (referred to as the burdening of CITE). Second, thresholds and criteria for determining reasonableness were to be devised (including consideration of Contractor Weighted Average Share (CWAS)).

Later, the two phases were combined and cost principles which included the concept of using industry norms in the determination of reasonableness was circulated to industry for comment. The industry position was that the combination of costs into CITE was inappropriate since it would cause changes in accounting practices, would lump together costs that were often not related, would use IR&D to describe costs that were not IR&D and would obscure visibility in

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the makup of these various expenses. Also, there was opposition to the use of industry norms in determining the reasonableness of IR&D costs. This opposition was based upon the belief that IR&D costs were more reflective of the needs of an individual company than of a particular industry. However, industry voiced cautious support for the effort to include CWAS as a criteria for reasonableness. (Ref. 4, pp. 25-26)

In early 1966 the Logistics Management Institute undertook a review of the proposed cost principles which encompassed the two major elements:

- combination of IR&D and B&P into a single account, and
- use of a norm or average approach for the determination of reasonableness rather than reviewing and analyzing the contractors' IR&D efforts.

The LMI study criticized both suggestions and concluded that the proposed CITE plan did not represent an improvement in the process of determining the reasonableness of IR&D and B&P costs. (Ref. 16, p. ii)

In late 1966 OASD(I&L) personnel became increasingly concerned about the combination of all technical effort into CITE. On 7 October 1966 the Assistant Secretary of Defense for Installations and Logistics discussed the issue with the Secretary of Defense who stated that he did not want IR&D and B&P costs lumped into a single category. Thus, pursuit of the CITE approach ended. (Ref. 4, p. 27)

Leadership in developing the new cost principles now shifted to OASD(I&L) and the so-called Malloy Committee which will be discussed in Section 2.3.1. However, it will useful to examine some of the events not associated with developing the new cost principles which took place during the 1964-1966 time period. These outside events were becoming more important.

2.2.2. Related Events

During 1964 three major policy letters were written to senior DOD officials which summarized the DOD position on IR&D cost allowability, patent and data rights, and so forth. In February 1964 the ASD(IL) wrote to Senator McClellan, Chairman, Subcommittee on Patents, Trade Marks and Copyrights, Committee of the Judiciary. He provided background on the cost principles and allowability of IR&D costs and addressed specific questions on DOD's policy on acquiring patent and data rights as a consequence of reimbursing a portion of a contractor's IR&D (the DOD does not acquire such rights). (Ref. 17) In November 1964 the Deputy Secretary of Defense responded to a GAO letter regarding the DOD policy on patent and data rights. (Ref. 18) The essence of this letter was later sent to field personnel in Defense Procurement Circular #22. (Ref. 19) During the same month, the Deputy Director, Defense Research and Engineering, provided the Bureau of the Budget (BOB) a detailed position paper on the DOD's rationale for supporting IR&D, DOD policy

on patent and data rights, DOD position on a relevancy requirement for IR&D, and DOD policies and procedures for determining the amount of reimbursement. (Ref 20) These letters provide a good summary of the DOD philosophy which has existed over the years.

In the spring of 1965 the Army Audit Agency published a report on its study of IR&D and other related technical effort. (Ref. 21) The audit covered 19 individual defense contractors and produced five major conclusions:

> 1. IR&D efforts were being intermingled with other independent technical efforts such as bid and proposal, conceptual studies, contract support, etc. (cost classification problem).
>
> 2. Some contractors applied indirect and administrative costs to IR&D while others did not (burdening problem).
>
> 3. The technical rating methods used by the three Services were not consistent and there was little exchange between the Services.
>
> 4. Advance agreements were negotiated before, during, and after the period covered. Some contractors that should have agreements did not have them. There were inconsistencies in cost-sharing arrangements.
>
> 5. Contractors were free to change IR&D plans during performance and there had been significant changes in some programs. (Ref. 21, pp. 2-4)

This was the first formal audit to document many of the problems which had motivated the efforts to improve the IR&D cost principles. Further, it questioned the adequacy of DOD surveillance and control of IR&D.

About a year later the Subcommittee on DOD Appropriations of the House Committee on Appropriations systematically

questioned DOD witnesses on the benefits of IR&D to the DOD. They also asked whether the DOD witnesses felt the resources could be better utilized by adding them to the Service RDT&E accounts and making IR&D a disallowed cost. The DOD position was that IR&D was of value and should be retained as an allowable cost. However, with one exception, the witnesses were unable to state specific benefits. (Ref. 22) This probing led Dr. Foster, DDR&E, to establish a Defense Science Board Task Group on IR&D which will be discussed in more detail in Section 2.3.2.

2.3. OASD(IL) Led IR&D Activities (1967-1969)

2.3.1. Evolution of the Cost Principles

Subsequent to the Secretary of Defense decision to drop the CITE concept, OASD(IL) took the lead in developing new cost principles for IR&D and B&P. Essentially the same people continued working on the cost principles. The first product of the OASD(IL) effort emerged in January 1967. Key elements were:

1. IR&D costs of CWAS approved contractors were to be accepted as reasonable except that the Secretary of the Military Department could withdraw the approval in special cases.

2. IR&D costs for non-CWAS approved contractors incurring less than $1M in IR&D costs were to be subject to a formula ceiling.

3. IR&D costs for non-CWAS approved contractors incurring over $1 million of IR&D costs were to be subject to the negotiation of advance agreements. Failure to negotiate such an agreement limited the contractor to a $1 million ceiling.

4. Cost sharing from the first dollar was eliminated.

5. Unsolicited B&P costs (incurred prior to receipt of RFP) were to be handled exactly the same as IR&D costs.

6. B&P costs incurred after receipt of a request for proposal were to be subject to the general ASPR rules of reasonableness.

7. If a contractor was required to negotiate an advance agreement for either IR&D or B&P, he was required to negotiate an agreement for both. The agreement was to have a separate ceiling for each but either could be increased if the other was decreased by a like amount. (Ref. 4, pp. 28-29)

Principles in this form were sent to industry and other agencies in January 1968. Industry comments were received in April and June 1968 and suggested substantial changes to the cost principles. (Refs. 23 and 24) In response to these comments the attempt to segregate types of B&P costs was abandoned and a procedure for determining an IR&D ceiling when negotiations failed was provided.

In October 1968, revised cost principles were presented to the DOD Industry Advisory Group which recommended that negotiations of advance agreements be abandoned and that all contractors be subject to the same formula. (Ref. 4, p. 34) In December 1969, the Deputy Secretary of Defense approved the use of the formula for all contractors. (Ref. 25) The key elements of the new cost principles were:

1. Both IR&D and B&P were to be subject to a straight formula for determination of reasonableness,

2. There was to be interchangability between IR&D and B&P ceilings,

3. An appeals procedure was to be provided for special cases when the formula provided an unequitable result,

4. All B&P costs, solicited and unsolicited were to be included in the formula computation,

5. All IR&D and B&P costs were to be burdened except that G&A would not be included, and

6. Contractors with approved CWAS rating would not be subject to the formula. (Refs.26 and 27)

These cost principles were formally sent to industry, other Government agencies, and the GAO in February 1969. The next month they were published as advance information for DOD personnel in Defense Procurement Circular No. 68. The industry reacted negatively to the proposed cost principles taking the basic position that IR&D and B&P costs should be fully reimbursed with no limiting factors other than the general rule of reasonableness. (Ref. 28) The General Accounting Office also took a serious interest in the proposal and after pursuing a number of questions in the summer of 1969 (Ref. 29), took the position that the proposed principles would lead to increased government cost without commensurate benefits and decrease government awareness of the value of a program it was substantially funding (through the reduction of technical evaluation activity). (Ref. 30) These cost principles were overtaken by Congressional activities in the IR&D area and never implemented as will be discussed in Section 2.4. The outside events which occurred during 1967-69 will be summarized in the next section.

2.3.2. Related Events

As a result of the inquiries by the House Appropriations Subcommittee in the spring of 1966, DDR&E established a Defense Science Board (DSB) Task Group to examine:

- the adequacy of communications of IR&D efforts, and
- generate examples of benefits of IR&D.

The Task Group was mainly composed of executives from the aerospace industry. Their recommendations were that (1) the present concept of allowing IR&D as an overhead item be continued and (2) ODDR&E issue annually a DOD report containing voluntary submissions by companies on significant IR&D projects. (Ref. 6) A Supplement included the first group of examples (Ref. 31) and similar reports were published in 1968, 1969, and 1970 (Refs. 32, 33, 34, 35, and 36) Thus, in subsequent years DOD witnesses were forearmed with examples of benefits of IR&D. (see, for example, Ref. 37)

The Logistics Management Institute completed a Reconnaissance Study of IR&D and B&P in August 1967. Their primary recommendation focused on improving technical evaluations to achieve consistency, stimulate industry-Government coupling, avoid unnecessary duplication, and establish closer liaison between technical evaluators and negotiators. (Ref. 38)

It was during this time period that the GAO became more active in the IR&D/B&P area. In 1967 they issued a report on the costs of bidding and related technical efforts

charged to Government contracts at Lockheed Missile and Space Company. The GAO found much work in bidding and related efforts which they felt could be classified as IR&D. IR&D was covered by a ceiling and, hence, subject to reduced recovery whereas bidding and similar expenses were not covered by ceilings. Thus, a motive could be asserted for a contractor to shift costs from IR&D to other areas. The GAO felt the DOD regulations were ambiguous and since most disputes are decided in favor of contractors in this situation, the GAO recommended that the DOD issue improved cost principles at the earliest possible time. The GAO findings collaborated the cost classification findings of the Army Audit Report. (Ref. 39)

The GAO issued a draft report on a major study of Government-wide IR&D in July 1968. The GAO report identified several problem areas, such as:

- Lack of a Government-wide IR&D policy,
- Need for a closer relationship of Government R&D efforts and IR&D,
- Delays in negotiating advance agreements,
- Relationship between bid and proposal, other technical effort*, and IR&D (cost classification),
- Extensive use of cost sharing from the first dollar,
- Allocation of other overhead costs to IR&D (burdening),

*Other Technical Effort, OTE, was a term of convenience applied to technical effort which was not classified as IR&D but appeared to be IR&D-type work.

- Differences in Military Services administration of IR&D.
- Relevancy of IR&D to Government interests, and
- Rights to royalty-free use of inventions under IR&D.

Further, the GAO report included four recommendations:

1. There should be a Government-wide IR&D policy.
2. There should be a more systematic method of disseminating to Government personnel the information contained in the IR&D technical plans.
3. There should be uniform DOD procedures for prenegotiation arrangements, technical plan requirements, and scope and nature of the technical evaluations.
4. The Federal Council for Science and Technology should undertake a study as to whether the Government should receive royalty-free license rights to inventions arising from IR&D. (Ref. 40, pp. 88-89)

The DOD opposed one recommendation (No. 4), favored two (Nos. 2 and 3) and was neutral on the other one (No. 1). (Ref. 41) Industry provided the GAO extensive comments on the report but did not take explicit positions on the recommendations. (Ref. 42)

Thus, in the 1967-69 time period the Congress and, especially, the GAO were becoming more involved in the IR&D area and the DOD was reacting to their stimuli. Most of these stimuli were reasonably indirect and did not challenge the DOD policy in this area. However, in 1969 this situation changed.

2.4. Congressional Intercession (1969-1970)

The Congress became directly involved in IR&D policy matters during the floor debate on the FY 1970 Military Procurement Act. This involvement lasted for about 15 months and resulted in legislative action impacting IR&D in the FY 1970 and FY 1971 Military Procurement Authorization Acts.

2.4.1. FY 1970 Military Procurement Authorization Act

In August 1969 Senator Proxmire introduced Amendment No. 123 in the FY 1970 Military Procurement Authorization Bill. The amendment read as follows:

> "No part of the funds authorized by this Act shall be available for payment, directly or indirectly, to any contractor under a negotiated contract for any research and development work, bid and proposal expense, or other technical effort unless such work, expense, or other effort is specifically authorized under the terms of the contract or unless such work, expense, or effort is determined by the contracting agency to be of direct or indirect benefit to the work being performed under the contract." (Ref. 43)

In his comments Senator Proxmire criticized the lack of control the DOD had over IR&D, bid and proposal, and other technical effort costs and the significant increase in these costs from 1963 to 1969. He alleged that DOD officials did very little reviewing of contractor IR&D programs and were in no position to determine their worthiness. He was especially critical of the planned DOD cost principles (February 1969 version) which he asserted:

> ". . . completely eliminated any semblance of control by instituting a formula basis for determining the reasonableness of contractors' IR&D and bid and proposal costs. Under this system no contractor,

> regardless of the degree of business he does with DOD would be required to have his proposed programs scrutinized in any way prior to incurring costs that will be reimbursed by the Government." (Ref. 43)

Amendment No. 123 would have essentially imposed the AEC cost principles* on the DOD and would have had far reaching consequences. Accordingly, Senator Proxmire later agreed to replace Amendment No. 123 with one which would impose a 20 percent reduction in IR&D, B&P and OTE costs for FY 70 authorized funds and to resubmit the original amendment as a separate bill which would be the subject of hearings in the next session of Congress. In his comments in announcing this agreement on the floor of the Senate, Senator Proxmire reiterated his criticism of existing and planned DOD policy in this area. He cited the GAO report of 1967 as giving examples of the kind of excesses which occurred under IR&D and raised as major question, "Why do we need to spend $685 million for an IR&D program when we already are spending billions of dollars on R&D contracts?" He went on to state that he had ". . . felt for a long time this program (IR&D) should not only be questioned but deleted . . . ." Thus, the lines were clearly drawn for the subsequent Congressional inquiry into IR&D. (Ref. 44)

In resolving the issue over Amendment No. 123 the Senate unanimously supported the proposed 20 percent

*The AEC IR&D cost principles are reproduced as Appendix B.

reduction in IR&D while the House did not include such a clause in its bill. Consequently, the issue went to the Conference Committee and the result was Section 403 of Public Law 91-121 which required that the DOD limit its reimbursement to 93 percent of the amount that it would otherwise paid. The provisions of the law were implemented by Defense Procurement Circular No. 75 in December 1969. (Ref. 45) Because of the rubber baseline and limited application (FY 70 funds only), the law was quite difficult to implement in a meaningful way (Ref. 46) and, as will be noted below, only remained in effect for a year. While the difficulties in implementing the law were recognized by DOD and industry, they were far more interested in what would transpire with respect to Senate Bill 3003.

2.4.2. FY 1971 Military Procurement Authorization Act

As agreed with Senators Stennis and McIntyre, Senator Proxmire introduced Senate Bill 3003 in October 1969. The bill provided that IR&D costs would be allowable under negotiated contracts only if specifically provided for in the contract and the IR&D had a direct or indirect benefit to the work being accomplished under the contract. Bid and proposal expenses under any negotiated contract would not be allowed to exceed one percent of the direct charges. (Ref. 47) In introducing this bill Senator Proxmire was even more veminent in his condemnation of current and planned DOD management of IR&D. Further, he exploited the findings of

the Army Audit Report (Ref. 21), GAO draft report of 1968 (Ref. 40), and the earlier GAO report (Ref. 39) to illustrate his assertions. In particular, he questioned the adequacy and administration of advance agreements, the effectiveness of technical evaluations, duplication of DOD sponsored R&D, and work being done under IR&D that was not related to Government or military needs. (Ref. 48)

In early January 1970 Senator Stennis asked for DOD views on what specific implementing actions would be involved if Congress established a specific ceiling on IR&D and for any other alternatives the DOD might suggest. (Ref. 49) The DOD response was provided by ASD(IL) and asserted that line item control was not administratively feasible. He then suggested two alternatives: first, the formula approach of the February 1969 proposed cost principles and, second, an approach based upon negotiated advance agreements. (Ref. 50) Subsequently, the Acting General Counsel of the DOD provided Senator Stennis the DOD views on Senate Bill 3003. The DOD strongly opposed the bill. (Ref. 51)

During the same time period the Aerospace Industries Association made known its position in opposition to Senate Bill 3003. Their key points were that the bill (1) would, in essence, preclude companies from recovering necessary costs of doing business through the prices of goods or services sold, (2) would preclude companies from developing and maintaining their technical competence, and (3) imposed

unnecessary restrictions since effective controls on companies' recoveries of the cost of independent rechnical efforts* were already provided by the intense competition for DOD and NASA contracts. (Ref. 52, and 53)

As promised earlier, hearings were scheduled in early 1970 by both Senate and House Armed Services Committees. However, before the hearings got underway there was a crash effort in OSD to develop a policy which would be acceptable to the Congress as a whole if not to Senator Proxmire. The general feeling was that the February 1969 cost principles were not defensible and continuing to pursue them would only lead to further restrictive legislation.

New DOD IR&D Policy

The result of this effort was a DOD white paper on IR&D signed by both the ASD(IL) and the DDR&E and approved by the Deputy Secretary of Defense. In essence, the proposed policy provided more direct and positive control particularly for the large defense contractors who incurred the majority of the costs in this area. The main differences from the February 1969 proposed cost principles were that (1) advance agreements were to be required for major contractors, (2) technical evaluations were to be made uniform DOD-wide

*Independent technical efforts is a generic term referring collectively to IR&D, B&P, and OTE.

and strengthened, and (3) a data bank was to be established to provide a centralized body of IR&D project data. It was this policy that the DOD took to Congress as an alternative to further legislation. (Ref. 54)

GAO Position Definitized

On the eve of the hearings the GAO formally published its extensive study of IR&D which had been issued in draft form in 1968. The GAO suggested three major areas for Congressional consideration:

1. All contractors' independent technical efforts, including IR&D, bid and proposal, and other technical efforts should be considered as a single entity since no clear distinction can be made between these items and, consequently, any agreed ceilings on IR&D can be avoided through description of an IR&D project under different terminology.

2. DOD should be required to break out and identify separately in its appropriation requests the amount estimated as required for this purpose.

3. Congress should establish a government-wide policy on independent technical effort since the DOD/NASA and AEC policies differ. In this area the following issues were suggested:

    a. Whether or not the present practice of allowing IR&D as an acceptable overhead cost in negotiated costs should be replaced by a system of:

    (1) Extending the use of direct R&D contracts to include those IR&D projects which the agency wishes to support fully or on a cost-sharing basis and thereby providing greater assurance that the desired work will be performed and that the Government will be entitled to information and royalty-free rights to any inventions arising therefrom and

(2) Authorizing an allowance for a stipulated percentage of the remainder of the contractor's total IR&D effort, irrespective of the source of funding, either as a profit factor or through acceptance as a recognized overhead cost as an incentive to contractors to continue technical efforts beyond those directly contracted with the Government.

b. Whether or not allowances to contractors for IR&D should be confined to projects that have a direct and apparent relationship to a specific function of the agency, and

c. Whether or not, if IR&D allowances by DOD and NASA are continued on the present basis and are not related directly to current or prospective Government procurement, financial support should be provided to companies with similar capabilities which do not hold Government contracts as a means of supporting and strengthening industrial technology. (Ref. 55, Digest pp. 2-3)

The GAO report included extensive discussions of the lack of an overall government IR&D policy, the need for a closer relationship of Government R&D efforts and IR&D, rights to royalty-free use of inventions under IR&D, and other problem areas. (same as those in the draft report Ref. 40) This report was the basis for GAO testimony at the hearings.

Congressional Hearings

The Congressional hearings on IR&D were held early in 1970. The House hearings were conducted by an IR&D Subcommittee of the Armed Services Investigating Subcommittee of the Armed Services Committee. Representative Philbin (Massachusetts) chaired the IR&D subcommittee and was assisted by Representative Gubser (California). The Senate hearings were conducted by the Ad Hoc Subcommittee on Research

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and Development which was chaired by Senator Thomas McIntyre (New Hampshire) and included Senators Young (Ohio), Byrd (Virginia), Murphy (California), and Brooke (Massachusetts). The House hearings were conducted 25, 26, February and 2 March 1970 and the Senate hearings on 2, 6, 9, and 13 March 1970.

The individuals and organizations testifying at the hearings are listed on the next page. Senator Proxmire spoke for this bill. However, the other Congressmen opposed his proposed legislation. The General Accounting Office representatives basically reiterated the positions taken in their report. The majority of witnesses at both hearings were from industry. They provided information on the benefits of IR&D, cost trends, management procedures, and reiterated the industry position on IR&D. The AEC representatives provided their rationale for why the AEC needed cost principles which differ from those of the DOD. (Refs. 56 and 57)

The only DOD witness was Dr. Foster and he forcefully defended the value of IR&D to the DOD. Further, he proposed a DOD administrative solution to the problems identified by the GAO and Congress which would negate the need for legislation in the area. The five point proposal is given below and was based on the white paper approved a few days earlier by the Deputy Secretary of Defense:

INDIVIDUALS AND ORGANIZATIONS TESTIFYING AT IR&D HEARINGS

HOUSE HEARINGS

Hon. Emilio Daddario, Representative
General Accounting Office
Western Electronic Manufacturers Association
Aerospace Industries Association
National Security Industrial Association
Electronic Industries Association
Boeing Company
Westinghouse Electric Company
Department of Defense (DDR&E)

SENATE HEARINGS

Hon. George Murphy, Senate (California)
Hon. William Proxmire, Senator (Wisconsin)
Hon. Alan Cranston, Senator (California)
General Accounting Office
Western Electronics Manufacturers Association
Aerospace Industries Association
National Security Industrial Association
Electronic Industries Association
Department of Defense (DDR&E)
Atomic Energy Commission

"1. Use individually negotiated advance agreements for the control and reimbursement of these costs for approximately 100 of the larger defense contractors.' This will require an increase in the number of contractors with which we negotiate advance agreements by a factor of almost two. Such agreements, after a formalized detailed technical review of the proposed IR&D program, will establish a separate dollar ceiling for the DOD's reimbursement of each of these costs, but allow the contractor to combine the individual amounts into a single pool if he chooses. We will require the contractor to burden these costs as he would for a contract, except that G&A would not be added. The requirement to negotiate an advance agreement will be enforced by automatically establishing a low threshold for recovery of these costs where no advance agreement exists.

2. Strengthen technical review and evaluation of contractors' IR&D programs, as currently established under DOD Instruction 4105.52. Establish uniform review and evaluation procedures to be used throughout the DOD. The system will require the review of a company's individual IR&D projects as submitted at the time of the advance agreement.

3. A data bank will be established to provide a centralized body of IR&D project cost and technical information. This information will be available to the Government technical community at large.

4. Use the DOD developed formula for control and determination of reasonableness of these costs for the remaining large number of smaller companies who recover IR&D and B&P costs. This will provide a workable system that can be uniformly applied, and one which will assure results that can be easily monitored and adjusted as needed.

5. The Military Departments will increase as necessary the support and resources needed to effectively perform the required IR&D technical reviews and evaluations." (Ref. 56, pp. 267-269)

Thus, the DOD once again took the initiative in establishing an appropriate solution to the IR&D problem. The DOD proposal was a balanced position between the restrictive

proposal of Senator Proxmire and the liberal suggestions of industry representatives.

Congressional Resolution

The House and Senate came to different conclusions on the need for legislation in the IR&D area and the differences were ultimately resolved by the Conference Committee for the Military Authorization Bill for Fiscal Year 1971.

The Senate Armed Services Committee recommended legislative action in the IR&D area but did not support Senator Proxmire's bill. The Committee supported the DOD efforts to improve its administration of IR&D. However, the Committee expressed its belief that in view of the importance of independent technical effort to the security of the country and the amount of money used to fund it annually, broad legislative controls were justified. (Ref. 58, pp. 97-98; see also Ref. 59) The Senate adopted language which provided the following:

> "a. Restricted payments to contractors for independent research and development, bidding and proposal and other technical effort work which is relevant to Defense functions and operations,
>
> b. Required negotiation of advance agreements with all contractors who receive more than $2 million in IR&D, B&P, or OTE in their last preceding year,
>
> c. Required that negotiations of advance agreements be based on submitted plans and a technical evaluation of the IR&D portion of those agreements,

d. In the event negotiations are held with any company required to enter into an advance agreement, but no agreement is reached, reimbursement would be made in an amount substantially less than the contractor otherwise would have been entitled to receive,

e. The Department of Defense was required to report to Congress with regard to IR&D, B&P and OTE expenditures,

f. Establish a ceiling of $625 million on payments to be made pursuant to advance agreements negotiated under the act, and

g. Repeal of Section 403 of the fiscal year 1970 act which limited payments for IR&D, B&P and OTE to 93 percent of the total cost contemplated by the Department." (Ref. 60, p. 21)

The House Armed Services Committee IR&D Subcommittee concluded that adequate control of defense expenditures for IR&D, B&P, and OTE could be achieved through improved DOD administration rather than through legislation. The House Subcommittee also recommended that:

(1) Section 403, Public Law 91-121 be repealed

(2) The Department of Defense:

(a) Separate the costs of B&P and OTE in the negotiation of advance agreements for IR&D,

(b) Extend the use of advance agreements to firm receiving $2 million or more from the DOD for IR&D, B&P and OTE provided the use of cost sharing arrangements be eliminated,

(c) Provide appropriate right of appeal where, in the absence of an advance agreement, the DOD establishes recovery of costs which a contractor claims is less than the amount of its fair share,

(d) Develop uniform regulations which will provide clear guidance to all services as to policies, practices and procedures to be followed in the establishment of allowable IR&D costs and the negotiation of IR&D advance agreements, and

(e) Provide Congress annual reports on the IR&D payments made to major contractors during the prior year.

(3) The criteria of relevancy not be used as a determining factor in the support of basic research efforts of contractors. (Ref. 61, pp. 14-15)

The House included no language on IR&D in its version of the authorization bill. Thus, the issue went to the Conference Committee for resolution.

The compromise worked out in the Conference Committee was that legislation would be inacted but there would be no ceiling on DOD reimbursement of IR&D, B&P and OTE. Further, the relevancy requirement was changed to a "potential" relationship to accommodate the House objection that a direct relevancy requirement would preclude contractors from doing basic research under IR&D. Finally, all reference to "Other Technical Effort" was eliminated since the DOD planned to reclassify all OTE costs into IR&D, B&P or other appropriate overhead categories. (Ref. 60, pp. 21-22) The final legislation was Section 203 of Public Law 91-441, the Military Procurement Authorization Act for Fiscal Year 1971, which is included as Appendix C. The DOD had previously begun to implement its five point plan since both Armed Services Committees had agreed to it. (Ref. 62) Once the

law was passed the implementation was expedited. However, the implementation required a significant period of time since it represented a rather significant overhaul of the DOD's administration of IR&D. Current DOD policies and practices are discussed in the next section.

SECTION III

CURRENT DOD POLICY AND ADMINISTRATION

The current DOD policy and administration of IR&D is based on both the requirements of the Public Law provisions and the plan which DOD advanced during the IR&D hearings. These requirements and commitments are outlined in Section 3.1. After the law was passed DOD established a senior management policy council to monitor implementation and deal with IR&D policy issues. The activities of this group are summarized in Section 3.2. The major elements of the current DOD policy and administration of IR&D are outlined in Section 3.3. Then, relevant data on the size and content of the IR&D program are presented in Section 3.4.

3.1. Legislative Requirements

In setting out to overhaul IR&D policy and administration, DOD not only had to comply with the provisions of Section 203, Public Law 91-441, but also the provisions of the "get well" plan presented to Congress during the hearings. The major requirements of the law were:

1. Any company which recovered, in its prior fiscal year, more than $2 million of IR&D or B&P from DOD contracts that are subject to the Truth in Negotiations Act must negotiate an advance agreement with DOD.

    a. Advance agreements may be concluded with the corporation or with product divisions which recover more than $250 thousand of such payments.

b. Companies required to negotiate advance agreements cannot be paid IR&D/B&P costs except pursuant to the terms of an advance agreement.

c. If a company negotiates but does not reach agreement, no reimbursement shall be made except for an amount substantially less than would otherwise be allowed by DOD.

2. The IR&D portion of the advance agreement must be negotiated on the basis of DOD technical evaluation of the contractor's proposed program.

3. No IR&D or B&P costs may be paid unless the work has, in the opinion of the Secretary of Defense, a potential relationship to military functions or operation.

4. Reduce allowances resulting from failure to reach agreement are subject to appeal in accordance with regulations to be prescribed by the Secretary of Defense.

5. The Secretary of Defense is required to submit annual reports to Congress on or before 15 March setting forth

a. Companies with whom negotiations were held and results.

b. Defense Contract Audit Agency (DCAA) report on IR&D and B&P payments to major defense contractors.

c. The manner of DOD compliance with the legislation and any major policy changes proposed by DOD.

6. The prior legislation establishing the 93 percent limitation was repealed. (Ref. 63, pp. 5 and 6)

Further, the DOD had committed itself to implementing its proposed solution to the IR&D problem. Accordingly, in early October 1970 Senator McIntyre wrote to the Secretary of Defense stating:

> "The provision as now written (Section 203, Public Law 91-441) is perfectly consistent with the plan for improved administration of these programs which was presented to Congress by Dr. Foster in his testimony before the Committee this past March. It is the Committee's hope that the Department will move expeditiously to implement this plan."

Senator McIntyre went on to identify five objectives for implementation:

1. Reclassify appropriate OTE items to IR&D or B&P,

2. Establish uniform standards for burdening except for G&A,

3. Establish uniform procedures for determining allowable IR&D/B&P,

4. Establish a data bank for IR&D, and

5. "Beef up" personnel and other resources to improve technical evaluations and realize the goal of negotiating with 100 largest defense contractors. (Ref. 64)

Subsequently, Senator Stennis endorsed Senator McIntyre's views in a follow-up letter to the Secretary of Defense. (Ref. 65) Thus, in addition to the specific provisions of the law, the DOD was committed to a number of additional actions. Early in the implementation process a top management group was established to oversee the implementation and DOD policy in this area.

3.2. DOD Management Organization for IR&D.

In July 1971 the Deputy Secretary of Defense established a DOD IR&D Policy Council to recommend necessary guidance and policy on a continuing basis. (Ref. 66) Members included DDR&E (Chairman), ASD(IL), ASD(C) and the Assistant Secretaries of the Military Departments for

I&L and R&D. Representatives of NASA and AEC were invited to participate as observers. A Charter was prepared and formally published in DOD Instruction (DODI) 5100.66, "Establishment of Policy for, and Technical Evaluation of, IR&D Programs." (Ref. 67) In addition to chairing the DOD IR&D Policy Council, DDR&E was also responsible for the DOD Technical Evaluation Group which was established to coordinate the technical evaluation and activity and which will be discussed in more detail in Section 3.3.3. The ASD(IL) is responsible for the ASPR Committee which generates the cost principles and has staff cognizance for the tri-service negotiation groups which negotiate advance agreements.

The DOD IR&D Policy Council has met eleven times since it was established. Typical topics considered by the Council are summarized below:

1971

- Review/Approve Charter
- Status of Trial IR&D Data Bank

1972

- Working Group Activities
- Congressional Interest in IR&D
- Service Briefings on Procedures for Negotiating Advance Agreements
- Review of Proposed Technical Evaluation Form
- Industry View of IR&D/B&P Procedures/Policy
- Uniform Negotiation Procedures (twice)
- Patent and Data Rights
- Evaluation Simplification

1973

- Introductory Briefings (All members changed during 1973.)

1974

- DOD Input to GAO In-Depth Investigation
- Industry Tri-Association Committee Presentation
- Service Comments on Relevancy
- DOD IR&D Data Bank Decision Briefing
- Review of Updated Documents
- Summary of DSB Report on IR&D
- Guidelines for Level of IR&D Support

1975

- Discussion of DSB Report on IR&D

The agenda items were initially mainly associated with implementation and have since evolved to a continuing review of policies and procedures.

The Air Force has established an Air Force IR&D Policy Council to interface with the DOD Council and oversee Air Force IR&D activities. It is chaired by the Assistant Secretary of the Air Force R&D and includes Secretariat, Air Staff and Headquarters, Air Force Systems Command representatives. (Ref. 68) Neither of the other Services have established IR&D policy councils.

The DOD IR&D Policy Council established a Working Group on Nature, Objectives and Effects of the IR&D Program at an early meeting. The Group conducted an industrial survey in the summer of 1972 to obtain additional data on how industry handles IR&D and industry reaction to DOD policies and procedures. The Group has published a very informative report on IR&D; the latest version was released in June 1974 (Ref. 69) and is available from Mr. Gersham R. Makepeace, ODDR&E, who has chaired the Group since its inception.

3.3. Elements of DOD IR&D Policy and Administration

The major elements of the DOD IR&D policy and administration are discussed in this section. The evolution of the DOD policies and practices are traced to their current status. The areas discussed are (1) cost principles, (2) negotiation of advance agreements, (3) technical evaluations, (4) potential military relationship determinations, (5) appeal hearing groups, (6) annual report to Congress, and (7) IR&D data bank.

3.3.1. Cost Principles

The requirements of Public Law 91-441, Section 203, were initially addressed in Defense Procurement Circular (DPC) No. 84 dated 30 November 1970. This DPC:

- Required contractors to negotiate advance agreements for the period beginning 1 January 1971 if they recovered over $2 million of IR&D and B&P from DOD contracts in their fiscal year 1970,
- Required IR&D/B&P to have a potential relationship to a military function or operation as a condition of allowability,
- Provided for technical evaluations,
- Provided for interchangeability between IR&D and B&P,
- Reduced payment for contractors who failed to complete required negotiations was established at an amount not to exceed 75 percent of what otherwise would have been accepted, and
- Provided for three-man Departmental appeals boards (Ref. 70, see also Ref. 63, p. 9)

Representative Gubser, who had been on the House IR&D Subcommittee, thought that DPC No. 84 overimplemented the law. The DPC provided that any contractor who recovered over $2 million in IR&D and B&P form the DOD would be required to negotiate an advance agreement. Representative Gubser questioned two aspects of the above requirement. First, there was no restriction on the type of contracts the $2 million was recovered under whereas the law included the statement:

> "The provisions of this section shall apply only to contracts for which submission and certification of cost or pricing data are required in accordancw with Section 2306(f) of Title 10, United States Code" (Truth in Negotiation Act).

Second, the law referenced IR&D or B&P whereas the DPC used the phrase IR&D and B&P. Both of these points were given serious consideration by the DOD and in the first case resolved in favor of Representative Gubser's position but the second was not changed since DOD felt its position was consistent with prior commitments and legislative history. Defense Procurement Circular No. 87 changed the criteria to only IR&D/B&P costs recovered on contracts subject to the Truth in Negotiations Act. (Refs. 71 and 72)

The revised ASPR IR&D/B&P principles were developed consistent with DPC 84 and 87. They also provided for two other provisions which related to Dr. Foster's five point plan. These were the requirement for full burdening of IR&D/B&P except for G&A and for the use of CWAS, or the

formula, in establishing IR&D/B&P ceilings for contractors not required to negotiate advance agreements. These principles were first published as Defense Procurement Circular No. 90 in September 1971. They became effective for new contracts awarded in the first fiscal year of each contractor beginning on or after 1 January 1972. In hardship cases application could be delayed for up to one year. (Ref. 73, see also Ref. 63, p. 10) These cost principles are still in effect. (Ref. 74, see Appendix D)

3.3.2. Negotiation of Advance Agreements

The tri-service negotiation groups had been in existence since the early 1960s and the new policies and procedures had the main impact of requiring negotiations with more contractors and strengthening the government negotiating position. During the hearings the DOD had obligated itself to establish uniform negotiation procedures. (Ref. 64) This topic was one of the main concerns of early DOD IR&D Policy Council meetings. Further, an ASPR case (ASPR Case 71-102, ASPR Guidance for Negotiating Advance Agreements for IR&D and B&P) was established in 1971 to consider the topic. The Director of Procurement Policy, ASD(IL), put forward a strawman set of procedures which included a weighted guideline approach to determining a reasonable ceiling. This approach was unacceptable to the ASPR Section XV, Part 2, Subcommittee because they did not feel a set of guidelines could satisfactorily encompass all possible circumstances and

conditions. (Ref. 75) Although there has been much discussion of uniform negotiation procedures, none have been issued by OSD and each negotiation group still does its negotiations as it sees fit.

The Air Force tri-Service group has used a guideline approach in establishing the Government negotiation objective for their negotiations since 1972. The guideline is applied by the negotiator and the results are reviewed at a pre-negotiation meeting of the negotiator, his supervisor, and the IR&D technical manager. If in the judgment of the negotiator it is necessary to deviate from the guidelines to obtain an equitable result, such is permitted.

Once it became clear that it was not possible to obtain agreement on uniform procedures for negotiations, and the GAO had identified residual deficiencies in this area, a joint DDR&E/ASD(IL) memorandum was issued giving broad guidance for the negotiation of IR&D/B&P advance agreements. The guidance provided

- All elements in the evaluation and negotiation process should seek out and reward projects which solved critical deficiencies or reduced the cost of equipment,
- Departmental negotiators should meet together from time-to-time to exchange views and identify issues,
- Results of the technical evaluation should have a meaningful and traceable effect on the negotiated ceiling,
- Multiyear advance agreements are encouraged,

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- Inflationary or deflationary economic factors would be given consideration,
- Technical representatives should participate in pre-negotiation meetings,
- Negotiators are responsible for B&P potential military relationship determinations. The basis should be the same as for IR&D determinations since IR&D and B&P are interchangeable, and
- Non-relevant projects can be included in the ceiling so long as there are enough potentially relevant projects to cover all costs allocated to the DOD. (Ref. 76)

This guidance was subsequently updated in October 1974. However, only a few minor changes were made. The OASD(IL) IR&D focal point was designated to arrange inter-Departmental negotiator meetings. A new paragraph requiring negotiators to maintain adequate negotiation files was added and the first paragraph was moved to the DODI 5100.66. (Ref. 77) Thus, while uniform procedures have not been established there is overall guidance available to provide a framework for the negotiation process.

3.3.3. Technical Evaluations

Improving the technical evaluation process was a major thrust of Dr. Foster's five point plan for improving DOD administration of IR&D. Further, Congress appears to have regarded technical evaluations as a necessary part of providing adequate stewardship of the tax payers funds going into IR&D. Thus, a major effort was undertaken to upgrade the technical evaluation process. This effort was spearheaded by the DOD Technical Evaluation Group (successor to

Armed Services Research Specialist Committee) which was chaired by ODDR&E* and included members from each Service and a NASA representative.

Initial Technical Evaluation Policies and Procedures

The basic technical evaluation policy document, DODI 5100.66, "Establishment of Policy for, and Technical Evaluation of, IR&D Programs," was published in February 1972. This document provided for yearly evaluation of contractor submitted technical plans and on-site reviews at least once every three years. The Technical Evaluation Group (TEG) was to (1) establish criteria, methodology, and evaluation forms for use by all Services, (2) designate the lead department for each contractor, (3) determine the standard format for contractor technical plans and other similar functions. A departmental IR&D technical manager was to be designated by each Service. His responsibilities were (1) to designate the organizations within his department that were responsible for evaluating company technical plans, (2) ensure effective evaluations, (3) prepare and submit evaluation report, and so forth. Further, he was responsible for verifying that the evaluation covered at least 90 percent of the dollar value of each company's IR&D program to ensure that the

*Mr. Elliott B. Harwood was the initial chairman. The Group was subsequently chaired by Mr. David D. Acker and, now Mr. James W. Roach.

evaluation was valid. The departmental IR&D technical managers were the Service members of the TEG and were responsible for the technical evaluation activity in their Service. The evaluations themselves were done by scientists and engineers in the laboratories and acquisition divisions of the Services and NASA. (Ref. 67) A standard technical evaluation form for use DOD-wide was published in May 1972 and has been used henceforth by all the Services and NASA. (Ref. 78)

The guidelines for contractor technical plans were also issued in February 1972. They provided for presentation of a tabular synopsis and narrative discussion for each IR&D project. The tabular synopsis includes such information as the principal investigator, his telephone number, project funding, and so forth. The narrative includes a discussion of the problem being addressed, the objective and technical approach for the current year, and progress for the prior year. The technical plans were to be organized by technical areas as indicated by Committee on Scientific and Technical Information (COSATI) fields and groups. (Ref. 79)

To further insure that the new evaluation procedures were understood by field personnel, ODDR&E sponsored an IR&D Seminar in September 1972. It was attended by 200 DOD/NASA personnel mainly associated with the technical evaluation process.

The agenda for the meeting indicates the scope of coverage:

Keynote	Mr. E. Ball, ODDR&E
Evolution of IR&D	Mr. C. Deardorff, OASD(IL)
Report of Working Group	Mr. G. Makepeace, ODDR&E
DOD IR&D Technical Evaluation Group	Mr. E. Harwood, ODDR&E
- Technical Plans	Maj J. Eash, USAF Member
- On-Site Reviews	Mr. J. Crellin, USA Member
- Scoring Technical Evaluations	Mr. A. Cook, USN Member
NASA Evaluation Activities	Dr. R. Nash, NASA Member
Negotiating with Contractors	Mr. L. Mitchell, USAF Senior Negotiator
IR&D Data Bank	Mr. W. Thompson, DDC
Relevancy Determinations	Mr. E. Harwood, ODDR&E Mr. J. Garcia, NASA
Audit Activities	Mr. R. Logsdon, DCAA
Summation and Future Activities	Mr. D. Acker, ODDR&E

Service Implementation

Since the Service members of the TEG were also responsible for implementation of the process in their Services, there was a relatively rapid implementation. Each Service published internal regulations on the IR&D technical evaluation process. (Refs 80, 81, and 82) A detailed set of guidelines for field personnel was published by the Air Force as an Air Force Systems Command Supplement to the appropriate Air Force Regulation. The Supplement provided scoring procedures, instructions for completing the evaluation

forms, evaluation report format, and so forth. (Ref. 83)

In the summer of 1974, NASA created an IR&D office in the Office of Aeronautics and Space Technology. The objectives of the office were to: (1) manage this NASA-wide technical evaluation activity and (2) to encourage a strong interaction between NASA and industry. (Ref. 84) This action is expected to upgrade NASA particiaption in the technical evaluation process.

Revised Documentation

In early 1974 the Technical Evaluation Group undertook a review of existing DOD IR&D documentation. As a consequence the DODI 5100.66 and guidelines for contractor technical plans were reissued in late 1974. During the intervening period of time the revisions were negotiated with industry (via CODSIA), reviewed and commented upon by the Services, and finally approved by the DOD IR&D Policy Council.

The revised DODI 5100.66, "Establishment of Policy for, and Administration of, IR&D Programs" (Ref. 2), was somewhat broadened to include reference to the DOD IR&D Data Bank and to provide a set of principles which include a rationale for DOD support of IR&D. The main change relating to the technical evaluation process was the replacement of the requirement that 90% of the dollar value of the contractor program be evaluated with the requirement that the lead Department verify that the overall evaluation has been sufficiently comprehensive to permit the formation of a

reasonable conclusion concerning the technical quality of the contractor's program. Further, the new DODI specifically assigns to the TEG responsibility for assisting auditors and contracting officers in resolving cost classification questions involving IR&D. This practice had developed in the early 1970s but had previously been covered by regulation.

The guidelines for contractor technical plans were rewritten mainly for clarity and did not change the nature of the information being requested from industry. (Ref. 85)

3.3.4. Potential Military Relationship Determination

Section 203 of Public Law 91-441 required the DOD to determine whether or not IR&D projects have a "potential relationship to a military function or operation," (referred to as agency relevancy). Responsibility for this determination was assigned to the Technical Evaluation Group. (Ref. 86, para IV C2a) Since no legislative criteria was provided for this determination, there was considerable uncertainty as to just what it should be. The Air Force took the lead in formally stating criteria for the determination. There were some difficulties to early determinations and a few cases were resolved by ODDR&E. However, with time, some degree of consistency evolved in the determinations and the other Services gradually adopted the Air Force criteria. In early 1973 the Chairman of the Technical Evaluation Group formally issued the Air Force criteria as a guideline to be

used by all Services. (Ref. 86) The criteria is illustrated below:

Is the DOD precluded by law or otherwise, from funding such R&D?	What is the nature of the military requirement for the end product?	What will be the application of the end product?	Is another government agency responsible for this field of R&D?	CONCLUSION Is the IR&D project potentially relevant?
Yes				No
No	URGENT			Yes
	NONE (Not used by military)			No
	ROUTINE	Primarily Military		Yes
		Primarily non-military, but with substantial military application	Yes	No
			No	Yes
		Only incidental military application		No

Experience in the Air Force indicates that about 90% of the contractor IR&D projects are potentially related based upon this criteria. Since the DOD reimburses only about 40% of the contractor IR&D programs, the relevancy requirement has had little direct impact on ceilings. However, it may have motivated contractors to pursue work which they felt would be judged potentially related.

3.3.5. Departmental Appeal Hearing Groups

Section 203 of Public Law 91-441 required that an appeal procedure be established by the Secretary of Defense for contractors who negotiate but are unable to reach agreement with the DOD negotiator. Departmental IR&D/B&P Appeal Hearing Groups were established by ASPR 15-205.35 (para Dlh). Each Department is required to have a group which is composed of representatives of the Assistant Secretary for I&L (Chairman), Assistant Secretary for R&D, and General Counsel. Determinations by the Appeals Groups are to be the final and conclusive determinations of the Department of Defense.

To date there has been only one appeal. It occurred during the first year of operation under the new procedures when Aerojet General Corporation failed to reach agreement with their negotiator (Navy). Aerojet appealed the negotiator's determination and the Navy Appeal Hearing Group ruled in favor of the negotiator. Aerojet subjequently initiated litigation in the US Court of Claims but a final ruling has not yet been issued by the Court. The essence of

this situation is that Aerojet refused to accept a ceiling which was other than the amount they unilaterally determined to be their normal and reasonable cost of business. They asserted to do otherwise was a form of cost sharing which is precluded by the ASPR. The Navy rebuttal, in part, was that, by definition, negotiation is a process of offers and counteroffers and that Aerojet was insisting that their offer be accepted a priori. (Ref. 87)

3.3.6. Annual Report to Congress

Section 203 of Public Law 91-441 requires an annual DOD report on IR&D setting forth:

- Companies with whom negotiations are held and results.
- DCAA report on IR&D and B&P payments to major defense contractors.
- The manner of DOD compliance with the legislation in Section 203 and any major policy changes proposed by DOD.

The procedure which has evolved is that the DOD submits its report on or before 15 March each year. Subsequently, Senator McIntyre enters it into the Senate record along with any related letters and GAO reports and gives his personal assessment of DOD's actions. To date five reports have been released:

Year	Congressional Record
1971	24 March 1971, S3815-3818
1972	11 May 1972, S7681-7697
1973	8 May 1973, S8570-8583
1974	28 May 1974, S9042-9055
1975	9 April 1975, S5560-5568

DODI 7700.17, "Report to the Congress on IR&D/B&P Advance Agreements Negotiated with Defense Contractors" provides the mechanism for assembling the data for this report. (Ref. 88)

3.3.7. IR&D Data Bank

The IR&D Data Bank was one of the items in Dr. Foster's five point IR&D "get well" program. However, the need for such a data bank appears to trace back several years.

Background

At hearings of the House Subcommittee on DOD Appropriations, conducted in April 1966, Representative Mahan asked DDR&E and the Service R&D witnesses for examples of benefits of IR&D to the DOD. Only the Air Force witness was able to immediately respond. (Ref. 22) DDR&E then established a Defense Science Board Task Group on IR&D which, in part, compiled a volume of examples of benefits of IR&D. (Ref. 31) These examples were collected directly from industry on a voluntary basis. This procedure was also followed in 1968, 1969, and 1970. (Refs. 32, 33, 34, 35, and 36) While these volumes provided a ready reference for DOD witnesses and were provided to Congressional Committees, they were not too useful for supplementing the technical plans in disseminating information to DOD scientists and engineers.

The idea of an IR&D data bank similar to the DOD's Work Unit Information System was advocated by the GAO in its 1968 draft report. (Ref. 40, pp. 49-51) The concept was to provide a centralized body of IR&D data available to DOD

scientists and engineers to preclude unnecessary duplication of effort. The idea was generally well received by Congress but opposed by industry as unnecessary. (Ref 90) However, in devising an acceptable plan for improved administration of IR&D, DDR&E included establishing a data bank of cost and technical information. (Ref. 54)

Trial IR&D Data Bank

DOD established a trial IR&D data bank at the Defense Documentation Center in 1970. (Ref. 89) Abstracts of technical objectives, approach and progress, limited manpower data, the principal investigator and his telephone number, COSATI field and group, category of technical effort (research, development, or studies), and so forth were included. However, all cost data was excluded because of industry objections. An input manual was published in June 1971, (Ref 91) and an output manual in August 1972. (Ref. 92) The data bank became operational in January 1972 and made its first search in March 1972. Since contractor participation was voluntary, only about 34 corporations provided data. Government usage was about 1000 searches between the time the bank opened for business and October 1974.

Evaluation

In the early 1970s the Army Missile Command (MICOM) established a program for utilizing IR&D data. The utilization program included a current awareness program for MICOM

scientists and engineers wherein a profile was established for each S&E and IR&D summaries provided to them. The MICOM system included a capability for retrospective searches and also staff personnel searched the IR&D data before approving in-house projects to preclude unnecessary duplication of effort. As a part of this system MICOM established a computerized data bank of IR&D information which they extracted from IR&D technical plans. The data included was less extensive than that included in the DDC IR&D Data Bank. However, the MICOM data bank essentially covered all contractors. (Ref. 93)

The existence of two IR&D data banks was criticized by the GAO in a letter report in August 1973. (Ref. 94) Subsequently, the Technical Evaluation Group evaluated the two IR&D data banks and submitted a comprehensive set of recommendations to the DOD IR&D Policy Council in February 1974. (Ref. 95) The major recommendations were (1) the DOD should have an IR&D data bank located at the Defense Documentation Center (DDC), (2) it should be covered in appropriate regulations (DODI 5100.66), (3) the data bank should be made available to DOD field personnel via the DDC remote terminal system and (4) cost data should be included in the data bank.

Permanent Data Bank

The DOD IR&D Policy Council approved the recommendations at its March 1974 meeting. In subsequent negotiations with

industry cost data was again deleted. Otherwise, the recommendations have been rather faithfully implemented via the revised DODI 5100.66 (Ref. 2) and the revised Department of Defense Form 271, "IR&D Data Sheet" which has been approved by the Office of Management and Budget. (Ref. 96) Thus, beginning in 1975 all contractors with advance agreements will input data to the IR&D Data Bank which is now on a permanent basis. Revised data input manuals are currently being prepared by DDC for use by the contractors. However, the approved data sheet format was sent by DDR&E to all contractors in December 1974 so they could input data in 1975. (Ref. 97) During the trial period the data bank was restricted to DOD users. However, in December 1974 NASA was granted access to the IR&D Data Bank.

3.4. IR&D Data Summary

Some data on IR&D/B&P costs and technical content are available from existing sources, however, the data leaves much to be desired. Overall data on IR&D/B&P costs will be summarized in Section 3.4.1. A rough estimate of the DOD's indirect contribution to industry research and development is given in Section 3.4.2. Finally, a brief summary of the technical content of IR&D is given in Section 3.4.3.

3.4.1. IR&D Cost Data

The Defense Contract Audit Agency (DCAA) collects IR&D data each year for the major defense contractors. This data is published in a yearly report. (Ref. 98).

Similar data has been assembled by DCAA since 1963. Summaries of this data appear in DOD presentations, GAO reports, Congressional discussions, the yearly DOD report to Congress and Senator McIntyre's report to the Senate. Contractor-by-contractor data is included in the DCAA report but not publicly released since it is business sensitive data.

A typical set of DCAA data is given in Table 3.1. The first column, "Contractor Costs," are contractor incurred costs. The second column, "Accepted by Government," are the amounts accepted by the Government as reasonable for allocation to all customers (ceiling or actual expenditures if lower). The "DOD Share" is the DOD's allocable share of the accepted column. The DCAA data also includes total and DOD sales. Hence, various ratios to sales can be calculated. For 1974, typical ratios based on the above data are:

$$\frac{\text{DOD Share of IR\&D}}{\text{DOD Sales}} = 2.1 \text{ percent, and}$$

$$\frac{\text{DOD Share of IR\&D and B\&P}}{\text{DOD Sales}} = 3.7 \text{ percent.}$$

Unfortunately, there are many deficiencies in the DCAA data which largely negates its value. First, the coverage is DOD contractors who have an annual auditable volume of costs incurred of $15 million or more or required 4,000 or more man-hours of DCAA direct audit effort. Thus, only a portion of the contractors are included. The DOD position has been that

Table 3.1. Summary of IR&D and B&P Costs*

Year	Contractor Costs			Accepted by Government			DOD Share		
	IR&D	B&P	Total	IR&D	B&P	Total	IR&D	B&P	Total
	(000,000 omitted)								
1968	$ 766	$381	$1,157	$579	$367	$946	$338	$271	$609
1969	808	426	1,234	653	409	1,062	410	289	699
1970	753	413	1,166	597	398	995	376	278	654
1971	703	427	1,130	567	390	957	354	265	619
1972	936	469	1,405	725	432	1,157	392	306	698
1973	1,051	526	1,577	809	488	1,297	441	356	787
1974	$1,145	$546	$1,694	$901	$504	$1,405	$457	$361	$805

*From Ref. 99, p. 3 and the 1975 DOD Report to Congress.

this sample includes 85-90 percent of the total (Ref. 99, p. 9). A number of additional problems are inherent in the DCAA data including:

1. Different sets of contractors included in sample in different years,

2. Changes in burdening practices from year-to-year are not reflected in the data,

3. The IR&D definition was broadened in 1971 and unknown amounts of additional effort were thereafter transferred into IR&D, and

4. The DCAS data on DOD share includes costs reimbursed by foreign governments which vary from year-to-year.

An effort has recently been made to track some of these changes as illustrated in Table 3.2:

Table 3.2

COMPARISON OF 1972/1973 IR&D/B&P COSTS*

	1972	1973
Total IR&D/B&P	$698 million	$787 million
Less increase due to burden	0	55
	$698 million	$732 million
Less amount allocated to foreign sales	13.8	36.0
	$684.2 million	$696.0 million
DOD Sales	$19,117 million	$20,941 million
Less foreign sales	435	961
Net DOD Sales	$18,682 million	$19,980 million
Ratio to Sales	3.65	3.48

Thus, the year-to-year adjustments can be quite significant. Further, the author is aware of no effort to develop a consistent set of data going back to 1963 or even 1968. Hence, year-to-year comparisons of this data are specious and should be avoided.

There is one other source of detailed data on IR&D and that is the tri-service negotiation groups. They have the official files which include proposed values as well as the type data summarized by the DCAA. The Air Force has computerized some portion of its data base. However, extracting data from the tri-servcice negotiator's files usually involves tedious sifting through the hard copy material.

*Obtained from OASD(IL), also in Ref. 100, p. S9043.

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3.4.2. DOD Indirect Contribution to Company-Funded R&D

Each of us contribute to contractor IR&D when we buy virtually anything which is on the market. General Motros has one of the largest IR&D programs the author has been exposed to. Whenever, you buy one of their cars you contribute to their IR&D program. The same is true when you buy a toaster, washer, television and so forth. Thus, the DOD is just one of a multitude of contributors to company research and development. The total amount of company-funded research and development (as distinct from federally-supported R&D) is given in National Science Foundation data (Ref. 101, p. 26) as $11,347 million for 1972. The DOD contribution to this amount was about $392 million. Hence, the DOD contributed only about 3.5 percent of the total company-funded research and development in the country in 1972.

3.4.3. Technical Content of IR&D

The DOD IR&D Data Bank project summaries for 1974 were summarized in an effort to highlight some characteristics of DOD-related IR&D efforts. (Ref. 102) The sample size is indicated in Table 3.3. The 104 divisions or companies represent 25 corporations as listed in Table 3.4. The number of projects is about one-half the number estimated to be conducted by the contractors with advance agreements each year. The distribution of projects and effort by category (research, development, and studies) is given in Table 3.5. About one-half the projects are in research (applied and

Table 3.3

Size of IR&D Data Bank (1974)

Number of Companies/Divisions	104
Number of Projects	2890
Professional Manyears	10193

Table 3.4

Corporations in Data Bank (1974)

Bell Laboratories	Martin Marietta
Boeing	Motorola
Chrysler	Perkin-Elmer
Curtiss-Wright	Philco-Ford Communication
General Dynamics	Raytheon
General Electric	RCA
Goodyear Aerospace	Rockwell International
Grumman	Sanders Associates
GTE Sylvania Electronic	Sperry Rand
Hughes Aircraft Company	TRW Systems
ITT Defense--Space Group	United Aircraft
Lockheed Aircraft	Westinghouse
LTV Aerospace	

Table 3.5

Distribution of Projects and Manpower Loading by Category

Category	Number of Projects (percent)	Professional Manyears (percent)
Research	47	33
Development	42	44
System and Concept Formulation Studies	11	23

basic). Past studies suggest that the vast majority of these efforts are applied research with a relatively low percent classified as basic research (maybe 3—5). The emphasis on system studies is probably greater for this group of contractors than for the general population since it includes most of the major systems primes.

The breadth of IR&D activity is indicated by the distribution of effort versus the technical areas listed in Table 3.6. For this group of contractors there are projects in 73 percent of the technical areas and ten or more projects in 33 percent of the areas (see Table 3.7). Those technical areas with the most projects are listed in Table 3.8 and those with the greatest manpower loading are given in Table 3.9. Thus, technical effort in IR&D does appear to be broad based but with some concentration in those areas most closely related to DOD activities.

Table 3.6 Technical Areas

Aeronautics

0101 Aerodynamics
0102 Aeronautics
0103 Aircraft
0104 Aircraft flight instrumentation
0105 Air facilities

Agriculture

0201 Agricultural chemistry
0202 Agricultural economics
0203 Agricultural engineering
0204 Agronomy and horticulture
0205 Animal husbandry
0206 Forestry

Astronomy and Astrophysics

0301 Astronomy
0302 Astrophysics
0303 Celestial mechanics

Atmospheric Sciences

0401 Atmospheric physics
0402 Meteorology

Behavioral and Social Sciences

0501 Administration and management
0502 Documentation and information technology
0503 Economics
0504 History, law and political science
0505 Human factors engineering
0506 Humanities
0507 Linguistics
0508 Man-machine relations
0509 Personnel selection, training and evaluation
0510 Psychology *(Individual and group behavior)*
0511 Sociology

Biological and Medical Sciences

0601 Biochemistry
0602 Bioengineering
0603 Biology
0604 Bionics
0605 Clinical medicine
0606 Environmental biology
0607 Escape, rescue and survival
0608 Food
0609 Hygiene and sanitation
0610 Industrial *(Occupational)* medicine
0611 Life support
0612 Medical and hospital equipment and supplies
0613 Microbiology
0614 Personnel selection and maintenance *(Medical)*
0615 Pharmacology
0616 Physiology
0617 Protective equipment
0618 Radiobiology
0619 Stress physiology
0620 Toxicology
0621 Weapon effects

Chemistry

0701 Chemical engineering
0702 Inorganic chemistry
0703 Organic chemistry
0704 Physical chemistry
0705 Radio and radiation chemistry

Earth Sciences and Oceanography

0801 Biological oceanography
0802 Cartography
0803 Dynamic oceanography
0804 Geochemistry
0805 Geodesy
0806 Geography
0807 Geology and mineralogy
0808 Hydrology and limnology
0809 Mining engineering
0810 Physical oceanography
0811 Seismology
0812 Snow, ice and permafrost
0813 Soil mechanics
0814 Terrestrial magnetism

Electronics and Electrical Engineering

0901 Components
0902 Computers
0903 Electronic and electrical engineering
0904 Information theory
0905 Subsystems
0906 Telemetry

Energy Conversion *(Non-propulsive)*

1001 Conversion techniques
1002 Power sources
1003 Energy storage

Materials

1101 Adhesives and seals
1102 Ceramics, refractories and glasses
1103 Coatings, colorants and finishes
1104 Composite materials
1105 Fibers and textiles
1106 Metallurgy and metallography
1107 Miscellaneous materials
1108 Oils, lubricants, and hydraulic fluids
1109 Plastics
1110 Rubbers
1111 Solvents, cleaners and abrasives
1112 Wood and paper products

Mathematical Sciences

1201 Mathematics and statistics
1202 Operations research

Mechanical, Industrial, Civil and Marine Engineering

1301 Air conditioning, heating, lighting and ventilating
1302 Civil engineering
1303 Construction equipment, materials and supplies
1304 Containers and packaging
1305 Couplings, fasteners and joints

Mechanical, Industrial, Civil and Marine Engineering *(cont'd)*

1306 Ground transportation equipment
1307 Hydraulic and pneumatic equipment
1308 Industrial processes
1309 Machinery and tools
1310 Marine engineering
1310.1 Submarine engineering
1311 Pumps, filters, pipes, tubing and valves
1312 Safety engineering
1313 Structural engineering

Methods and Equipment

1401 Cost effectiveness
1402 Laboratories, test facilities, and test equipment
1403 Recording devices
1404 Reliability
1405 Reprography

Military Sciences

1501 Antisubmarine warfare
1502 Chemical, biological, and radiological warfare
1503 Defense
1504 Intelligence
1505 Logistics
1506 Nuclear warfare
1507 Operations, strategy, and tactics

Missile Technology

1601 Missile launching and ground support
1602 Missile trajectories
1603 Missile warheads and fuzes
1604 Missiles
1604.1 Air and space launched missiles
1604.2 Surface launched missiles
1604.3 Underwater launched missiles

Navigation, Communications, Detection and Countermeasures

1701 Acoustic detection
1702 Communications
1702.1 Radio communications
1703 Direction finding
1704 Electromagnetic and acoustic countermeasures
1705 Infrared and ultraviolet detection
1706 Magnetic detection
1707 Navigation and guidance
1708 Optical detection
1709 Radar detection
1710 Seismic detection

Nuclear Science and Technology

1801 Fusion devices *(Thermonuclear)*
1802 Isotopes
1803 Nuclear explosions
1804 Nuclear instrumentation
1805 Nuclear power plants
1806 Radiation shielding and protection

Nuclear Science and Technology *(cont'd)*

1807 Radioactive wastes and fission products
1808 Radioactivity
1809 Reactor engineering and operation
1810 Reactor materials
1811 Reactor physics
1812 Reactors *(Power)*
1813 Reactors *(Non-power)*
1814 SNAP technology

Ordnance

1901 Ammunition, explosives and pyrotechnics
1902 Bombs
1903 Combat vehicles
1904 Explosions, ballistics and armor
1905 Fire control and bombing systems
1906 Guns
1907 Rockets
1908 Underwater ordnance

Physics

2001 Acoustics
2002 Crystallography
2003 Electricity and magnetism
2004 Fluid mechanics
2005 Masers and lasers
2006 Optics
2007 Particle accelerators
2008 Particle physics
2009 Plasma physics
2010 Quantum theory
2011 Solid mechanics
2012 Solid-state physics
2013 Thermodynamics
2014 Wave propagation

Propulsion and Fuels

2101 Air breathing engines
2102 Combustion and ignition
2103 Electric propulsion
2104 Fuels
2105 Jet and gas turbine engines
2106 Nuclear propulsion
2107 Reciprocating engines
2108 Rocket motors and engines
2108.1 Liquid rocket motors
2108.2 Solid rocket motors
2109 Rocket propellants
2109.1 Liquid rocket propellants
2109.2 Solid rocket propellants

Space Technology

2201 Astronautics
2202 Spacecraft
2203 Spacecraft trajectories and reentry
2204 Spacecraft launch vehicles and ground support

Table 3.7

Frequency of Projects and Resources by Technical Areas

Number of Projects	Technical Areas (percent)	Corresponding Professional Manyears (percent)
0	27	0
1- 9	40	7
10-19	11	13
20-29	7	13
30-39	2	5
40-49	2	4
50-99	8	20
100-199	2	13
200-299	1	25

Table 3.8

Technical Areas With Greatest Number of Projects

Technical Area	Percent of Total Number of Projects
Electronic Components (0901)	8
Aircraft (0103)	8
Computers (0902)	6
Communications (1702)	6
Radar Detection (1709)	5
Masers and Lasers (2005)	3
Industrial Processes (1308)	3
Spacecraft (2202)	3
Missiles (1604)	3
Jet and Gas Turbine Engines (2105)	3
Navigation and Guidance (1707)	3

Table 3.9

Technical Areas With Largest Professional Manyear Loading

Technical Area	Percent of Total Effort
Aircraft (0103)	21
Cost Effectiveness (1401)	6
Mathematics and Statistics (1201)	6
Communications (1702)	5
Radar Detection (1709)	4
Computers (0902)	4
Electronic Components (0901)	4
Jet and Gas Turbine Engines (2105)	3
Missiles (1604)	3

SECTION IV

MAJOR AREAS OF CONTROVERSY

Prior to 1969, the primary IR&D issues revolved around such things as reasonableness, burdening, cost sharing, and other aspects of DOD administration of IR&D. The main participants in the dialogue were industry and the DOD. Congress made some inquiries during this period but had little impact on the dialogue. However, since 1969, Congress has been directly involved in the IR&D area and the nature of the issues has changed to some extent. In addition to questions of DOD administration, some individuals are now challenging the fundamental concept, asserting that Congress should have some type of line item control of IR&D and searching for some fundamental change in the mechanism which will finess many of the cited problems. Further, activity in the IR&D area has been significantly greater than in the 1960s. A list of the major IR&D events since 1970 is given on the following page. A brief summary of each of these items is given in Appendix E. These reports and statements provide the basic positions which are summarized in this section by major area of controversy.

MAJOR IR&D EVENTS SINCE PASSAGE OF SECTION 203, PUBLIC LAW 91-441

Date	Event
March 1971	GAO Report, "Feasibility of Treating Contractor's IR&D Costs as a Budget Line Item"
April 1971	GAO Report, "Implementation of Section 203, Public Law 91-441, On Payments for IR&D and B&P Costs"
December 1972	Report of the Commission on Government Procurement
April 1973	GAO Report, "Payments for IR&D and B&P Costs"
August 1973	GAO Letter Report on IR&D Data Banks
September 1973	GAO Letter Report on Small Contractor Problems
	Senator Proxmire Amendment to Limit IR&D
March 1974	Industry Position Paper on IR&D and B&P Efforts
April 1974	DDR&E Statement to Congress
May 1974	GAO Report, "DOD's Implementation of Section 203, Public Law 91-441, Involving Contractors' IR&D"
	Admiral Rickover Statement to House Appropriation Committee, Subcommittee on DOD
	Statement of Principles for DOD R&D
August 1974	GAO Partial Report, "In-Depth Investigation into IR&D and B&P Programs"
December 1974	GAO Report, "IR&D Allocations Should Not Absorb Costs of Commercial Development Work"
February 1975	DDR&E Statement to Congress
	DSB Task Force on IR&D Report
Impending	GAO Final Report, "In-Depth Investigation into IR&D and B&P Programs"

4.1. Allowability of IR&D Costs

The current DOD policy is that IR&D costs are allowable and, hence, recoverable to the extent they are reasonable and allocable.

The main adversary of this policy is Senator Proxmire and he is supported by Admiral Rickover. In September 1973 Senator Proxmire stated ". . . a case can be made that this program (IR&D) is a backdoor boondoggle and ought to be eliminated altogether." (Ref. 103, p. S17517) Senator Proxmire apparently challenges the need for IR&D primarily on the basis that it is unnecessary for the DOD to have two separate programs to sponsor research and development efforts by private contractors (direct contract R&D and IR&D). Further, he sees defense contractors who receive IR&D as being able to improve their ". . . competitive advantages over small firms and nondefense contractors who are not eligible for the IR&D subsidy." (Ref. 103, p. S17518) Admiral Rickover basically agrees with the above positions and asserts that if IR&D was made a disallowed cost, and the DOD directly contracted an equivalent amount of funds, the DOD would get far more for its money. (Ref. 104, p. 119)

The majority of people who have commented on IR&D have supported its allowability. The Commission on Government Procurement (COGP), which included Senators Chiles and Gurney, Representatives Horton and Holifield, and the Comptroller General of the United States (Elmer Staats), supported IR&D

as ". . . in the Nation's best interest to promote competition (both domestically and internationally), to advance technology, and to foster economic growth . . . ." (Ref. 1, p. 31)

Senator Cranston earlier supported IR&D in his testimony to the IR&D hearings in 1970:

> "I have concluded that in an era of rapid technological innovation, the IR&D program is the most economical long-run program for guarantying security of the United States. . . ." (Ref. 56, p. 1676)

The latest Defense Science Board Task Force on IR&D, which was selected largely from academia to avoid the obvious vested interest of defense contractors, strongly supported the allowability of IR&D. (Ref. 105, p. i) Further, a recent panel reviewing military R&D for the Center for Strategic and International Studies, Georgetown University, also supported the concept of IR&D:

> "This panel believes that IR&D is a valuable and legitimate operation. It should be funded substantially and should be controlled by the government only to the extent necessary to safeguard the public interest and the competitive positions of DOD's suppliers.
>
> The basic public policy issue here is whether a government agency should directly control the work done under IR&D. This panel takes a position midway between a common industry position--no direct control at all--and a position of many Congressional critics--full control of the amount and nature of the IR&D.
>
> IR&D is basically desirable, because it is a check to insure against errors in judgment--or too great a focus on immediate needs--by those government officials who determine R&D activities. Also, if used flexibly, it helps provide a measure of stability to the national technical manpower pool. The spur of competition ensures relevance and payoffs." (Ref. 106, p. 34)

Thus, there has been substantial support for the IR&D

concept from nonmilitary-industrial complex representatives.

The majority of DOD technologists who have spoken out on the issue have supported the need for IR&D. Dr. Currie, DDR&E, has taken a strong position on IR&D in his testimony to Congress (Refs.107, 108, and 109) as have the Assistant Secretaries for R&D of the Military Departments. (Ref. 110) Further, several of the military technologists have spoken in favor of IR&D: General George S. Brown, when Chief of Staff of the Air Force (Ref. 111); Lt General William Evans, Deputy Chief of Staff (DCS) for Research and Development, Headquarters, U.S. Air Force DCS/Research and Development (Ref. 112); Major General Charles Wilson, when DCS/Production and Procurement, Air Force Systems Command (Ref. 113, p. 60); and, at the working level, Colonel Charles Scolatti, when Commander of the Air Force Flight Dynamics Laboratory. (Ref. 114) Further, the vast majority of DOD personnel are reported to support the need for and value of IR&D. (Ref. 113, p. 60)

It goes without saying that the aerospace industry regards IR&D as vital to its continued existence. When Senator Proxmire again challenged IR&D in 1973, the industry established a Tri-Association Ad Hoc Committee for IR&D and B&P. The Committee published the industry case for IR&D in three interrelated documents in early 1974. (Refs.115, 116, and 117)

Another issue which is involved in the question of allowability is the benefit/cost aspect. No one in industry or the DOD has been able to quantitatively demonstrate that benefits exceed costs for IR&D for the same reason this has not been done for DOD contract R&D. (See, e.g., Ref. 56, p. 1675 for Hyman Fine's comments). Hence, benefits are usually addressed by way of specific examples of payoff to the DOD. The most extensive recent contribution to this area is in the industry "Technical Papers on IR&D and B&P Efforts" Ref. 117, pp. 26-247) which not only presents examples but also tries to structure an overall framework for a benefit discussion.

4.2. Congressional Line Item Control of IR&D Costs

In the first direct Congressional restrictions on the DOD management of IR&D in the FY 70 Military Procurement Authorization Act (PL 91-121, Section 403), the Congress imposed a form of line item control. The DOD was to limit IR&D expenditures to 93 percent of what they would have otherwise been. This requirement was basically unworkable and was repealed a year later. During the FY 71 Military Procurement Authorization Bill discussions, the issue of line item control was again raised. The Senate version of the authorization bill incorporated a ceiling on IR&D. However, the ceiling was removed by the Conference Committee and did not appear in the final act. Hence, there is no Congressional line item control of IR&D today.

Senator Proxmire asked the GAO to determine the feasibility of treating contractors' IR&D costs as a budget line item in late 1970. In early 1971 the GAO reported that in their judgment Congressional line item control was feasible. The DOD has always opposed this concept and took strong exception to the GAO report. Further, the GAO recommended that no action be taken on line item control of the time since the adequacy of Section 203, Public Law 91-441, provisions had not yet been determined. Hence, the GAO report had no direct impact at the time it was published (see Refs. 118, 119 and 120).

In September 1973, Senator Proxmire asserted that Public Law 91-441 IR&D provisions had been ineffective, costs for IR&D had continued to rise, and hence, a Congressionally imposed ceiling was necessary. He suggested legislation which would have limited IR&D to 50 percent of what it had previously been. However, he agreed to a GAO in-depth investigation, but commented ". . . I do think that the GAO study will give us the basis, give us the reason, to put a ceiling on the authorizations." (Ref. 103)

The DOD has constantly opposed line item control as administratively impractical and as essentially eliminating the independence of IR&D. (Refs. 50 and 118) The industry has also argued against line item control. Their basis is that line item control is inconsistent with the basic concept that IR&D is a normal cost of doing business and, hence, an

element of overhead. Thus, IR&D is applicable to all products sold to government or commercial customers. Legislation should not arbitrarily limit recovery of "normal" costs of business, rather, the Government should accept its fair share of these costs. (Ref. 115, p. 32)

Line item control appears to be a highly likely outcome of the current IR&D debate, especially if Congress as a whole is not satisfied with the DOD management of IR&D after they receive the final report on the GAO in-depth investigation and conduct whatever hearings they regard as necessary.

4.3. Mechanisms for Reimbursement of IR&D Costs

IR&D costs are currently recovered through overhead. This is the procedure which has been followed since IR&D was first recognized as an allowable cost in the early 1940s. This approach parallels practice in the commercial world where contractors recover IR&D costs as part of the price of their product. The same is true for competitively priced DOD fixed-price contracts. In these cases competition is presumed to protect the customer. Thus, the issue is how to handle IR&D costs for negotiated contracts. The basic dilemma involves "the Government's inability to satisfy the opposing goals of (a) stimulating innovation in an unconstrained fashion and (b) obtaining reasonable assurance that tax dollars thus spent result in effort of broad national value as opposed ot undue enrichment." (Ref. 1, p. 40)

Some thought has been given to alternative approaches, however, no firm suggestions have been made. One member of

the Commission on Government Procurement advocated looking into a variety of alternate approaches, including:

- National R&D awards,
- Agency priority lists and recovery proportional to compatibility with the list, and
- Tax credit devices. (Ref. 1, pp. 40-42)

The GAO in-depth investigation includes a perusal of alternate methods. The GAO sent a list of 14 alternatives to a wide variety of Government, industry, and other people for comment. Three basic approaches were included: direct contracting, recovery through overhead, and recovery through profit. (Ref. 121) Recipients were asked for their opinions on the 14 listed alternatives and suggestions for other approaches. The results of this survey will be interesting if not conclusive.

One of the six papers in the Tri-Association Committee's "Technical Papers on IR&D and B&P Efforts" gives the industry position on alternative methods. Nine methods, which span the spectrum from full recovery to the AEC method, were considered. Twelve criteria were identified and used in assessing the alternatives. The conclusion was that full reimbursement (Inherent Economic Constraints in Competition) is the preferred alternative. "Anything less than the full reimbursement of these costs . . . in effect is a subsidization of the U.S. Government by American Industry." (Ref. 117, pp. 16-24)

In essence, most alternatives identified in these studies are variations on the theme of four basic approaches:

- direct contract,
- recovery through overhead,
- recovery through profit, and
- tax credit.

No one has yet come up with an alternative to the current method which has attracted significant industrial, DOD, and Congressional support. Hence, until such a brilliant idea appears, DOD IR&D policy will probably evolve around the current process of allowing recovery through overhead.

4.4. Elements of DOD Policy and Administration

In this section the major areas of controversy regarding specific elements of DOD IR&D policy and procedures are presented. Several areas of controversy were resolved in the 1970 upgrading of IR&D administration (burdening, cost sharing, and so forth). However, several areas are still being debated. The areas to be discussed include:

- Reasonableness criteria,
- Negotiation Procedures,
- Technical Evaluations,
- Relevancy,
- Patent and Data Rights, and
- Cost Classification.

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4.4.1. Reasonableness Criteria

The issue in this area is the determination of reasonableness for major contractors (those that recover over $2 million in IR&D and B&P). The determination today is made through negotiation of advance agreements. In this area there are those who support the current procedures, those who think they should be strengthened to give the DOD more control and those who would relax the controls.

The first dissenting position of the Commission on Government Procurement advocated continuation of the current DOD reasonableness test. The Comptroller General and three of the four Congressmen on the Commission supported this position.

Senator Proxmire argues that the current procedures are not effective since IR&D costs have continued to grow since Section 203, Public Law 91-441, was passed. (Ref. 98, p. S17517) Thus, he would supplement the DOD procedures with Congressional controls as summarized in Section 4.2. Admiral Rickover advocates direct contracting of IR&D projects which have sufficient benefits to warrant the cost. (Ref. 104, p. 123)

Most of the other challenges to DOD policy in this area advocate liberalization of the reasonableness criteria. These include the majority recommendation of the Commission on Government Procurement (COGP) (Ref. 1, p. 31), the recommendation of the DSB Task Force (Ref. 105, pp. 16-17), and

the industry position (Ref. 115, p. 34). The industry wants full recovery of incurred costs irrespective of the extent of negotiated DOD contracts in a cost center. The DSB Task Force and COGP majority recommendation would apply CWAS in some form to major contractors. These proposals are very similar to the proposed cost principles of February 1969 (See Section 2.3.1). All of them would result in significant increased in the cost of IR&D to the DOD. GAO and DCAA estimate that the increases would range from $50 million to about $110 million. (Ref. 30 and Ref. 122) Further, these approaches would materially reduce the DOD's visibility of contractor IR&D through reduced technical evaluation activity (which goes hand-in-hand with negotiation of advance agreements). The benefits to be realized by the DOD due to the above mentioned proposals appear to be nominal. Thus, these proposals suggest significant increases in cost to DOD with, at best, nominal benefits. It is doubtful these proposals could be implemented by the DOD without incurring the wrath of Congress and budget line item control.

4.4.2. Uniform Negotiation Procedures

One of the areas that Senator McIntyre identified in his follow-up letter to the Secretary of Defense in 1970 was establishment of uniform negotiation procedures. The DOD tried unsuccessfully to develop such procedures in the early 1970s. In lieu of procedures, the DOD ultimately published broad guidelines (see Section 3.3.2.).

The GAO cited this as a deficient area in their detailed implementation investigation: "Negotiation procedures are neither uniform nor consistent . . . ." (Ref. 123, pp. 23-25) Further, they reiterated the recommendation that the DOD establish uniform negotiation procedures.

The Air Force has devised a coupled guideline/judgmental approach which seems to satisfy the intent of the original OSD concept of uniform negotiation procedures to preclude inequities to contractors. Further, this approach has enabled the Air Force IR&D Policy Council to review and approve overall negotiation objectives on a year-by-year basis. Hence, it would appear that uniform guideline/judgmental procedures could be developed DOD-wide if interservice barriers could be lowered somewhat.

4.4.3. Technical Evaluations

Increased emphasis on technical evaluations was one of the key aspects of DDR&E's five point plan to improve DOD administration of IR&D. Uniform procedures were implemented by a revitalized Technical Evaluation Group chaired by an ODDR&E representative (see Section 3.3.3.). The issue now is the efficiency and effectiveness of the technical evaluation process.

The GAO in its detailed review of DOD implementation of Section 203, Public Law 91-441 had only one criticism of the technical evaluation process and that was related to the need for consistent, adequate feedback of the results of

technical evaluations (Ref. 123, p. 21). Further, the GAO recommended that the DOD improve the administration of contractors' IR&D by:

> "Establishing guidelines that require a quantification of the technical quality of contractors' programs to be uniformly recognized in the negotiation of ceilings with reward or penalty, as appropriate." (Ref. 123, p. 36)

Thus, the technical evaluation process received much better marks in 1973 than it had in the prior detailed GAO review in 1968 (see Ref. 40).

In a recent interview Dr. Currie, DDR&E, commented favorably on the technical reviews:

> "Our IR&D review teams are getting the cooperation of the companies, and I believe that the review is very effective." (Ref. 124, p. 8)

Another positive reaction to the current process came from the Commander of the Air Force Flight Dynamics Laboratory. He felt that the IR&D technical evaluation process had been greatly improved during his six year involvement with it (1968-1974) and that there had been an improvement in corporate management of IR&D in parallel with the government's improvement in its technical evaluation process. Further, he observed that:

> "The IR&D programs are evaluated with more scrutiny, technical expertise, and depth than any other R&D element." (Ref. 114)

In their comments on the above cited GAO report, industry complained that the cost of the technical evaluation process was substantial and that they desired "economical but effective reviews." (Ref. 123, p. 45) Industry has recently been relatively silent on the technical evaluation process. However, if their position on reasonableness was accepted there would be no need for technical evaluations since industry would receive full recovery of IR&D costs as necessary business expenses.

The Defense Science Board Task Force on IR&D questioned both the effectiveness and efficiency of the technical evaluation process. They observed:

> "Technical reviews should be kept to a reasonable level. Company brochures should be kept simple and used primarily for conveying information; and overhead costs associated with present reviews, which are probably too high for both government and contractors, should be reduced. Finally, the self-correcting nature of the overall system . . . seems to be the best guarantee of quality." (Ref. 105, p. 11)

Unfortunately, the Task Force gave no basis for its assertions regarding the technical evaluation process.

Admiral Rickover criticized the technical evaluation process in his testimony to Congress, asserting that "The DOD reviews of contractors' IR&D program tend to be superficial . . .." (Ref. 104, p. 118) Further, in his recommendations, Admiral Rickover suggests that the DOD should direct contract any projects which have sufficient benefits to warrant the cost so that ". . . responsible Government officials can exercise technical supervision of the work . . ."

(Ref. 104, p. 123)

In summary, the technical evaluation process as currently structured provides the DOD timely visibility of and influence on contractor IR&D efforts and provides the contractors an independent assessment of their IR&D programs. These two factors are significant benefits of the entire IR&D process. A reduction in technical evaluation activity would seriously erode these benefits. Admiral Rickover's proposal would eliminate the independence of a segment of the R&D spectrum. Thus, it may well be that the DOD's current process is not too far from an optimum balance.

4.4.4. Potential Military Relationship Requirement

The potential military relationship (PMR) requirement is probably the most controversial aspect of Section 203, Public Law 91-441. The Senate version of the bill had language requiring a direct relationship to a military function or operation. The House bill had no similar language. In the Conference Committee the compromise was a requirement that projects have a potential relationship to a military function or operation (referenced to as agency relevancy). However, the GAO has noted that

> "the law . . . failed to provide any criteria for determining when a project has potential relationship to a military function or operation or any indication as to what the provision was intended to achieve." (Ref. 125, p. 2)

Thus, it should not be surprising that there are differing interpretations of what was expected from the requirement and

what should be done about it.

Support for a continuation of the agency relevancy requirement has come from the supporters of the first dissenting position of the Commission on Government Procurement and, generally, from the Military Departments.

Those supporting no relevancy requirement or a government-wide requirement (tantamount to no requirement, in the author's view) are industry (Ref. 115, p. 33), the supporters of the majority recommendation of the Commission on Government Procurement (Ref. 1, p. 31), the Defense Science Board Task Force on IR&D (Ref. 105, p. 5) and the DOD.(Ref. 126, p. 2) Support for liberalization within the DOD is mainly at the OSD staff level. The arguments in favor of a liberalized policy in this area are mainly philosophical--contractors should be free to diversify to create a broader business base, relevancy tests are inconsistent with the concept of IR&D as company-funded, and so forth.

Senator Proxmire argues that the PMR requirement has not been effective since few if any ceilings have been lowered because of the requirement. He asserts that this is because of contractor "brochuremanship" and not a true potential relationship although he provides no support for this assertion. (Ref. 103, p. S17517) Admiral Rickover has a similar view; ". . . the Department's interpretation of what makes projects have a potential military relationship is quite liberal." (Ref. 104, p. 118) Both men advocate

basically the same solution--require that projects have a direct benefit to the military.

In summary, a great deal of energy has gone into arguing over the merits of an agency relevancy requirement even though it has had little impact on contractor recovery of costs. However, the requirement may well have utility to the DOD in precluding gross redirection of effort to non-DOD areas. Thus, there seems to be little benefit to the DOD to relax this requirement. Changing the requirement to direct relevancy would preclude support for most research which, ultimately, will benefit the DOD.

4.4.5. Patent and Data Rights

Background

The DOD policy on patent and data rights on items resulting from IR&D was the subject of much discussion in the early 1960s and the DOD policy was clearly stated in several letters during that priod of time:

> "The Government does not - and should not - automatically acquire rights in technical data resulting from a contractor's independent research and development, even though the costs may be said to have been substantially paid for by the Government through the Government's purchase of the company's products or services." (Ref. 18, p. 5)

The fundamental rationale for the above policy was summarized as follows:

> "In short, it is the policy of the Department of Defense that we should pay our fair share of a contractor's normal and reasonable costs, including IR&D costs, with the Government acquiring no greater rights than accrue to any other customer buying the contractor's

> products or services. In this respect we should not deal with companies heavily engaged in defense work on a less favorable basis than with companies predominatly engaged in commercial work. We believe that this policy is most likely to assure a continuing flow of new technology of importance to the national defense." (Ref. 18, p. 6; see also Refs. 17 and 20)

The GAO challenged the DOD policy on patent rights in its draft report on IR&D in 1968 and suggested that the DOD should receive royalty-free license rights to inventions arising from IR&D. (Ref. 40, p. 89). However, the DOD rejected the GAO suggested changes in policy. (Ref. 127)

The patent and data rights issue was reviewed by senior defense officials again in early 1970 prior to approval of the new DOD policy statement on IR&D/B&P. Secretary Packard approved the continuation of the DOD policy of not acquiring rights to technical data and patents arising from IR&D programs. (Ref. 54)

Current Issue

This is one of the few policy areas in which the DOD policy is at an extreme limit. In this case industry fully supports the DOD policy on the basis that IR&D efforts:

> ". . . are company initiated and company funded within the indirect costs of doing business. The Government acceptance of its share of these costs appropriately allocated to Government contracts is no different than any other customer's payment of these costs included in the purchase price of a company's products or services. As any other customer; the Government benefits from improved products or services resulting from inventions conceived during IR&D. Equity demands the company retain title to its own inventions and patents." (Ref. 115, p. 32)

Senator Proxmire and Admiral Rickover both criticize the DOD policy on patent and data rights on the basis that the DOD can reimburse a contractor for a substantial portion of his IR&D and yet the contractor retains all rights to inventions, patents and technical data developed under these programs. Admiral Rickover cited one example of an automatic welding machine which was developed under IR&D in a military division, transferred to a commercial division, then marketed to defense contractors who passed on the royalty charges to the DOD. Both men argue that this policy gives the large defense contractors a substantial competitive advantage over smaller firms. Further, they contrast the DOD policy to that of the AEC which provides a mechanism for acquiring patent and data rights if the AEC makes a significant contribution. (Ref. 103, p. S17518 and Ref. 104, p. 120) Neither man mentioned that the GAO had earlier reported that because of the nominal AEC participation in contractor IR&D costs, there had been no instances under which either patent or data rights were acquired by the AEC. (Ref. 40, p. 43) Two Air Force lawyers also criticized the DOD policy in a recent article. (Ref. 128)

In summary, this is one of the few areas in which DOD policy is at an extreme limit. This gives rise to charges of inequities but the real cost of the policy has yet to be demonstrated. One or even a few "horror" cases hardly justify a major policy change. However, if the current policy can be shown to have a high cost to the DOD, then a policy change may be in order.

4.4.6. Cost Classification

This problem was mentioned in Section 3.1. as an area of concern during the 1960s. During those years, there was a ceiling only on IR&D. Bid and proposal and other technical overhead costs were not covered by ceilings. Consequently, there was considerable concern regarding the migration of IR&D-type work into the areas which had no ceilings. An attempt was made to solve both of these problems in the 1971 cost principles. A ceiling was placed on bid and proposal costs and they were made interchangable with IR&D. The IR&D and B&P definitions were broadened to include additional efforts which were felt to be a legitimate part of IR&D/B&P (e.g., systems and other concept formulation studies). Other technical efforts which were not research and development in nature were to be placed in other overhead categories (e.g., maintenance of complex test equipment). Thus, this problem was to have been solved.

While the magnitude of this problem may have been lessened by the actions taken in 1971, it has not been solved--only shifted to new areas. Today, there are ceilings on IR&D and B&P costs. However, there are other overhead areas which include technical activities or efforts by technical personnel (e.g., manufacturing and production engineering, standardization efforts, selling costs, and so forth) which are not constrained by ceilings. Thus, the gray areas between costs covered by ceilings and costs not covered by ceilings have not been eliminated but only shifted to different areas.

One other development in this area during the 1970s is that the Technical Evaluation Group has been designated to support contracting officers in resolving these problems. During the last three years the Air Force IR&D Technical Manager has participated in about one dozen cost classification cases. There are indications that the frequency of cases is increasing as the auditors and plant representative personnel sharpen their reviews in these areas.

In summary, it does not appear to the author that there is any way to avoid a cost classification problem so long as some areas of indirect cost are capped with ceilings and other areas have no similar limitation. Further fine-tuning of definitions will certainly not eliminate the problem. One way to avoid the problem is to develop procedures for capping all areas of overhead not just one or two select items. Then, the contractor would be free to make

trade-offs between the indirect cost categories without impacting DOD costs on negotiated contracts.

4.5. Government-Wide Policy

A serious attempt was made during the early 1960s to develop a Government-wide policy on IR&D. However, the DOD and AEC were never able to reconcile their differences and there is no uniform, Government-wide policy today.

The Commission on Government Procurement recommended that IR&D receive uniform treatment, Government-wide but made provision for exceptions which would be treated by the Office of Federal Procurement Policy. (Ref. 1, pp. 31 and 39) The industry has generally supported a common policy for all Government agencies. (Ref. 115, p. 34) The GAO recently surveyed Government agencies for their views on this topic and found no unanimity among federal officials on the need for uniform, Government-wide policy on IR&D. However, the GAO expressed its support of the recommendation of the Commission on Government Procurement. The Executive Branch Position on the Commission on Government Procurement IR&D recommendation is currently being staffed through the government agencies. The recommended position is to use the DOD policy and procedures as the standard with one exception--the agency relevancy requirement would be broadened to a government-wide requirement. The recommendation also provides a mechanism for exceptions to the standard policy. (Refs. 129 and 130) The outcome of this effort

will not be known until the various government agency positions are formally established. However, the recent creation of the Energy Research and Development Administration (incorporating the R&D elements of the AEC) could lead to greater unanimity in this area.

SECTION V

SUMMARY

The spectrum of possible IR&D policy ranges from direct contracting for all R&D (no IR&D), which gives the DOD and Congress complete control, to contractor full-recovery of all IR&D costs, which gives industry essentially complete freedom in this area. However, optimum DOD policy would probably not be at either of these extremes but would be "balanced" somewhere between. The current DOD policy in essentially all areas is sufficiently balanced to incur the criticism of "hard liners," such as Admiral Rickover and Senator Proxmire, as well as "industry" spokesmen, such as the Tri-Association Ad Hoc IR&D/B&P Committee and the supporters of the majority recommendation of the Commission on Government Procurement. There are, no doubt, improvements which can be made in DOD policy and administration. However, proposed changes should be extensively researched prior to implementation because of the complexity of the IR&D area tends to obscure the outcome of policy changes.

The future evolution of the DOD policy is highly dependent upon events which are about to unfold. The final report on the GAO in-depth investigation will have a significant impact. Further, the Senate Armed Services Committee plans to hold hearings on IR&D during the FY 76 budget cycle. During the last Congressional review of this area, the Senate supported Congressional controls while the House tended to

prefer DOD administrative solutions. What will evolve this year is uncertain because the key House supporters of IR&D are no longer members of Congress. Consequently, the industry and DOD may find it more difficult to preclude further legislative restrictions this year than in the past.

In conclusion, it appears the current DOD policy is, in the main, a reasonable balance of good stewardship of the taxpayers funds and satisfaction of the needs of industry. It is doubtful that major changes can be made without disrupting this balance to the disadvantage of the Department of Defense.

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APPENDICES

APPENDIX A

DOD IR&D COST PRINCIPLES (1959)

15-205.35 *Research and Development Costs.*

(a) Basic research, for the purpose of this Part 2, is that type of research which is directed toward increase of knowledge in science. In such research, the primary aim of the investigator is a fuller knowledge or understanding of the subject under study, rather than any practical application thereof. Applied research, for the purpose of this Part 2, consists of that type of effort which (i) normally follows basic research, but may not be severable from the related basic research, (ii) attempts to determine and expand the potentialities of new scientific discoveries or improvements in technology, materials, processes, methods, devices, and techniques, and (iii) attempts to "advance the state of the art." Applied research does not include any such efforts when their principal aim is the design, development, or test of specific articles or services to be offered for sale, which are within the definition of the term development as hereinafter provided.

(b) Development is the systematic use of scientific knowledge which is directed toward the production of, or improvements in, useful products to meet specific performance requirements, but exclusive of manufacturing and production engineering.

(c) A contractor's independent research and development is that research and development which is not sponsored by a contract, grant, or other arrangement.

(d) A contractor's costs of independent research as defined in (a) and (c) above shall be allowable as indirect costs (subject to paragraph (h) below), *provided* they are allocated to all work of the contractor.

(e) Costs of contractor's independent development, as defined in (b) and (c) above (subject to (h) below), are allowable to the extent that such development is related to the product lines for which the Government has contracts, *provided* the costs are reasonable in amount and are allocated as indirect costs to all work of the contractor on such product lines. In cases where a contractor's normal course of business does not involve production work, the cost of independent development is allowable to the extent that such development is related and allocated as an indirect cost to the field of effort of Government research and development contracts.

(f) Independent research and development costs shall include an amount for the absorption of their appropriate share of indirect and administrative costs, unless the contractor, in accordance with his accounting practices consistently applied, treats such costs otherwise.

(g) Research and development costs (including amounts capitalized), regardless of their nature, which were incurred in accounting periods prior to the award of a particular contract, are unallowable except where allowable as precontract costs. (See 15-205.30.)

(h) The reasonableness of expenditures for independent research and development should be determined in light of all pertinent considerations such as previous contractor research and development activity, cost of past programs and changes in science and technology. Such expenditures should be pursuant to a broad planned program, which is reasonable in scope and well managed. Such expenditures (especially for development) should be scrutinized with great care in connection with contractors whose work is predominantly or substantially with the Government. Advance agreements as described in 15–107 are particularly important in this situation. In recognition that cost sharing of the contractor's independent research and development program may provide motivation for more efficient accomplishment of such program, it is desirable in some cases that the Government bear less than an allocable share of the total cost of the program. Under these circumstances, the following are among the approaches which may be used as the basis for agreement: (i) review of the contractor's proposed independent research and development program and agreement to accept the allocable costs of specific projects; (ii) agreement on a maximum dollar limitation of costs, an allocable portion of which will be accepted by the Government; (iii) an agreement to accept the allocable share of a percentage of the contractor's planned research and development program.

APPENDIX B

AEC IR&D COST PRINCIPLES

9-15.205-35 Research and development costs.

(a) AEC does not accept a general allocation of independent research and development costs. Such costs are considered unallowable except to the extent specifically set forth in the contract. Research and development costs may be made allowable only to the extent to which they provide a direct or indirect benefit to the contract work.

(b) Independent research and development may be determined to be of benefit to the contract work when it is in the general field of the contract work and where the results may well have some future bearing on the contract work. The words "direct or indirect benefit" are used to allow some flexibility and to permit some basic research in the general field of the contract work.

(c) The determination that an independent research and development project is of benefit to the contract requires the exercise of technical judgment. It is not sufficient that the project relate to the field of atomic energy; technical staff must find that it is related to the contract work. Areas of interest which may relate to the contract work include: Technological methods or processes, materials research, work in the same technical field, etc. For example, independent materials research on aluminum alloy properties might be related to the contract work if a contract concerns the manufacture of fuel elements using aluminum alloy. Beryllium research, on the other hand, would not be relevant in this case. Such research might, however, relate to other AEC contracts. In master contracts or in contracts where several tasks are involved, to be of benefit the independent research and development project must relate to one or more of the tasks.

(d) A technical appraisal of each of the projects included in the contractor's independent research and development program is necessary to identify any that may be acceptable under the above principle for allocation to the AEC contract work. In addition to excluding any projects which do not provide a direct or indirect benefit to the AEC contract work, the following shall also be excluded: (1) Any research and development projects primarily

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of a promotional nature, such as projects directed toward the development of new business or projects connected with proposals for new business (e.g., a new reactor concept the contractor wants to sell), (2) any studies or projects which are in fact undertaken in whole or in part for other sources, and (3) any such otherwise acceptable project which duplicates research and development work sponsored by AEC. The cost of research and development which has not met the test of benefit to the contract work should be excluded from any distribution of allocation of overhead to the contract.

(e) Where technical staff or proper skill and qualification is not available or the questions cannot be easily resolved by Field Offices, Headquarters staff should be called into consultation.

(f) After segregating the research and development which has been determined to be of benefit to the AEC contract work, the cost thereof shall be allocated to the contract work using the method approved by AEC for the distribution of other overhead expenses.

(g) When AEC is the predominant customer, special consideration must be given to whether the independent research and development of benefit to the contract work should be performed as part of the contract work. This is necessary to avoid the apportionment to the AEC of most, if not all, of independent research and development costs over which the AEC would have no direct control. Only an amount which is reasonable under the circumstances should be allowed. Contracting officers may find it desirable to:

(1) Specify a maximum dollar limitation of independent research and development costs, an allocable portion of which will be accepted by AEC, or an allocable share of a percentage of the contractor's independent research and development program which will be accepted by AEC.

(2) Obligate the contractor to give the contracting office advance notice of any termination of an accepted project or changes which require the contracting officer's approval.

(h) Where AEC shares in the cost of an independent research and development [1] project of a contractor or subcontractor and its

[1] The term "independent research and development" means either research or development or both. Because of the insignificant amount involved, the situation covered by 9-15.205-35(k) does not involve a contribution to a contractor's independent research and development project within the meaning of this section.

share of the cost (predetermined or actual) bears the percentage relationship indicated below to the total cost of such project during the contractor's or subcontractor's annual accounting period, the following rights shall be obtained in and to technical data and inventions or discoveries made or conceived in the course of or under such project during the contractor's or subcontractor's accounting period:

AEC's share	Technical data acquired	Patent rights acquired
Less than 20 percent.	Summary reports, to the extent requested by AEC, will be furnished on specific independent research and development projects.	None
20 percent or more, but less than 75 percent.	Summary reports shall be furnished of the pertinent IR&D project indicating the progress and specifying whether any inventions or discoveries were made or conceived during the pertinent accounting period and, if requested by AEC, a complete and detailed technical report shall also be furnished.	Nonexclusive, irrevocable, paid-up license to AEC for AEC purposes.
75 percent or more.	All technical information and data on IR&D projects will be furnished AEC for dissemination and use as AEC sees fit, but insofar as such technical information and data disclose patentable subject matter, the same will not be disseminated until patenting action has been taken.	Nonexclusive, irrevocable, paid-up license to the Government for all purposes, with the right to grant sublicenses for all purposes.

Upon a determination of the percentages as hereinabove provided, the appropriate patent and technical data provision shall be incorporated in the contract in accordance with AECPR 9-9.5019.

(i) Determination of the percentage of AEC's share of the cost of a contractor's independent R&D project shall be made on the basis of the share of such cost provided by all AEC contracts and subcontracts during the contractor's or subcontractor's annual accounting period.

(j) The field office with the predominant contract interest will be responsible for determining the percentage of the total support provided or to be provided by AEC when AEC shares in the costs of an independent research and development project and for including the appropriate contract provisions required.

(k) When the cost of the work involved in segregating the independent research and development which benefits the contract work is disproportionate to the amounts involved, a flat amount not exceeding either (1) 5 percent of the contractor's total estimated cost of independent research and development, or (2) 5 percent of the total estimated cost of direct labor and material under the contract, whichever is less, may be negotiated.

(l) The costs of independent research and development, whether or not accepted as allowable cost, shall include an amount for absorption of their appropriate share of related indirect and administrative costs.

(m) As in any overhead determination, there shall be proper coordination among field offices (and Headquarters, where desirable) in determining the amount of independent research and development which is allowable where more than one office has a contract or contracts with the same contractor. Where the amount is significant and more than one office is involved, the guidance of Headquarters should be sought.

(n) Any limitation on the reimbursement of independent research and development is not to be used to justify an increase in the fee.

APPENDIX C

SECTION 203, PUBLIC LAW 91-441

SEC. 203. (a) Funds authorized for appropriation to the Department of Defense under the provisions of this Act or any other Act shall not be available for payment of independent research and development, bid and proposal, or other technical effort costs unless the work for which payment is made is relevant to the functions or operations of the Department of Defense and unless the following conditions are met—

(1) the Secretary of Defense, prior to or during each fiscal year, negotiates advance agreements establishing a dollar ceiling on such costs with all companies which during their last preceding fiscal year received more than $2,000,000 of independent research and development, bid and proposal, or other technical effort payments from the Department of Defense, the advance agreements thus negotiated (A) to cover the first fiscal year of each such company beginning on or after the beginning of each fiscal year of the Federal Government and (B) to be concluded either directly with each such company or with those product divisions of each such company which contract directly with the Department of Defense and themselves received more than $250,000 of such payments during their company's last preceding fiscal year.

(2) the independent research and development portions of the advance agreements thus negotiated are based on company submitted plans on each of which a technical evaluation is performed by the Department of Defense prior to or during the fiscal year covered by such advance agreement;

(3) no payments for independent research and development, bid and proposal, and other technical effort costs are made by the Department of Defense to any company or product division with which an advance agreement is required by subsection (a)(1) of this section, except pursuant to the terms of that agreement; and

(4) the total dollar value of the advance agreements negotiated prior to or during a given fiscal year as required under subsection (a)(1) of this section does not exceed a ceiling to be established annually by the Congress.

(b) In the event negotiations are held with any company or product division with which they are required under subsection (a)(1) of this section, but no agreement is reached with any such company or product division—

(1) no payments for independent research and development, bid and proposal, and other technical effort costs shall be made to any such company or product division during the fiscal year for which an agreement was not reached, except in an amount substantially less than the amount which, in the opinion of the Department of Defense, such company or product division would otherwise have been entitled to receive; and

(2) the amount of money received by that company for independent research and development, bid and proposal, and other technical effort costs during its last preceding fiscal year shall be included in determining compliance by the Department of Defense with the ceiling established by Congress, pursuant to subsection (a)(4) of this section, for the fiscal year in question.

(c) The Secretary of Defense shall submit an annual report to the Congress on or before January 31, 1972, and on or before January 31 of each succeeding year, setting forth—

(1) those companies with which negotiations were held pursuant to subsection (a)(1) of this section prior to or during the preceding fiscal year, together with the result of those negotiations;

(2) the manner of his compliance with the ceiling established by Congress for the preceding fiscal year pursuant to subsection (a)(4) of this section; and

(3) the latest available Defense Contract Audit Agency statistics on the independent research and development, bid and proposal, and other technical effort payments made to major defense contractors whether or not covered by subsection (a)(1) of this section.

(d) The provisions of this section shall apply only to contracts for which the submission and certification of cost or pricing data are required in accordance with section 2306(f) of title 10, United States Code.

(e) The ceiling to be established pursuant to subsection (a)(4) of this section for fiscal year ending June 30, 1971, shall be $625,000,000.

(f) Section 403 of Public Law 91-121 (80 Stat. 204) is hereby repealed.

APPENDIX D

DOD IR&D COST PRINCIPLES (1971)

15-205.35 *Independent Research and Development Costs.*

(a) *Definitions.* A contractor's independent research and development effort (IR&D) is that technical effort which is not sponsored by, or required in performance of, a contract or grant and which consists of projects falling within the following three areas: (i) basic and applied research, (ii) development, and (iii) systems and other concept formulation studies. IR&D effort shall not include technical effort expended in the development and preparation of technical data specifically to support the submission of a bid or proposal. For the purposes of this paragraph:

(1) *Basic research* is that research which is directed toward increase of knowledge in science. The primary aim of basic research is a fuller knowledge or understanding of the subject under study, rather than any practical application thereof.

(2) *Applied research* is that effort which (A) normally follows basic research, but may not be severable from the related basic research, (B) attempts to determine and exploit the potential of scientific discoveries or improvements in technology, materials, processes, methods, devices, or techniques, and (C) attempts to advance the state of the art. Applied research does not include efforts whose principal aim is design, development, or test of specific items or services to be considered for sale; these efforts are within the definition of the term "development," defined below.

(3) *Development* is the systematic use, under whatever name, of scientific and technical knowledge in the design, development, test, or evaluation of a potential new product or service (or of an improvement in an existing product or service) for the purpose of meeting specific performance requirements or objectives. Development shall include the functions of design engineering, prototyping, and engineering testing.

(4) *Systems and other concept formulation studies* are analyses and study efforts either related to specific IR&D efforts or directed toward the identification of desirable new systems, equipments or components, or desirable modifications and improvements to existing systems, equipments, or components.

(5) *Company* includes all divisions, subsidiaries, and affiliates of the contractor under common control.

(b) *Composition of Costs.* IR&D costs shall include not only all direct costs, but also all allocable indirect costs except that general and administrative costs shall not be considered allocable to IR&D. Both direct and indirect costs shall be determined on the same basis as if the IR&D project were under contract.

(c) *Allocation.* As a general rule, IR&D costs shall be allocated to contracts on the same basis as the general and administrative expense grouping of the profit center (see 3-1003.3) in which such costs are incurred. However, where IR&D costs clearly benefit other profit centers, or the entire company, such costs shall be allocated through the G&A of such other profit centers or through the corporate G&A, as appropriate. In those instances when allocation of IR&D through the G&A base does not provide equitable cost allocation, the contracting officer may approve use of a different base. Where allowable IR&D is established by advance agreement pursuant to (d)(1) below, the advance agreement shall specify the allocation procedures.

(d) *Allowability.* Except as provided in (e) below, costs for IR&D are allowable only in accordance with the following:

(1) *Companies Required to Negotiate Advance Agreements (CWAS-NA).*

(A) Any company which received payments, either as a prime contractor or subcontractor, in excess of $2 million from the DoD for IR&D and B&P in a fiscal year, is required to negotiate an advance agreement with the Government which establishes a ceiling for allowability of IR&D costs for the following fiscal year. Computation of the amount of IR&D and B&P costs to determine whether the $2 million criterion was reached will include only those recoverable IR&D and B&P costs allocated during the company's previous fiscal year to all DoD prime contracts and subcontracts for which the submission and certification of cost or pricing data was required in accordance with Section 2306(f) of Title 10, United States Code. The computation shall include full burdening in the same manner as if the IR&D and B&P projects were contracted for except that G&A will not be applied.

(B) When a company meets the criterion in (A) above, required advance agreements may be negotiated at the corporate level and/or with those profit centers (see 3-1003.3) which contract directly with the DoD and which in the preceding year allocated recoverable IR&D and B&P costs in excess of $250,000 including burdening as in (A) above, to DoD contracts and subcontracts for which the submission and certification of cost or pricing data was required in accordance with Section 2306(f) of Title 10, United States Code. When ceilings are negotiated for separate profit centers of the company, the allowability of IR&D costs for any center which, in its previous fiscal year, allocated less than $250,000 of IR&D and B&P costs to such DoD contracts and subcontracts may be determined in accordance with (d)(2) below.

(C) Companies which meet the threshold in (A) above shall submit technical and financial information to support their proposed IR&D program in accordance with guidance furnished by the Armed Services Research Specialists Committee. Results of the technical evaluation performed by the Armed Services Research

Specialists Committee, including determination of potential relationship, will be made available to the contractor by the cognizant Departmental central office.

(D) Ceilings are the maximum dollar amounts of total costs for IR&D work that will be allowable for allocation to all work of that part of the company's operation covered by an advance agreement. Within the ceiling limitations contractors will not be required to share IR&D costs. In negotiating a ceiling, in addition to other considerations, particular attention must be paid to such factors as:

(i) The technical evaluation of the Armed Services Research Specialists Committee including the potential relationship of IR&D projects to a military function or operation.

(ii) Comparison with previous year's programs including the level of the Government's participation.

(iii) Changes in the Company's business activities.

(E) The total amount of IR&D costs allocated to DoD contracts pursuant to this subparagraph (1) shall not exceed the total of expenditures for IR&D projects with a potential relationship to a military function or operation. For contracts which do not provide for cost determinations on a historical basis, this requirement will be considered to have been met if the estimated IR&D costs allocated to the contract do not exceed its proportionate share of the total estimated costs of IR&D with a potential relationship to a military function or operation.

(F) No IR&D costs shall be allowable if a company fails to initiate negotiation of a required advance agreement prior to the end of the fiscal year for which the agreement is required.

(G) When negotiations are held with a company meeting the $2 million criterion or with separate profit centers (when negotiations are held at that level under (B) above) and an advance agreement is not reached, payment for IR&D costs is required to be reduced substantially below that which the company or profit center would otherwise have received. The amount of such reduced payment shall not exceed 75% of the amount which, in the opinion of the contracting officer, the company or profit center would be entitled to receive under an advance agreement. Written notification of the contracting officer's determination of a reduced amount shall be provided the contractor. In the event that an advance agreement is not reached prior to the end of the contractor's fiscal year for which such agreement is to apply, negotiations shall immediately be terminated and the contracting officer's determination of the reduced amount shall be furnished.

(H) Contractors may appeal decisions of the contracting officer to reduce payments. Such appeal shall be filed with the contracting officer within 30 days of receipt of a decision. For the purpose

of hearing and deciding such appeals, each department will establish an appeals hearing group consisting of the following:

(i) A representative to be designated by the Assistant Secretary (Installations and Logistics) or the Director, DSA, who shall be Chairman;

(ii) A representative to be designated by the Assistant Secretary (Research and Development) or ODDR&E in the case of DSA; and

(iii) A representative to be designated by the General Counsel, Judge Advocate General of the Department or Counsel of DSA. Determinations of the appeals group shall be the final and conclusive determination of the Department of Defense.

(I) Advance agreements negotiated shall include at least the following:

(i) A separate dollar ceiling for IR&D. However, provision shall be made permitting the contractor to recover costs for IR&D above the negotiated ceiling, provided that recovery of B&P costs covered by the same agreement is decreased below its ceiling by a like amount.

(ii) A provision stating how IR&D costs are to be allocated (see (c) above).

(iii) A statement that the costs for IR&D work recoverable under contracts citing DoD funds subject to Section 203, P.L. 91–441 limitations shall not exceed A such contracts' allocable share of the ceiling, and B the total costs of the contractor's IR&D determined to have a potential relationship to a military function or operation.

(iv) A statement that estimated costs or actual costs incurred, as appropriate, not in excess of the ceilings negotiated shall be used in the pricing of all contractual actions when negotiations are based on elements of cost and in final price determinations.

(J) Prior to the execution of an advance agreement, the IR&D factor to be used for forward pricing and interim billing will be developed by and obtained from the cognizant central office of the Department responsible for negotiating IR&D advance agreements. The IR&D factor shall exclude estimated or actual costs for projects considered unrelated to a military function or operation.

(2) *Companies Not Required to Negotiate Advance Agreements (CWAS).* Allowable IR&D costs for companies not required to negotiate advance agreements in accordance with (1) above shall be established by a formula, either on a company-wide basis or by profit centers, computed as follows:

(i) Determine the ratio of IR&D costs to total sales (or other base acceptable to the contracting officer) for each of the preceding three years and average the two highest of these ratios; this average is the IR&D historical ratio;

(ii) Compute the average annual IR&D costs (hereafter called average), using the two highest of the preceding three years;

(iii) IR&D costs for the center for the current year which are not in excess of the product of the center's actual total sales (or other accepted base) for the current year and the IR&D historical ratio com-

puted under (i) above (hereafter called product) shall be considered allowable only to the extent the product does not exceed 120% of the average. If the product is less than 80% of the average, costs up to 80% of the average shall be allowable.

(iv) Costs which are in excess of the ceiling computed in (iii) above are not allowable except where the ceiling computed for bid and proposal cost under 15-205.3 is reduced in an amount identical to the amount of any increase over the IR&D ceiling computed in (iii) above.

However, at the discretion of the contracting officer, an advance agreement may be negotiated when the contractor can demonstrate that the formula would produce a clearly inequitable cost recovery. The requirements of (d)(1) above are not mandatory for such agreements.

(e) *Deferred Costs* CWAS-NA). IR&D costs which were incurred in previous accounting periods are unallowable, except when a contractor has developed a specific product at his own risk in anticipation of recovering the development costs in the sale price of the product provided that:

(1) the total amount of IR&D costs applicable to the product can be identified,

(2) The proration of such costs to sales of the product is reasonable,

(3) The contractor had no Government business during the time that the costs were incurred or he did not allocate IR&D costs to Government contracts except to prorate the cost of developing a specific product to the sales of that product, and

(4) No costs of current IR&D programs are allocated to Government work except to prorate the costs of developing a specific product to the sales of that product.

When deferred costs are recognized, the contract (except firm fixed-price and fixed-price with escalation) will include a specific provision setting forth the amount of deferred IR&D costs that are allocable to the contract. The negotiation memorandum will state the circumstances pertaining to the case and the reason for accepting the deferred costs.

APPENDIX E

SUMMARY OF RECENT DIALOGUE ON IR&D

While it might have appeared that there was considerable activity in the IR&D area in the 1960s, the pace of such activity has increased in the 1970s. The GAO has conducted an annual review of DOD implementation as well as several special topic reviews. As a consequence of a renewed challenge to IR&D by Senator Proxmire, the GAO has underway an in-depth investigation of IR&D, industry formed a tri-association committee on IR&D and the DOD established another DSB Task Group to examine DOD IR&D Policy. The major events since the passage of Section 203, Public Law 91-441 are summarized below:

Date	Event
March 1971	GAO Report, "Feasibility of Treating Contractor's IR&D Costs as a Budget Line Item"
April 1972	GAO Report, "Implementation of Section 203, Public Law 91-441, On Payments for IR&D and B&P Costs"
December 1972	Report of the Commission on Government Procurement
April 1973	GAO Report, "Payments for IR&D and B&P Costs"
August 1973	GAO Letter Report on IR&D Data Banks
September 1973	GAO Letter Report on Small Contractor Problems
September 1973	Senator Proxmire Amendment to Limit IR&D
March 1974	Industry Position Paper on IR&D and B&P Efforts
April 1974	DDR&E Statement to Congress

Date	Event
May 1974	GAO Report, "DOD's Implementation of Section 203, Public Law 91-441, Involving Contractor's IR&D"
May 1974	Admiral Rickover Statement to House Subcommittee on DOD Appropriations
May 1974	Statement of Principles for DOD Research and Development
August 1974	GAO Partial Report, "In-Depth Into Investigation IR&D and B&P Programs"
December 1974	GAO Report, "IR&D Allocations Should Not Absorb Costs of Commercial Development Work"
February 1975	DDR&E Statement to Congress
February 1975	DSB Task Group on IR&D Report
Impending	GAO Final Report, "In-Depth Investigation into IR&D and B&P Programs"

Each of these items will be summarized in the following paragraphs.

E.1. GAO Report, "Feasibility of Treating Contractors IR&D Costs as a Budget Line Item," March 1971 (Ref. 118)*

The GAO conducted this review in response to a request by Senator Proxmire for GAO's views as to the feasibility of converting contractors' IR&D to a budget line item. The GAO concluded that a line item control of IR&D payments to major defense contractors can be developed using estimates based on historical data, together with the DOD's estimate

*References are cited in the List of References

of the amount of research and development and procurement activity to be contracted in a particular year. The major contractors' DOD share of IR&D would be paid directly under special contracts rather than as an allocated overhead charge. However, the GAO suggested that no further legislative controls be placed on IR&D until the effectiveness of Section 203 of Public Law 91-441 was determined.

The DOD reply took exception to the GAO views and challenged the depth of the GAO investigation. The DOD response pointed out a number of possible problem areas. The DOD's basic position is that line item control is not administratively feasible.

Senator Proxmire entered the report in the Congressional Record. He again asserted that IR&D is a back-door boondoggle and that stricter controls are needed. (Ref. 119) Representative Gubser took exception to the GAO recommendation and asserted that it was not feasible. (Ref. 120)

E.2. GAO Report "Implementation of Section 203, Public Law 91-441, on Payments for IR&D and B&P Costs," April 1972, (Ref. 125)

This was the first yearly review of DOD's implementation of Section 203, Public Law 91-441 done in response to a request from Senator Stennis. It was recognized by the GAO reviewers that there had not been enough time elapse to provide a meaningful in-depth review and the GAO concentrated its efforts on a few issues which arose early in

implementation. The GAO pointed out that the language of Section 203 was not clear in whether the requirement for potential military relationship determinations applied to all IR&D payments or just those associated with contractors who negotiate advance agreements. The DOD had implemented the latter approach because of the administrative difficulty of doing otherwise. The GAO also noted that the law failed to provide a criteria for determining when a project has "a potential relationship to a military function or operation." The third area discussed was DOD's implementation of the $2 million criteria to include IR&D and B&P costs rather than IR&D or B&P costs. The GAO supported the DOD's action. The GAO concluded that, in its opinion, the DOD had been "reasonably diligent" in its implementation. Further, in submitting this report to Congress, Senator McIntyre complimented the DOD for doing "a commendable job" of implementing the statutory requirements of Section 203. (Ref. 131)

E.3. Report of the Commission on Government Procurement, December 1972 (Ref. 1)

The Commission was not able to arrive at a unanimous position on IR&D and in the end had a majority recommendation and two dissenting positions. The majority recommendation is summarized below:

1. IR&D and B&P expenditures are in the best interest of the nation to promote competition, to advance technology, and to foster economic growth.

2. Policy should recognize IR&D/B&P efforts as necessary costs of doing business and provide

a. Uniform treatment, Government-wide, with exceptions treated by the Office of Federal Procurement Policy

b. Contractor cost centers with 50 percent or more fixed-price government contracts and sales of commercial products and services should have IR&D and B&P costs accepted without question as to amount. Reasonableness for other contractors should be determined by the present DOD formula.

c. Contractor cost centers with over 50 percent cost type contracts should be subject to an agency relevancy test. No relevancy restriction should be applied to other contractors.

This recommendation was supported by six of the twelve Commissioners:

Perkins McGuire, Consultant and Corporate Director

Paul W. Beamer, Senior Vice President and Director, Valtec Corporation

Edward J. Gurney, Senator, Florida

Richard E. Homer, President and Director, E.F. Johnson Company

Peter D. Joers, Special Assistant to the President of Weyerhauser Corporation

Arthur F. Sampson, Acting Administrator, General Services Administration.

The first dissenting position agreed with the major points of the majority recommendation and the first subparagraph (1., 2. and 2a). However, the other two subparagraphs were unacceptable. The thrust of the subparagraphs added by the supporters of dissention position #1 was to retain the current DOD procedures covering IR&D and B&P

costs which were adopted pursuant to Section 203 of the 1971 Military Procurement Authorization Act. However, two new items were added. First, agency procurement authorization and appropriation requests would be accomplished by an explanation of the criteria established by the agency head for such allowances. Second, the government should obtain sufficient access to contractors' commercial records to enable a determination of the allowability of the costs (this item relates to difficulties the GAO encountered obtaining such access at one contractor--see Section E. 14). The first dissenting position was supported by:

Lawton M. Chiles, Senator, Florida;

Frank Horton, Congressman, New York;

Chet Holifield, Congressman, California;

Elmer Staats, Comptroller General of the United States; and

James E. Webb, Attorney at Law.

The second dissenting position suggested that additional mechanisms should be studied to try to find a solution to the IR&D dilemma. This position was sponsored by Frank Sanders, Under Secretary of the Navy, and supported by Commissioner Sampson as potential long term solution.

The Commission recommendations have been staffed by an Executive Branch Committee which established an Executive Branch position. This group was chaired by Mr. Charles Deardorff, OASD(IL). The proposed Executive Branch position

is currently being reviewed by the General Services Administration.

It is unlikely this effort will have much impact on DOD IR&D policy since most of the Congressional/GAO Commissioners supported a continuation of the current DOD policy with minor suggestions for change. Additional backup information is included in Reference 132.

E.4. GAO Report, "Payments for IR&D and B&P Costs, " April 1973 (Ref. 123)

This was the second annual review of DOD implementation of Section 203 of Public Law 91-441 in response to a request from Senator Stennis. Since the law had been in effect for two years the GAO conducted an intensive review. The GAO noted the continuing problems with the vagueness of the potential military relationship requirement. They noted several positive actions taken by the DOD to implement the provisions of Section 203. However, they did find several areas which they felt needed further emphasis by senior DOD officials. Accordingly they recommended that the DOD should:

- Insure compliance with the intent of the Armed Services Procurement Regulation which prohibits cost sharing within the ceiling.
- Perform after-the-fact reviews as soon as possible after the contractor's fiscal year ends to provide additional data for subsequent negotiations.
- Issue guidelines to the Services to insure more consistent determinations of potential military relevancy.

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- Continue to emphasize the desirability of negotiating advance agreements either prior to cost incurrence or early in the contractor's fiscal year and to seek alternative means of solving this problem.

- Establish uniform negotiation procedures and policies for negotiators to aid in the consistent and equal treatment of contractors.

- Establish guidelines that uniformly recognize, during ceiling negotiation, the technical quality of contractors' IR&D programs with reward or penalty, as appropriate.

- Require the Services to maintain negotiation files which record the rationale and show the dollar effect of the factor considered in establishing the ceiling.

The DOD generally agreed with the GAO recommendations (Ref. 133) and acted to implement them by issuing guidance on negotiations and PMR determinations (see Refs. 76 and 86).

The primary recommendation to the Senate Armed Services Committee was that no changes be made in Section 203, Public Law 91-441 pending further study of the area. In presenting the GAO findings and the DOD's annual report on IR&D to the Senate, Senator McIntyre noted that the DOD had made "substantial and satisfactory progress" during the past year in further implementing the provisions of Section 203. (Ref. 134)

E.5. GAO Letter Report, IR&D Data Banks, August 1973, (Ref. 94)

This was one of two GAO special reports on IR&D issued in 1973. The GAO report questioned the need for two IR&D data banks, the adequacy of use to justify even one data bank, and the appropriateness of current data bank procedures since they seemed to lead to duplication with the technical

plans. The DOD responded to the GAO report and answered several of the GAO questions. (Ref. 135) The DOD Technical Evaluation Group was also tasked to evaluate the data banks and the results are discussed in Section 3.3.7.

E.6. GAO Letter Report, "Small Contractor Problems with DPC 90," September 1973 (Ref. 136)

The GAO conducted this review to determine if there were major problems in the handling of small contractors under the new cost principles which provide, in part, that small contractors can negotiate advance agreements if for some reason the formula does not provide an equitable result. In essence, the GAO found no major problems in this area.

E.7. Senator Proxmire Amendment to Limit IR&D Recovery, 24 September 1973 (Ref. 103)

On 24 September 1973 Senator Proxmire introduced an amendment to the FY 75 DOR Military Procurement Authorization Bill which, if passed, would have required a 50 percent reduction in the DOD's reimbursement of IR&D, B&P and OTE costs. The amendment was immediately withdrawn by preagreement with Senator McIntyre; the Senators had agreed to jointly request an in-depth GAO investigation of the basis for IR&D/B&P/OTE and alternatives to the current policies and procedures. The initial target date for completion of the study was 1 April 1974.

Senator Proxmire in his comments to the Senate (Ref. 103) once more challenged the concept of IR&D/B&P but in stronger terms than in the past. His statement includes the following comments: a case can be made that IR&D is a backdoor boondoggle and ought to be eliminated altogether; DOD controls have not been effective and IR&D costs continue to rise, both in dollar amounts and as a percentage of defense sales; the test of relevancy is not effective; IR&D amounts to a Pentagon subsidy for major defense contractors and has been used to prop up defense contractors whose sales have declined; IR&D contributes to the continued dominance of the large aerospace firms; the Pentagon has not demonstrated a willingness or capability for determining whether proposed IR&D work is ever actually performed or whether such work benefits the government; the government receives no license, patent, royalty or other rights in any inventions that result from IR&D efforts paid for with taxpayers' money; and IR&D contributes to hidden profits.

Subsequently, Senator Proxmire's staff and the staff of the Armed Services Committee prepared a group of specific questions to be addressed by the GAO. These questions were forwarded to the GAO by letters dated 8 October 1974. The GAO was asked to do a comprehensive study and include alternative recommendations ". . . so that the Committee will have a choice of actions which may be adopted." The 22 questions are reproduced as Appendix F. The response was originally

requested by 1 April 1974. However, the magnitude of the task precluded completion by that time. A partial report on the in-depth review was subsequently published in August 1974 (See Section E.13) and as of 15 April 1975 the final report has still not been published but is expected in mid-June 1975.

In response to the challenge to IR&D, industry established a Tri-Association (Aerospace Industries Association, National Security Industrial Association, and Electronic Industries Association) Ad Hoc Committee on IR&D and B&P. Their primary written product is discussed in the next section. DDR&E chartered a Defense Science Board Task Group to review the IR&D situation and advise him on desirable changes in policy and procedures. Their report is discussed in Section E.16.

In essence, most IR&D activity subsequent to this event was a reaction to Senator Proxmire's renewed challenge.

E.8. Industry Position on IR&D/B&P (Refs. 115, 116, and 117)

The Tri-Association Ad Hoc Committee on IR&D and B&P undertook a major effort to establish an industry position and to sell it to Congress. The position and backup data are reflected in three documents which were published in March 1974. These were "A Position Paper on IR&D and B&P," an "Executive Summary" thereof, and a volume entitled "Technical Papers on IR&D and B&P Efforts." These documents varied in

length from 5 to 312 pages. The position taken by industry was consistent with their previous positions. Their specific recommendations are summarized below:

> "1. The requirement for potential military relationship in Public Law 91-441 would be eliminated as unworkable . . . .
>
> 2. The requirement for establishing ceilings on IR&D and B&P should be eliminated because it is in basic conflict with stated Government objectives to encourage competition and maintain a strong industry capability.
>
> 3. Line-items should not be established in any agency budgets for funding IR&D and B&P costs . . . .
>
> 4. A new Government agency responsible for operational aspects of IR&D and B&P should not be established. Rather all government agencies should follow a common policy . . . .
>
> 5. Congress, in the national interest, should specifically express positive support for IR&D and B&P and correct the current motivation to continually reduce this effort.
>
> 6. In considering "alternative methods" of funding IR&D and B&P, it should be remembered that IR&D and B&P are indirect business expenses and should be fully reimbursed. In summary, full cost recovery of IR&D and B&P would place the U.S. Government on an equal footing with all other customers. Anything less than full reimbursement of these costs, in effect, is a subsidization of the Government by American industry." (Ref. 115, pp. 33-34)

This is as strong a statement of the classical industry position as one is likely to see. Additional background, rationale, and discussion is given in the other parts of the Position Paper.

The "Technical Papers" volume includes six papers:

- Economic Considerations Regarding IR&D and B&P Expense
- Alternate Methods of IR&D and B&P Cost Reimbursement
- Benefits Derived from IR&D Effort
- Benefits Derived from B&P Efforts
- U.S. and Foreign Nation Support of Industrial Technical Effort
- Industry Response to 22 Proxmire--McIntyre Questions.

About two-thirds of the volume is devoted to the discussion and presentation of benefits of IR&D.

E.9. DDR&E Statement Before the Senate Committee on Appropriations, 5 April 1974. (Ref. 107, pp. 9-34 to 36)

Dr. Currie in his prepared statement to the Senate Appropriations Committee took a strong position in support of IR&D:

> "IR&D is an essential and effective means to provide the United States with a superior technology base to meet our government's requirements. The Congress is strongly urged to give it full support."

E.10. GAO Report, "DOD Implementation of Section 230, Public Law 91-441 Involving Contractors' IR&D," 1 May 1974 (Ref. 126)

This was the third annual GAO report on the DOD implementation of Section 203 in response to Senator Stennis. In commenting on the DOD implementation the GAO noted the new DOD guidance issued by Dr. Foster and Mr. McCullough on 18 April 1973 (Ref. 76) but stated that it was too early to evaluate its effectiveness. On the need for a uniform

government-wide policy GAO contacted DOD, NASA, AEC, DOT, HEW, HUD and EPA and found no unanimity on the need for a uniform government-wide policy nor the desirability of adopting DOD policy for government-wide use. The GAO recommended that no change be made to Section 203 until completion of their in-depth investigation.

E. 11. Admiral Rickover Testimony before House Subcommittee on DOD, May 1974 (Ref. 104)

In his testimony Admiral Rickover identified four "obvious and serious problems" in the way DOD is doing IR&D business:

- DOD neither directs nor controls the contractor's R&D work being performed,
- DOD has no way to eliminate duplication, or to determine if the benefits obtained by DOD are worth the costs incurred,
- The Government has no rights in technical data or in patents derived from the work though it is primarily financed with public funds, and
- Much necessary and legitimate research and development work for weapons is being deferred by the Department of Defense for lack of funds. Yet the Department spends many hundreds of millions of dollars a year on contractors' pet projects which may not prove beneficial to the military.

He also made the following assertions:

- DOD technical reviews are superficial and the Departments interpretation of what projects have a potential relationship is quite liberal.
- The DOD would get more for its money by direct contracting rather than reimbursing IR&D.

- AEC has managed just fine without the liberal IR&D policies of the DOD, and

- IR&D is a subsidy given without going through the normal process of obtaining Congressional approval.

Thus, Admiral Rickover's position is very similar to Senator Proxmire's feelings.

When asked what he would recommend with respect to IR&D Admiral Rickover gave the following response:

> "First, Department of Defense payments for independent research and development and bid and proposal expense should be drastically reduced. The Department of Defense cannot afford to spend $787 million to $1 billion a year for this work when sufficient funds are not available to fund its own research and development projects.
>
> Second, the Department of Defense, like the Atomic Energy Commission, should allow costs of independent research and development projects only to the extent those projects provide a direct benefit to the military.
>
> Third, the Department of Defense should receive, for the Government, patent and data rights commensurate with its contribution to the costs incurred on independent research and development projects. Again, the AEC has a system which does give the Government rights to technical data and license for patents commensurate with the Atomic Energy Commission's investment in the work.
>
> Fourth, in cases where independent research and development projects are deemed to have sufficient benefits to warrant the cost, the Defense Department should finance the work by direct contract rather than through IR&D, so that the responsible Government officials can exercise technical supervision of the work, and so that the United States can retain appropriate rights to resulting technical data, inventions, and patents." (Ref. 104, p. 123)

Thus, what might have appeared to be a uniform DOD front on IR&D was broken with Admiral Rickover's blunt criticism of DOD IR&D management.

E. 12. Statement of Principles for DOD Research and Development, May 1974 (Ref. 110)

Dr. Currie and his three service counterparts, the Assistant Secretaries for R&D, signed a Statement of Principles for DOD Research and Development in May 1974 which includes the following section:

> "Independent Research and Development. A strongly supported IR&D program is essential. It must be well directed, mostly by industry, and the benefits must be clearly visible."

E. 13. GAO Partial Report, "In-Depth Investigation into IR&D and B&P Programs," August 1974 (Ref. 95)

This was the first product of the GAO in-depth investigation into IR&D. It included answers to nine of the first ten Congressional questions. Thus, in this report the GAO

- analyzed and reconsidered the costs of IR&D and B&P programs as reported by DOD for the years 1968 through 1973 (Questions 1 to 5, Appendix F)
- explored the availability of information on the costs of administering the programs (Question 6)
- Considered whether certain costs (directed toward new business, promotional and nontechnical services, etc.) are allowed and reimbursed as IR&D and B&P under DOD's regulations (Questions 8 and 9), and
- Evaluated the procedures implemented by DOD for contractors not meeting the $2 million threshold prescribed by Section 203 for advance agreements and technical evaluations (Question 10).

E. 14. GAO Report, "IR&D Allocations Should Not Absorb Costs of Commercial Development Work," December 1974 (Ref. 137)

In this report the GAO questions the DOD's acceptance of $87 million of JT 9D development costs as IR&D from 1968 through 1973 because the development was sponsored by, or required in performance of, contracts with commercial customers. The GAO recommended that the DOD

- provide specific guidance to Government review teams and the Defense Contract Audit Agency to insure that technical effort allowed as IR&D is not sponsored by, or required in the performance of, commercial contracts and

- expedite action under consideration to require that IR&D agreements specifically authorize access to contractors' commercial records for determining whether IR&D costs are allowable.

In its reply the DOD basically agreed with the GAO interpretation of the current ASPR but argued that

> "the Navy's advance agreements with Pratt and Whitney for the years in question were sound business transactions and were clearly in the Government's best interest." (Ref. 138, p. 2)

Regarding the desirability of additional guidance and access in some cases to contractors' commercial records, the DOD reply notes the practical difficulty of making determinations in this area but states that the DOD is

> "considering the feasibility of requiring contractors to whom advance IR&D agreements are negotiated to certify that costs incurred for IR&D projects sponsored by or required in the performance of a contract or other arrangement will not be allocated to DOD contracts." (Ref. 138, p. 3)

E. 15. DDR&E Statement Before the House Armed Services Committee, 21 February 1975 (Ref. 108)

Dr. Currie once again directly addressed IR&D in a major statement. He provided rationale for DOD support of IR&D and responded to charges that IR&D is a subsidy and not attuned to DOD needs. Finally, he again solicited Congressional support for IR&D.

E. 16. Defense Science Board IR&D Task Force Report, February 1975 (Ref. 105)

The Defense Science Board Task Force on IR&D was chartered in April 1974 to:

1. Identify the various objectives and uses of IR&D/B&P,

2. Identify alternative means for satisfying these objectives, and

3. Set forth and assess the pros and cons of various alternatives and recommend possible modus operandi.

A criteria in forming the Task Force was that members not be associated with the segment of industry which benefits most from IR&D. Accordingly the members were largely from the academic or non-aerospace sectors:

Dr. Gerald Tape (Chairman)
President, Associated Universities, Inc.

Dr. Walter Roberts
President, University Corporation for Atmospheric Research

Dr. Robert Loewy
Vice President and Provost
Rensselaer Polytechnic Inst.

Dr. Oswald Villaro
Senior Scientific Adviser
Stanford Research Institute

Dr. John Baldeschwieler
Chairman, Division of Chemistry and Chemical Engineering
California Institute of Technology

Dr. Joseph Charyk
President, Communications Satellite Corporation

Mr. Robert Everett
President, MITRE Corp.

Dr. Raymond Bisplinghoff
Chancellor, University of Missouri

Lt Gen Austin Betts, USA (Ret.)
Vice President for Operations
Southwest Research Institute

Lt Gen Robert E. Coffin, USA (Ret.)

Government Representative:
Mr. James W. Roach, ODDR&E

This group coined a new acronym to describe IR&D and B&P-Competitive Technical Effort (CTE)-which is reminiscent of CITE from the mid-1960s. The Task Force supported the concept of IR&D/B&P and recovery through overhead and offered the following recommendations:

- DOD reimburse, through overhead, defense contractors for CTE in the amount considered necessary to maintain a truly competitive environment among DOD's industrial sources of supply.

- The amount of CTE authorized be determined to the greatest extent possible automatically on the basis of commercial market place experience or negotiated on the basis of simple formula and guidelines, changeable by DOD periodically as conditions dictate.

- The DOD IR&D Policy Council determine the level of CTE reimbursement by setting CTE policy, establishing the CTE formula and guidelines, and reviewing CTE goals and results at regular intervals.

- The DOD not attempt to manage, direct, or require prior approval of the substance of CTE programs. Continue, however, technical exchanges for the benefit of contractor and DOD.

- There be no test of relevancy applied to CTE. If relevancy tests must be applied, they should be tests for government-wide benefits.

- DOD promote the use of inter-agency coordinated CTE policy and procedures to the extent other agencies depend on competitive sources of supply in the way DOD does, but not to create a central agency for CTE administration.

These recommendations are not particularly precise in statement but their intent is clear. The DOD should once again advocate cost principles similar to the February 1969 cost principles which make IR&D CWAS applicable (remove cost controls from most contractors) and greatly reduce the technical evaluation activity. No benefit/cost analysis is presented to show what the DOD gains from the recommended course of action. Hence, it is not clear what is new in 1975 (vice 1969) that will make the suggested changes palatable to the Congress.

E. 17. Other Inputs to the Dialogue

There have been many additional inputs to the IR&D dialogue which were not highlighted in the above paragraphs. A few of these are summarized here:

In September 1973 General George S. Brown (then Chief of Staff of the Air Force and a past Commander, Air Force Systems Command) made the following comments relative to IR&D:

"Some contractors expect the Department of Defense to participate in and absorb costs for a constant or increasing level of IR&D even though their business base may be decreasing. This is unrealistic. We understand the need for and the value of IR&D programs, and we are willing to pay our fair share. But contractor management must evaluate and reassess the worth of these projects, and make absolutely sure that the company is judicious in the use of IR&D money. What we can afford under current conditions is a far cry from what we'd all like to see done in this area." (Ref. 111, p. 6)

Lt General William Evans, Air Force Deputy Chief of Staff for R&D, in testimony to the House DOD Appropriations Subcommittee said the Air Force

"'. . .firmly endorses the concept of IR&D and believes that the use of these funds are more broadly effective than if they were constrained to specified research and development. Such a system would require the establishment of an extensive and expensive reporting, administrative and audit system for handling the program. There is no efficient way to allocate a fixed dollar figure among the numerous and various size contractors nor is there a feasible method to establish an amount in the budget for such specified efforts."

Such work, he went on, 'would tend to become directed R&D with the consequent loss of creative input from an otherwise unavailable broad base of technical professionals throughout the country. The Air Force cannot always know the exact areas to explore and act as the sole judge of embryonic concepts.'

He also cited IR&D as being a relatively uncomplicated process administratively and therefore effective for performing numerous essential R&D tasks too small to be performed economically by contracting." (Ref. 112, p. A 19)

At the technologist level the Commander of the Air Force Flight Dynamics Laboratory (Col Charles Scolatti) documented his feelings about IR&D and included the following observations in his overall assessment.

- Contractor IR&D is making a big impact on technology for weapon systems,

- Because of the improvements in on-site evaluations, documentation, IR&D management, etc., the IR&D program is now the major contributor of systems technology,

- Present and future weapon systems are now dependent on IR&D contributions.

- IR&D program results are not sufficiently publicized or credited,

- The IR&D programs are evaluated with more scrutiny, technical expertise and depth than any other R&D element, and

- Duplication has been reduced to a minimum. Unwarranted duplication has been eliminated (Ref. 114, pp. 3-5)

APPENDIX F

CONGRESSIONAL QUESTIONS

FOR GAO IN-DEPTH INVESTIGATION

1. The DCAA audits of IR&D costs show that the ratio of IR&D costs to defense sales increased from 2.73% in 1966 to 3.83% in 1972. What accounts for this increase? What is the rationale to support a high level of contractor IR&D expenditures even in the face of declining defense sales?

2. Reconcile the apparent inconsistencies in the figures for IR&D expenses from 1968 to 1972 between your April 16, 1973, report, reports by the DCAA, and the figures given by DOD to the Senate Armed Services Committee as printed in the committee report of September 6, 1973.

3. In its report to Congress, the DOD includes an amount for "other technical effort (OTE)" in its IR&D figures. What are the audit substantiated amounts for OTE for the years 1968 to the present? Why are these amounts not included in the DCAA audit report? Do the same rules apply for OTE as for IR&D and Bid and Proposal Costs?

4. The DCAA audit report of IR&D covers only those defense contractors with "an annual auditable volume of costs incurred of $15 million or more and other contractors who, although not meeting the auditable volume criteria, required 4,000 or more manhours of DCAA's direct audit effort per year." What does the term "auditable volume" of costs incurred mean? What is the difference between auditable volume of costs and total defense sales (including both prime contracts and defense subcontracts)? What is your estimate of total IR&D *including* contractors that do not meet the criteria of $15 million of annual auditable costs incurred and 4,000 manhours of defense audit effort?

5. The IR&D figure, reported to Congress are based on a DCAA statistical report covering 77 defense contractors. The top 77 defense contractors account for only 69% of defense prime contracts. How much additional IR&D costs are reimbursed by the DOD to divisions, contractors, and subcontractors not covered in the DCAA report?

6. What is the total in-house cost of administering the IR&D program—include the cost of reviewing contractor proposals, DOD negotiation teams, technical review efforts, administration of disputes, etc.? What are the comparable costs for AEC?

7. What problems are encountered by DOD and AEC contracting officers and technical or project personnel in evaluating and negotiating IR&D proposals?

8. Does DOD pay contractors' costs for:

(a) research and development projects primarily of a promotional nature, such as projects directed toward the development of new business or projects connected with proposals for new business;

(b) studies or projects which are undertaken, in whole or in part, for other customers; and

(c) projects which represent unwarranted duplication of other research and development work sponsored by the DOD.

Cite examples if any such costs are paid.

9. Do Bid and Proposal costs paid by the DOD include negotiating and promotional costs or the cost of salesmen, representatives or agents who do not provide technical services in connection with bids or proposals?

10. Public Law 91-441, section 203, provides that appropriated funds may not be spent for IR&D unless the Secretary of Defense determines that the IR&D has potential military value. However, it appears that the DOD does not technically review IR&D proposals in cases where it is charged less than $2 million a year. What is your evaluation of the adequacy of the DOD's technical review of such programs? Of the $700 million in IR&D expenses in 1972, how much goes to contractors under the $2 million ceiling? What is the Comptroller General's opinion of the legality of IR&D payments made in the absence of any technical review as to potential military value? Would it be feasible to lower the technical review threshold below $2 million?

11. With respect to IR&D proposals where the DOD is expected to pay in excess of $2 million per year, evaluate the adequacy of the contractors supporting data both with respect to estimated cost and technical justification? Since negotiated advance agreements on IR&D are of necessity sole source negotiations, do contractor submissions comply with the requirements of the Truth-in-Negotiations Act—that is does the contractor have to provide detailed cost or pricing data in support of his estimates and certify as to their accuracy, currentness and completeness? If not, why not?

12. For each of the years 1968 through 1972, identify what specific developments have been made by each of the top 25 defense contractors with respect to amount of IR&D received. For these same top 25 defense contractors identify each IR&D project in excess of $25,000 per year and indicate the potential military benefit rationale used by the DOD in accepting the project. Identify what patent applications have been made and what patents issued during this period to these top 25 contractors as a result of IR&D programs that have been subsidized by the DOD. Identify what income each company received from these patents or from prior patents developed under IR&D and determine whether or not this income has been credited to the DOD in proportion to its financial support of the project.

13. Does the DOD receive detailed technical reports or other technical data regarding technology developed under IR&D programs so that this information is considered in the development of weapons programs?

14. Does the DOD conduct reviews to evaluate the results of IR&D efforts by its contractors? What do such reviews, if any, show?

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15. Apparently IR&D amounts are accepted (if under $2 million a year) or negotiated (if over $2 million a year) based primarily on historical rates of expenditures. Moreover, the DOD pays the most IR&D to the largest defense contractors. What safeguards are in effect to offset the competitive advantage this gives large, established firms in relation to new firms trying to enter defense business—and particularly small firms? What safeguards are in effect to prevent defense contractors from exploiting inventions developed primarily at public expense under IR&D in competition with other firms for non-defense business? Should safeguards be established in each of the aforementioned instances if they are not now in effect?

16. Since the DOD accepts IR&D as a general overhead cost and the AEC instead reimburses only IR&D costs, which are shown to be of direct or indirect benefit to specific contracts, and since both agencies are involved extensively in research and development work, what, if any, differences exist in the nature of the work or the circumstances under which it is performed that would justify the continued acceptance of IR&D costs by the DOD?

17. What is the practicability of completely eliminating Department of Defense payments to contractors for IR&D and B&P as allowable costs under Department of Defense contracts?

18. Same as previous question, except establishing a separate program in each of the RDT&E appropriations for IR&D and B&P with an amount of funds to be distributed directly, by contract or grant, to industry. This distribution could be based upon such factors as the experience of negotiating teams, including technical review panels, and the same criteria presently used under the existing procedures.

19. What is the practicability of a combination of the present system, with an established dollar ceiling substantially lower than the $700 million level, and a separate, directly financed program as described under the previous question?

20. What is the practicability of the continuation of the present system but based upon a dollar ceiling which is reduced 10 percent each year with an equal increase in the directly financed program described under question 18 above?

21. What is the practicability as well as the desirability of establishing a separate ceiling for IR&D as distinguished from B&P if the decision is made to establish a total ceiling in law?

22. What is the practicability as well as the desirability of establishing an independent government agency which will be responsible for the IR&D program on a government-wide basis, as opposed to the present separate Agency basis?

APPENDIX G

ADDITIONAL BIBLIOGRAPHIC MATERIALS

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Senator McIntyre. Thank you very much.

Dr. Currie, thank you very much, you and your associates, for your long and fine testimony here this morning. There will be some questions submitted to you for the record.

At this time we will recess until 2 p.m. this afternoon and proceed with our next witnesses at that time.

Thank you again. We stand in recess.

[Whereupon, at 12:24, the subcommittee recessed, to reconvene at 2 p.m.]

INDEPENDENT RESEARCH AND DEVELOPMENT

WEDNESDAY, SEPTEMBER 24, 1975

U.S. SENATE, SUBCOMMITTEE ON RESEARCH AND DEVELOPMENT OF THE SENATE ARMED SERVICES COMMITTEE, AND THE SUBCOMMITTEE ON PRIORITIES AND ECONOMY IN GOVERNMENT OF THE JOINT ECONOMIC COMMITTEE

Washington, D.C.

The subcommittee met, pursuant to notice, at 2 p.m. in room 1114, Everett M. Dirksen Senate Office Building, Hon. Thomas J. McIntyre (chairman).

Present: Senators McIntyre (presiding), Culver, and Proxmire.

Also present: Hyman Fine, professional staff member, Senate Armed Services Committee; and Richard F. Kaufman, general counsel, Joint Economic Committee.

Senator MCINTYRE. We call as our witness this afternoon Mr. Raymond G. Romatowski, Assistant Administrator for Administration, Energy Development and Research Administration. Gentlemen, go ahead.

STATEMENT OF RAYMOND G. ROMATOWSKI, ASSISTANT ADMINISTRATOR FOR ADMINISTRATION, ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION, ACCOMPANIED BY STAFF MEMBERS CHARLES TROELL, JOSEPH SMITH, AND HUDSON RAGAN, ERDA

Mr. ROMATOWSKI. I have Mr. Charles Troell, Mr. Joseph Smith, and Hudson Ragan with me today. I should like to submit my prepared statement to be included in the record.

[The prepared statement appears on p. 601.]

I will highlight the statement in the remarks which follow. We have a number of enabling legislations and acts which created ERDA. These are identified in the statement. In the energy field, ERDA is an R. & D. agency, and our enabling legislation places great emphasis on demonstration of the commercial feasibility and practicality of a variety of energy related processes and technologies. The stress is placed on using all available means to develop energy sources and technologies and to demonstrate readiness for widespread commercial use.

This goal will be accomplished by developing, demonstrating and fostering the commercialization of all viable technologies for increasing and conserving our energy supplies. To discharge these obligations

we will be devising new approaches to harnessing the knowledge, capabilities, and other resources in both private and public sectors.

These new means must include the use of innovative procurement techniques which will better enable us to carry out the broad policies and varied responsibilities established by our enabling legislation, and by the annual authorization and appropriation actions to follow.

We are committed to the fullest possible utilization of small, innovative, high technology research and development organizations, and to working with a wide variety of industries under a number of different arrangements.

I supplied an organizational chart of ERDA. We have six program administrators, each of them being a Presidential appointee confirmed by the Senate and each one carrying with him a mission responsibility: Fossil energy, nuclear energy, solar, geothermal, and advanced energy systems, national security, conservation and environment and safety.

We represent about 8,000 civil service people and an additional 90,000 ERDA contracting employees in over 50 federal installations across the country. I have supplied a map of the United States with a legend for each of those facilities and laboratories.

Competition will be essential to our operations. We have energy sources competing for attention and use, and we must also have competing concepts and technologies within each different energy source. We must have a wide variety of organizations participating in these competitions—universities, individual inventors, nonprofit research organizations and profit-oriented commercial companies.

In the last group is the small, high technology R. & D. company which is a potential source of invention and innovation, and the large company with the resources needed to exploit technologies as they evolve both within and outside that company. We will be supporting technologies and organizations as they combine to create and maintain competitive markets for the equipment and processes needed to make economic use and conservation of all energy sources.

I would like to emphasize at this point that in neither size nor complexity does ERDA's involvement (present or anticipated) with these two controversial items of expense begin to approach that of DOD (or even NASA). The reasons for this will become apparent as I explain our policy and how it is applied in different kinds of contracting situations.

The primary reason, however, can be simply stated. The energy industry is a broad and diverse complex of companies and institutions, and a segment of the economy that is largely in private hands. This contrasts sharply with the defense and aerospace industry which is more concentrated and largely dependent upon Government procurement.

Independent research and development and bid and proposal efforts are necessary functions for companies in many of our contracting situations. Where this is so, those companies with which we contract must cover the costs of these efforts by the revenues they receive from current sales.

We believe the effective coupling of these technical and scientific activities with the needs of the market is essential both to the continued life of those companies and the continued existence of a compet-

itive market in which new products are brought forth to meet new needs or to satisfy old needs more effectively.

I would like now to outline the current ERDA policy and procedure with regard to I.R. & D. and B. & P. costs, and include as background the policies followed until recently by ERDA and its predecessor agencies.

As you know ERDA was created by combining portions of several existing agencies. The program we are implementing includes activities transferred with the agency components, as well as new program initiatives.

The bulk of the personnel, facilities and ongoing programs transferred to ERDA consist of the nonregulatory aspects of the former Atomic Energy Commission.

Additional personnel, facilities and programs came from the Office of Coal Research and other elements of the Department of the Interior, in particular the Bureau of Mines, and smaller complements came from the National Science Foundation and the Environmental Protection Agency.

Prior to their transfer to ERDA, the procurement actions of the program elements in Interior, NSF, and EPA were subject to the Federal procurement regulations and the FPR provisions on I.R. & D. and B. & P. costs applied. Thus, there was no benefit test for I.R. & D. activities and neither was there a specific limitation on reimbursement of B. & P. costs. The subcommittees are familiar with those provisions and I will not dwell on them further.

The AEC, on the other hand, followed a somewhat unique policy on I.R. & D. and B. & P. costs; we have continued to follow some practices and have changed others. These are identified in the discussion which follows.

I believe the policies I am about to describe provide a good blend of approaches to the basic kinds of situations in which we contract. I have to stress the word "blend." We have to adapt ourselves to a new kind of framework for our organization. As we gain experience with these principles and with the rapidly expanding types of business arrangements and varieties of industries with which we will deal, we may see need for further revisions.

For Government-owned, contractor-operated facilities, ERDA follows the AEC practice. The scope of these contracts does not include performance of I.R. & D. nor bidding for other contracts, private or Government. Consequently, I.R. & D. and B. & P. costs are not pertinent. As I have indicated, we have not changed this AEC policy and quite frankly we can foresee no developments that would dictate a change. It is likely that this type of contract, currently representing the major portion of ERDA contract expenditures, will continue to represent a third or more of our expenditures—at the present time it is in the neighborhood of 75 percent—even when the nonnuclear programs achieve full growth.

For other R. & D. contractors, where I.R. & D. and B. & P. are necessary overhead functions, we have developed a modified policy coupled with specific controls.

For B. & P., we will reimburse ERDA's allocable share of reasonable actual costs of preparing and presenting proposals up to a limit equal to the average actual B. & P. costs for the last 3 years.

This contrasts with AEC policy which limited reimbursement of B. & P. costs to 1 percent of the contract direct labor and material costs. Thus, while continuing the AEC policy of placing a ceiling on such costs, we adjusted the limitation to meet the broader contractual situations which ERDA will face.

For I.R. & D., we assure ourselves that the company manages its program prudently, that the costs allocated to ERDA contracts are reasonable and of benefit to ERDA programs in one of the following ways depending on the type and level of ERDA contracting with a given contractor. The test of benefit to ERDA programs represents a broadening from the previous AEC rule of benefit to the contract work; again a recognition of the broader mission of ERDA.

If the contractor devotes most of its efforts in a given cost center to energy related activities and ERDA is the dominant customer, procurement personnel in ERDA field office will review the proposed I.R. & D. program and negotiate an agreement fixing the maximum dollars we will accept on ERDA contracts.

At the end of the year, the actual dollar expenditures will be audited and compared with the projects actually performed. Questions as to the benefit of any projects to ERDA programs are to be referred to the appropriate technical division at headquarters for decision.

There were relatively few of these contractors in the days of AEC (11 in 1973 and 1974) and the I.R. & D. dollars amounted to less than 2 percent of total costs of AEC's contracts with those contractors.

We do not anticipate any significant change in this pattern, although there may be more such contractors as we expand our efforts to include all potential energy sources.

Where ERDA contract work, while significant in dollars, represents only a small fraction of the total sales of a particular profit center, ERDA will conduct an after the fact review of those projects claimed by the contractor to be of benefit to ERDA programs.

We will accept for reimbursement an allocable share of those projects which we find to meet the benefit test. We are not yet able to size the number and dollar value of contracts that are likely to fall in this category.

While we do not expect it to include a large part of the ERDA budget, we know that many companies have plans to diversify to include energy related activity. We will watch closely as patterns develop and are prepared to adopt new policies if the situation so indicates.

Where ERDA contract work is small in amount and represents such a small fraction of the sales of the contractor's profit center that a review of projects for benefit to ERDA programs would not be cost effective, ERDA will accept a general allocation of the I.R. & D. costs up to a maximum of 5 percent of the total cost of the contract, but not in excess of $50,000. We expect this rule will find frequent application under ERDA, as it did in AEC.

The final category of contracting and one that is expected to account for a significant part of ERDA's budget covers contracts for design, construction, and operation of the demonstration and pilot plants and processes of varying sizes.

The objective of these efforts will be to test or demonstrate the commercial and environmental suitability of the technologies needed to exploit new energy sources.

We expect these contracts to be with a variety of contractors including small, high technology companies, consortia of commercial, nonprofit and governmental organizations and companies which previously have had few contracts with the Government.

Projects will vary in size and cost from a solar heating and cooling unit costing less than $500,000 installed on a commercial building to a plant to demonstrate a liquefaction process for converting high sulphur coal to clean boiler fuel estimated to cost $223 million.

We expect many of these to be cost-sharing contracts with each party to the contract helping defray the total cost of the work.

Large demonstration and pilot plant contracts usually are phased to allow a separation of types of effort. In the R. & D. and design phases, these projects will more nearly parallel traditional R. & D. contracts, and any I.R. & D. costs would be appropriately reimbursed.

We estimate that costs of these phases normally will run about 10 percent of the total project costs. In the construction and operating phases, which will represent about 90 percent of the costs, the projects normally will be organizationally and geographically separate from the sponsor's home office. To the extent this is the case, we would not expect to accept I.R. & D. and B. & P. costs from the sponsor's other operations.

The patent and data provisions of AEC's regulations provided for royalty-free patent licenses and data rights when AEC's participation in particular I.R. & D. projects reached specified levels. These provisions are not being continued by ERDA because they has not produced significant benefits to the Government and their continuation would be inconsistent with our objective of harmonizing our I.R. & D. regulations as much as possible with those of other major agencies that has no such requirements.

To summarize, these revisions were made to tailor ERDA policy to fit different situations. These changes followed review of ERDA's mission, AEC's experience and the policies underlying the AECPR, ASPR, and other Federal regulations.

It also followed consideration of the views expressed by the Comptroller General and the Commission on Government Procurement.

In adopting these policies, we recognized this action could result in somewhat higher contract costs. However, we felt this was necessary to stimulate industry toward greater participation in achieving ERDA's goals.

This concludes my statement. I am prepared to respond to any questions you may have.

[The prepared statement follows:]

PREPARED STATEMENT OF RAYMOND G. ROMATOWSKI

Mr. Chairman and members of the subcommittees, I thank you for the opportunity to present my views and those of the Energy Research and Development Administration on independent research and development and bid and proposal costs.

As you know, Mr. Chairman, ERDA has existed for only eight months. By way of background, I would like to begin with a brief description of the ERDA legislative base and organization.

The basic Acts governing ERDA's organization and policy are the Energy Reorganization Act of 1974 (P.L. 93-438) which created ERDA and led to its activation on January 19, 1975; the Federal Nonnuclear Energy Research and Development Act of 1974 (P.L. 93-577); the Solar Heating and Cooling Demonstration Act of 1974 (P.L. 93-409); the Solar Energy Research, Development,

and Demonstration Act of 1974 (P.L. 93–473); the Geothermal Energy Research, Development, and Demonstration Act of 1974 (P.L. 93–410); and the Atomic Energy Act of 1954, as amended (P.L. 83–703).

In the energy field, ERDA is an R&D agency, and our enabling legislation places great emphasis on demonstration of the commercial feasibility and practicality of a variety of energy-related processes and technologies. The stress is placed on using all available means to develop energy sources and technologies and to demonstrate readiness for widespread commercial use.

ERDA may be viewed as the catalyst which will enable a wide variety of individuals and organizations to develop ideas and hardware to the point of commercial application. We believe the intent of Congress, as expressed in the cited legislation, is clear. ERDA's mission is to provide the Nation with the energy technology options that must be available if we are to meet our energy requirements in the future.

This goal will be accomplished by developing, demonstrating and fostering the commercialization of all viable technologies for increasing and conserving our energy supplies. To discharge these obligations, we will be devising new approaches to harnessing the knowledge, capabilities, and other resources in both private and public sectors. These new means must include the use of innovative procurement techniques which will better enable us to carry out the broad policies and varied responsibilities established by our enabling legislation, and by the annual authorization and appropriation actions to follow. We are committed to the fullest possible utilization of small, innovative, high technology research and development organizations, and to working with a wide variety of industries under a number of differing arrangements.

ERDA ORGANIZATION

A word about our present organization

You will note, on the organization chart attached to my prepared statement, that each major mission (Fossil Energy; Nuclear Energy; Solar, Geothermal, and Advanced Energy Systems; National Security; Conservation; and Environment and Safety) is headed by an Assistant Administrator. These Assistant Administrators are appointed by the President, with the advice and consent of the Senate. ERDA is headed by an Administrator and Deputy Administrator, supported by the usual group of functional administrative organizations (Personnel, Procurement, Management Information, University and Manpower Development Programs, etc.) which I head as an Assistant Administrator; a General Counsel; a Controller; an Office of Congressional Relations; and an Assistant Administrator for Planning and Analysis. In addition we have other functions of an institutional nature such as the Assistant Administrator for Laboratory and Field Coordination and an Office of Industry and State and Local Government Relations. The field structure appears at the bottom of the chart and consists of Operations Offices and Energy Research Centers. This chart represents about 8,000 civil servants and an additional 90,000 ERDA contractor employees in over 50 Federal installations across the country. (The map attached to my statement indicates the location of these installations.) Through this administrative and laboratory structure, additional necessary talents are brought to bear under contracts, subcontracts, and grants with industry and universities.

COMPETITION

Competition will be essential to our operations. We have energy sources competing for attention and use, and we must also have competing concepts and technologies within each different energy source. We must have a wide variety of organizations participating in these competitions—universities, individual inventors, nonprofit research organizations, and profit-oriented commercial companies. In the last group is the small, high technology R&D company which is a potential source of invention and innovation, and the large company with the resources needed to exploit technologies as they evolve both within and outside that company. We will be supporting technologies and organizations as they combine to create and maintain competitive markets for the equipment and processes needed to make economical use and conservation of all energy sources.

When we talk of competition in the energy field, we are talking about something more than a number of companies who want to get in on the latest crisis market. Innovative ideas are needed. Professor Robert Gilpin wrote in his July 9, 1975, report to the Subcommittee on Economic Growth of the Joint Economic Committee that an innovative firm, if it is to convert new knowledge into a com-

petitive advantage, must have the in-house capacity to monitor and participate, if possible, in the advance of science and technology. This is, I think, a clear description of independent research and development effort.

POSITION ON I.R. & D. AND B. & P. COSTS

I would like to emphasize at this point that in neither size nor complexity does ERDA's involvement (present or anticipated) with these two controversial items of expense begin to approach that of DOD (or even NASA). The reasons for this will become apparant as I explain our policy and how it is applied in different kinds of contracting situations. The primary reason, however, can be simply stated. The energy industry is a broad and diverse complex of companies and institutions, and a segment of the economy that is largely in private hands. This contrasts sharply with the defense and aerospace industry which is more concentrated and largely dependent upon Government procurement.

Independent research and development and bid and proposal efforts are necessary functions for companies in many of our contracting situations. Where this is so, those companies with which we contract must cover the costs of these efforts by the revenues they receive from current sales. We believe the effective coupling of these technical and scientific activities with the needs of the market is essential both to the continued life of those companies and the continued existence of a competitive market in which new products are brought forth to meet new needs (or to satisfy old needs more effectively).

I would like now to outline the current ERDA policy and procedure with regard to IR&D and B&P costs, and include as background the policies followed until recently by ERDA and its predecessor agencies.

As you know, ERDA was created by combining portions of several existing agencies. The program we are implementing includes activities transferred with the agency components, as well as new program initiatives.

The bulk of the personnel, facilities and on-going programs transferred to ERDA consist of the non-regulatory aspects of the Atomic Energy Commission. Additional personnel, facilities and programs came from the Office of Coal Research and other elements of the Department of the Interior, and smaller complements came from the National Science Foundation and the Environmental Protection Agency.

Prior to their transfer to ERDA, the procurement actions of the program elements in Interior, NSF and EPA were subject to the Federal Procurement Regulations, and the FPR provisions on IR&D and B&P costs applied. Thus, there was no benefit test for IR&D activities and neither was there a specific limitation on reimbursement of B&P costs. The subcommittees are familiar with those provisions, and I will not dwell on them further.

The AEC followed a somewhat unique policy on IR&D and B&P costs; we have continued to follow some practices and have changed others. These are identified in the discussion which follows.

I believe the policies I am about to describe provide a good blend of approaches to the basic kinds of situations in which we contract. As we gain experience with these principles and with the rapidly expanding types of business arrangements and varieties of industries with which we deal, we may see need for further revisions.

For Government-owned, contractor-operated facilities. ERDA follows the AEC practice. The scope of these contracts does not include performance of IR&D nor bidding for other contracts, private or Government. Consequently, IR&D and B&P costs are not pertinent. As I have indicated, we have not changed this AEC policy, and we can foresee no developments that would indicate a change. It is likely that this type of contract, currently representing the major portion of ERDA contract expenditures, will continue to represent a third or more of our expenditures, even when the nonnuclear programs achieve full growth.

For other R&D contractors, where IR&D and B&P are necessary overhead functions, we have developed new policy coupled with specific controls.

For B&P, we will reimburse ERDA's allocable share of reasonable actual costs of preparing and presenting proposals up to a limit equal to the average actual B&P costs for the last three years. This contrasts with AEC policy which limited reimbursement of B&P costs to one percent of the contract direct labor and material costs. Thus, while continuing the AEC policy of placing a ceiling on such costs, we adjusted the limitation to meet the broader contractual situations which ERDA will face.

For IR&D, we assure ourselves that the company manages its program prudently, that the costs allocated to ERDA contracts are reasonable and of benefit to ERDA programs in one of the following ways depending on the type and level of ERDA contracting with a given contractor. The test of benefit to ERDA programs represents a broadening from the previous AEC rule of benefit to the contract work; again a recognition of the broader mission of ERDA.

If the contractor devotes most of its efforts in a given cost center to energy-related activities and ERDA is the dominent customer, procurement personnel in an ERDA field office will review the proposed IR&D program and negotiate an agreement fixing the maximum dollars we will accept on ERDA contracts. At the end of the year, the actual dollar expenditures will be audited and compared with the projects actually performed. Questions as to the benefit of any projects to ERDA programs are to be referred to the appropriate technical division at Headquarters for decision. There were relatively few of these contractors in the days of AEC (11 in 1973 and 1974) and the IR&D dollars amounted to less than two percent of total cost of AEC's contracts with those contractors. We do not anticipate any significant change in this pattern, although there may be more such contractors as we expand our efforts to include all potential energy sources.

Where ERDA contract work, while significant in dollars, represents only a small fraction of the total sales of a particular profit center, ERDA will conduct an after-the-fact review of those projects claimed by the contractor to be of benefit to ERDA programs. We will accept for reimbursement an allocable share of those projects which we find to meet the benefit test. We are not yet able to size the number and dollar value of contracts that are likely to fall in this category. While we do not expect it to include a large part of the ERDA budget, we know that many companies have plans to diversify to include energy-related activity. We will watch closely as patterns develop and are prepared to adopt new policies if the situation so indicates.

Where ERDA contract work is small in amount and represents such a small fraction of the sales of the contractor's profit center that a review of projects for benefit to ERDA programs would not be cost effective, ERDA will accept a general allocation of IR&D costs up to a maximum of five percent of the total cost of the contract, but not in excess of $50,000. We expect this rule will find frequent application under ERDA, as it did in AEC.

The final category of contracting and one that is expected to account for a significant part of ERDA's budget covers contracts for design, construction and operation of the demonstration and pilot plants and processes of varying sizes. The objective of these efforts will be to test or demonstrate the commerical and environmental suitability of the technologies needed to exploit new energy sources.

We expect these contracts to be with a variety of contractors including small, high technology companies, consortia of commercial, nonprofit and governmental organizations and companies which previously have had few contracts with the Government. Projects will vary in size and cost from a solar heating and cooling unit costing less than $500,000 installed on a commercial building to a plant to demonstrate a liquifaction process for convering high sulpher coal to clean boiler fuel estimated to cost $223 million. We expect many of these to be cost-sharing contracts, with each party to the contract helping defray the total cost.

Large demonstration and pilot plant contracts usually are phased to allow a separation of types of effort. In the R&D and design phases, these projects will more nearly parallel traditional R&D contracts, and any IR&D costs would be appropriately reimbursed. We estimate that costs for these phases normally will run about 10 percent of the total project costs. In the construction and operating phases, which will represent about 90 percent of the costs, the projects normally will be organizationally and geographically separate from the sponsors' home offices. To the extent this is the case, we would not expect to accept IR&D and B&P costs from the sponsors' other operations.

The patent and data provisions of AEC's regulations provided for royalty-free patent licenses and data rights when AEC's participation in particular IR&D projects reached specified levels. These provisions are not being continued by ERDA because they had not produced significant benefits to the Government and their continuation would be inconsistent with our objective of harmonizing our IR&D regulations with those of other major agencies that had no such requirements.

To summarize, these revisions were made to tailor ERDA policy to fit different situations. These changes followed review of ERDA's mission, AEC's experience and the policies underlying the AECPR, ASPR, and other Federal regulations. It also followed consideration of the views expressed by the Comptroller General and the Commission on Government Procurement.

In adopting these policies, we recognized this action could result in somewhat higher contract costs. However, we felt this was necessary to stimulate industry towards greater participation in achieving ERDA's goals.

This concludes my statement. I am prepared to respond to any questions you may have.

Senator CULVER. I understand you were present at the proceedings this morning?

Mr. ROMATOWSKI, I was there part of the time.

Senator CULVER. Were you there long enough to have gleaned sufficient knowledge from the proceedings that you might wish to comment as to any impressions you might have as a result of those hearings or anything you feel appropriate that you would like to comment on relating to those proceedings?

Mr. ROMATOWSKI. If you sit in DOD and look at the question of I.R. & D. and B. & P. costs, a good many considerations enter into the picture. In ERDA we have a different picture in terms of the size of our contractors' I.R. & D. programs. Being a relatively small agency in terms of the size of this effort, we tend to be very conservative in viewing this overall picture.

We are always very careful about paying only those costs which we can normally associate with our program. On the other hand as one watches the trend over the past several years in terms of the Commission on Government Procurement, the GAO reports and various other proceedings we are mindful of the general environment in which we have to operate. What we have tried to do in this modification is to select the blend of policies that we feel is, at the present time, most suited to our own operational responsibilities.

Mr. FINE. When Mr. Staats appeared before us last week he stated in very specific terms that he favors treatment of I.R. & D. and B. & P. as a line item in the normal budgetary and appropriations process.

Do you agree with him?

Mr. ROMATOWSKI. The way I would have to answer that question is a little bit along the lines of my immediately preceding statement. The Comptroller General looks at the entire I.R. & D. program of the Government and naturally can come to certain conclusions keeping in mind the large amount of dollars involved.

We have to look at the I.R. & D. program in our agency essentially in terms of a few millions of dollars, the administrative costs and the additional administrative burdens which would go along with a line item approach, and the fact that there would be a diminution of benefits. From our perspective, that does not seem to be an approach we could support.

With the line item approach, considering the vicissitudes of the process, it would be difficult to maintain the amount of I.R. & D. in terms of dollars over an extended number of budget years.

I suspect there probably would be some diminution. I also think it would be much more difficult for companies to plan a stable I.R. & D. program given that kind of annual process.

Mr. FINE. Under the existing law, there were specific periods when there were constraints. This did not seem to interfere with the trend of the I.R. & D. and B. & P. costs in the aggregate.

Why do you feel differently?

Mr. ROMATOWSKI. This is a subjective matter and it is difficult to determine except in actual practice. Because of the administrative complexity on both the private and the Government sides, it seems

to me that it would be more likely, because of the difficulty of the process, that we would see some diminution in the I.R. & D.

Mr. FINE. Then you do not agree with the Comptroller General?

Mr. ROMATOWSKI. I am viewing the picture through the eyes of a single agency and one which has a very small slice of the total I.R. & D. pie. It is not inconceivable that we could both be right.

Mr. FINE. For the record, would you undertake to discuss how you would go about adopting a line item approach for submission of your fiscal 1977 budget if this became a requirement and how you would administer such a line item so that industry would be treated equitably

Mr. ROMATOWSKI. We will try.

(Subsequent to the hearing the following information was received:)

It would be necessary to develop a total IR&D line item figure for ERDA by starting at the contractor level and rolling up the estimates to program level and then to a total ERDA figure. In keeping with the guidelines established by OMB and accepted by Congressional committees for a clearer programmatic presentation, it would be reasonable to keep the make up of the line item as flexible as possible and in consonance with the selected budget presentation plan. The financial plan system would then have to accommodate a tie-in of all IR&D costs with the totals for a particular program office.

A basic problem in getting such a system underway is a determination of an initial starting figure. Such a figure must necessarily include those advance agreements already executed—the balance could be estimates based on prior years' experience. A percentage, e.g., 10% of prior years' expended dollars on all R&D may suffice as an initial projection. Regardless of the total line item budget eventually approved, the budget would set a limit of expenditures on every project within a program office. Unfortunately, there would be little, if any, room for flexibility, and no known method of assuring that industry would be treated equitably.

We are aware that Senators Proxmire and McIntyre, on September 30, 1975, asked the Comptroller General to furnish specific details on implementation of the line item concept and encouraged him to work closely with Federal agencies and industry so as to ensure that all interests were taken into account. We are prepared to give the Comptroller General such assistance as he may request.

Mr. FINE. If the provisions of section 203, Public Law 91-441, which cover the DOD I.R. & D. programs, were made Government-wide, do you believe that ERDA could accommodate to the same rules and regulations as DOD and NASA?

Mr. ROMATOWSKI. I doubt whether ERDA would be able to adapt wholly to the same kind of rules and procedures that might govern DOD and NASA.

The Government-owned, contractor-operated (GOCO) facilities are a major part of the ERDA mission, the backbone of our technical capability. I believe these would always have to be an exception to any general policy. As far as the rest of our operation is concerned, I suspect there are considerable portions of our program both now and downstream that could be adapted in that direction.

Mr. FINE. For the record, would you address each of the sections, the provisions that are included in the section of law, and indicate specifically how that might affect ERDA's operations?

Mr. ROMATOWSKI. Yes.

[The information follows:]

ANALYSIS OF HOW SECTION 203, PUBLIC LAW 91-441, MIGHT AFFECT ERDA'S OPERATIONS

Sec. 203(a) prohibits use of funds appropriated to the Department of Defense to pay for IR&D or B&P costs unless the Secretary of Defense is of the opinion that such work has a potential relationship to a military function or operation and

unless, under appropriate circumstances, advance agreements establishing dollar ceilings are negotiated. The IR&D portion of such agreements must be based on evaluated plans submitted by companies and payments must be made pursuant to the terms of those agreements assuming the test was changed to one of potential relationship to the energy program, we could comply. Current ERDA policy includes this feature, except that advance agreements are negotiated when ERDA has the predominant share of the Government; we do not use the $2 million threshold established by Public Law 91-441.

Sec. 203(b) provides for the situation where negotiations required by Sec. 203(a) do not result in agreement. Compliance with these provisions would pose no problems for ERDA.

Sec. 203(c) requires an annual report to the Congress. This requirement presents no major problem.

Sec. 203(d) limits the application of Sec. 203 to contracts for which submission and certification of cost or pricing data are required. This presents no problems to ERDA.

Sec. 203(e) repeats Sec. 403 of Public Law 91-121 and has no effect on ERDA.

Mr. FINE. Why did you revise the old AEC policies and procedures for I.R. & D. and B. & P. for those contractors subject to these functions?

Mr. ROMATOWSKI. The revisions were of two kinds. Let me first address the programs that came from the Department of Interior subject to the FDR's. There we felt we needed to have additional controls along the lines of thsoe that we had inherited from the AEC.

So we pulled back from the FDR's and introduced the relevancy test. That is a pullback toward the AEC line. In the nuclear area, we found that we were running into considerable difficulty with B. & P. costs as the process became much more complicated in terms of the numbers of competitive proposals. During the last 1 or 2 years of AEC, there was considerable discussion of some easing of the 1-percent rule which was an arbitrary and experimental approach when first adopted in 1961.

As far as I.R. & D. is concerned—I.R. & D. with the nuclear and some of the new technologies—because the whole idea of our organization is the commercialization of technology, we were striving for a situation where we would encourage and motivate high-technology experimental I.R. & D activity which would flow naturally from the contractors doing work in their own plants.

So we modified the AEC requirements slightly. We modified the guidelines which came to us with some of the organizations from Interior and the Science Foundation, and tried to bring together a blend which seems to be more meaningful and logical for our present situation.

Mr. FINE. Is there available an estimate for the current calendar year which would correspond to the Defense Department estimate of their I.R. & D. and B. & P. costs?

Mr. ROMATOWSKI. I can make an estimate for you now and correct if for the record if I am off more than a few percent. In fiscal 1974, for the contractors with whom we had written agreements, the contract costs amounted to approximately $90 million; I.R. & D. payments were $1.6 million.

We would expect that because of the increase in our budget contract costs will amount to about $125 million for calendar 1975.

If you add to those the contractors with whom we do not write agreements, the 1975 total may be close to $200 million of contracts where I.R. & D. costs will be paid. The I.R. & D. costs for those contracts probably will run around $5 million.

Mr. FINE. And the 1975 estimate would represent ERDA in its new organizational structure as distinguished from the prior AEC organization?

Mr. ROMATOWSKI. That is correct. The $200 million represents approximately 10 percent of our R. & D. activity. Contracts with universities and for pilot and demonstration activities would account for the other 90 percent.

Mr. FINE. Does that include a combination of I.R. & D. and B. & P.?

Mr. ROMATOWSKI. No. B. & P. costs are estimated to add another $500,000.

Mr. FINE. You are familiar with the detail of the only report that Department of Defense provides the Congress which is printed in the Congressional Record.

Mr. ROMATOWSKI. Slightly.

Mr. FINE. In addressing and amplifying your remarks and being more specific in the amounts for the record, would you undertake to provide the details somewhat in the same manner as it appears in the Defense report?

Mr. ROMATOWSKI. Yes.

(Subsequent to the hearing the following information was received:)

2. An estimate of ERDA's 1975 reimbursements of IR&D and B&P in a format similar to that used by Defense.

The following are the amounts of IR&D and B&P costs we have estimated that ERDA will reimburse in Calendar year 1975:

SUMMARY OF INDEPENDENT RESEARCH AND DEVELOPMENT AND BID AND PROPOSAL COSTS INCURRED AND SALES ACHIEVED BY ERDA CONTRACTORS IN CALENDAR YEAR 1975 (ESTIMATED)

[In millions]

	Costs incurred	Amount accepted by Government	ERDA share
Independent research and development (I.R. & D.)	$77.0	$28.2	$3.4
Bid and proposal (B. & P.)	15.7	7.3	.6
Total I.R. & D. and B. & P.	92.7	35.5	4.0

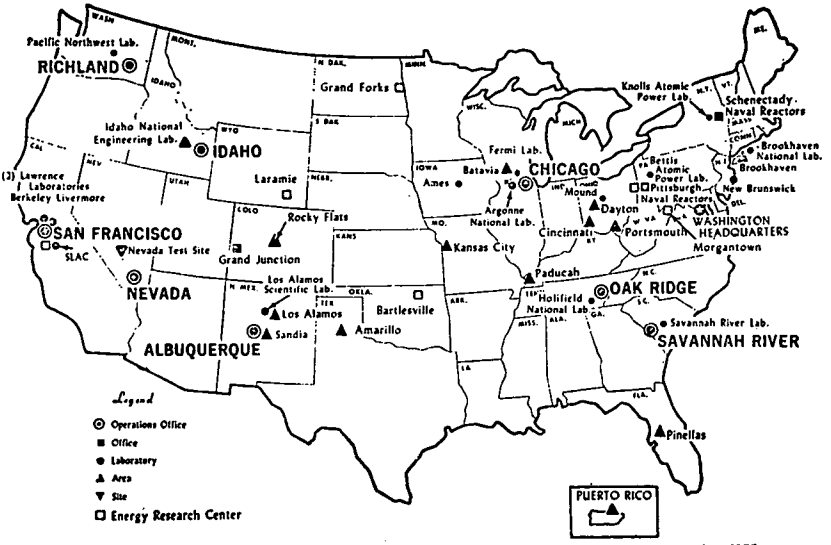
Note: Sales total: Government and commercial, $2,453.4. Total ERDA, $220.3.

SUMMARY OF INDEPENDENT RESEARCH AND DEVELOPMENT AND BID AND PROPOSAL COSTS INCURRED BY ERDA CONTRACTORS IN CALENDAR YEAR 1975 (ESTIMATED)

[In millions]

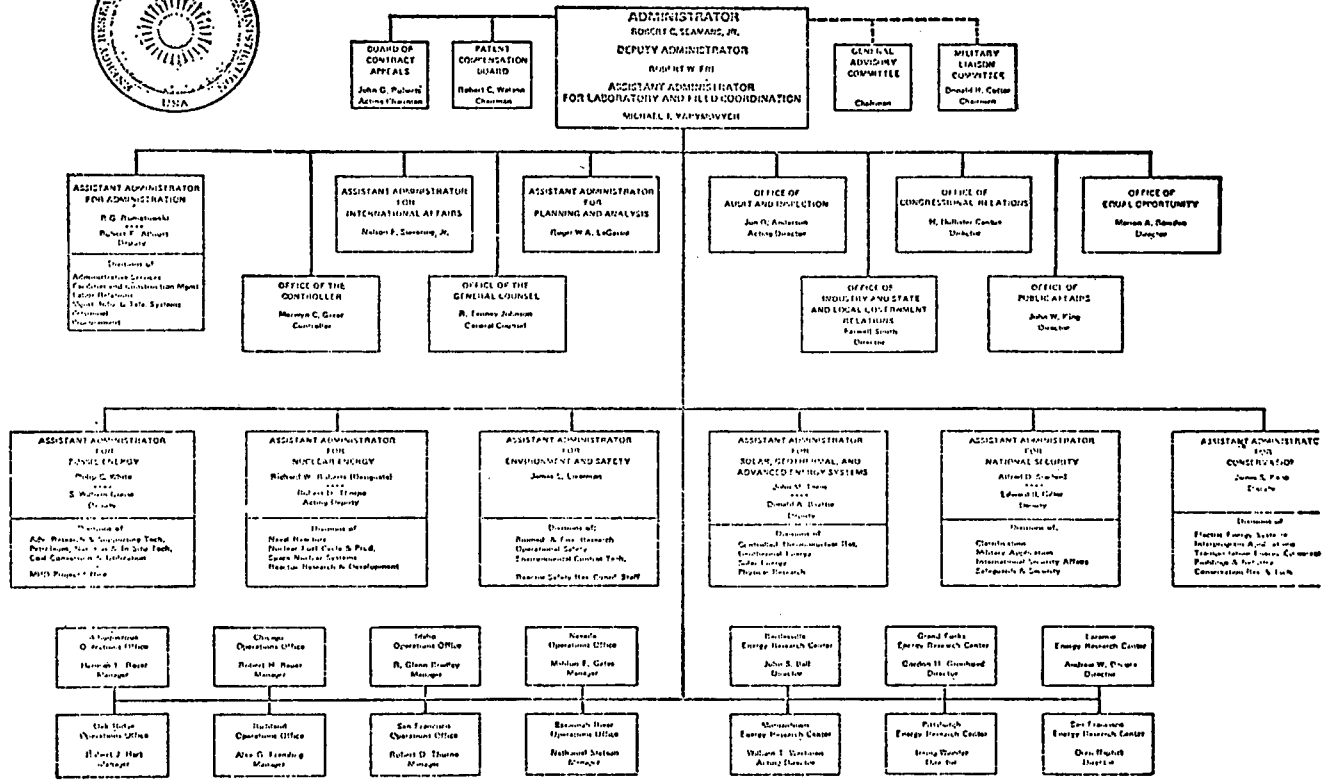
	Costs incurred	Amount accepted by Government	ERDA share	Number of contractor divisions
With advance agreements:				
I.R. & D	$77.0	$28.2	$3.4	18
B. & P	11.9	6.6	.4	21
Total I.R. & D. and B. & P. costs	88.9	34.8	3.8	
Without advance agreements:				
I.R. & D				
B. & P	3.8	.7	.2	4
Total I.R. & D. and B. & P. costs	3.8	.7	.2	

ERDA OFFICES



June 1975

ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION



ADMINISTRATOR

Mr. FINE. You state that for B. & P., while continuing the AEC policy of placing a ceiling on such costs, you adjusted the limitation to meet the broader contractual situations which ERDA will face. Will you explain what that means and why the change? Why don't you adopt the DOD procedure?

Mr. ROMATOWSKI. I hate to use the word "liberalization" but let me use it. The 1-percent rule which we had on B. & P. costs (a limit based on direct materials and labor costs) was a very rigid and stringent kind of guideline. The new procedure which we are following, essentially the averaging of actual B. & P. costs for the last 3 years for the particular contractor, seems to provide the necessary discretion in our procedure for any contractor to be motivated to bid for an ERDA contract.

If over time we find that our existing B. & P. policy works too much in one direction or another, we will certainly revise it. At the present time, we see no reason to move as far as the DOD or NASA policies.

Mr. FINE. For I.R. & D., you state that if the contractor devotes most of his efforts in a given cost center to energy-related activities and ERDA is the dominant customer, ERDA will review the proposed I.R. & D. program and negotiate an agreement fixing the maximum dollars you will accept on ERDA contracts and what criteria do you use to establish the maximum dollars?

Mr. ROMATOWSKI. Well, the maximum dollars will come from review of the proposed program, in terms of the relevancy of those activities to ERDA's energy R. & D. programs, and an evaluation of estimated costs of that program. Wherever we have some question about the relevance of a contractor's proposed I.R. & D. program, we will discuss it with technical personnel qualified in those particular fields and make a determination of whether or not they are relevant.

We expect a number of proposed activities will be disallowed as being not relevant, but we will not approach it with some predetermined ceiling in mind.

Mr. FINE. What criteria for maximum dollar allowance do you use where ERDA contract work represents only a small fraction of the total sales of a particular profit center?

Mr. ROMATOWSKI. There we do a postaudit of the contractors' I.R. & D. effort. But essentially, we use the same approach in examining each of the projects that the contractor suggests or asserts is relevant to the ERDA program.

Mr. FINE. You mention that in some cases ERDA contract work is small in amount and represents such a small fraction of the sales of the contractor's profit center that a review of projects for benefit to ERDA would not be cost effective. In those cases you will accept a general allocation of I.R. & D. costs up to a maximum of 5 percent of the total cost of a contract but not in excess of $50,000. What basis is there for the $50,000 ceiling, and how did this work out under AEC?

Mr. ROMATOWSKI. If I can take the question a little bit in reverse, under the AEC we had a great many contracts which fell into this de minimus category. We determined as an agency policy that for contracts in that range, where it was really difficult to segregate out all the factors we needed to consider, it was more cost effective to the Government to approach it in this way.

Mr. FINE. You state that for large demonstration and pilot plant contracts, I.R. & D. costs in the R. & D. and design phases would be appropriately reimbursed. Would this be done as part of the directed contract effort or as an allowable allocation of overhead?

Mr. ROMATOWSKI. It will be an allowable allocation in overhead. It will be approached on the same basis as we approach the I.R. & D. costs in any contract. We estimate that preliminary and final design activities normally would constitute about 10 percent of the total cost of the project.

The contractor will be using his own conceptual designs for diagrams, site selection, environmental impact statements and he also will employ subcontractors for some of the work. As a result the treatment of I.R. & D. will be the same as it would be for a regular R. & D. contract.

Mr. FINE. In that context the benefit to ERDA would be a criteria in your consideration?

Mr. ROMATOWSKI. Yes, sir, absolutely.

Mr. FINE. You state that in the construction and operating phases of these plants, the projects will be organizationally and geographically separate from the sponsor's home office, and you would not expect to accept I.R. & D. and B. & P. costs from the sponsor's other operations.

Why would a pro rata share of such costs, if they represented a contractor's general I.R. & D. effort, not be an appropriate charge to your program?

Mr. ROMATOWSKI. We are talking here essentially about a subcontractor who would probably be the constructor for such a demonstration plant, and here clearly it would be inappropriate. We are also talking probably about another subcontractor who would be the operator of such a plant, and there we are very close to the AEC practice in terms of Government-owned facilities.

In both these cases it seems to us that there is very little rationale for contractors to incur or for us to pay I.R. & D. costs. As far as the prime contractor is concerned, there will be some I.R. & D. costs reimbursed during those phases.

Mr. FINE. You say that ERDA is not continuing AEC's practices concerning obtaining royalty free patent licenses and data rights when AEC participation in particular I.R. & D. projects reached specified levels.

The reason you give is that AEC practices did not produce significant benefits to the Government and that continuation would be inconsistent with your objective of harmonizing your I.R. & D. regulations with other major agencies that had no such requirement.

What basis do you have for saying that AEC has not realized significant benefit?

Mr. ROMATOWSKI. There were a number of considerations that went into this modification. The specific answer to your question is one of transactional density. We found very few cases where we exceeded the 20-percent threshold which is necessary for a nonexclusive royalty fee license.

Second, we found very few projects that had patentable ideas associated with them. Third, we had some problems in terms of the life of many of the I.R. & D. projects.

They were multiyear with the ratio of AEC participation fluctuating from year to year. In some cases, contractors would exclude from I.R. & D. those projects that had a high potential for patentability in terms of ideas or processes.

We also have underway at the present time a comprehensive patent study in our agency which covers all aspects of our R. & D. activity. This will be completed in June or July of next year.

There are several other items or ideas that had something to do with this change. In the nonnuclear area, we are talking about a technology base essentially sponsored and brought into being by private sector expenditures, particularly in fossil and electrical generation distribution. It seemed to us that a different policy was required than that which held forth in AEC.

Finally, as an escape clause under our existing policy if a patentable item does arise in I.R. & D. and we need, for some reason, royalty free use of that in a later activity, we can under the AEC Act make that happen in the negotiation process.

Mr. FINE. Do you believe that the measure of significant benefits as related to AEC might be a different value if one were to look at the DOD program or NASA?

Mr. ROMATOWSKI. It may be.

Mr. FINE. Why wouldn't it be in the Government and taxpayer's interest to continue AEC's practices and perhaps bring other Government agencies under the same rules?

Mr. ROMATOWSKI. I am not sure I am capable of answering that question the way it is asked. I believe both the DOD and NASA will have to examine their own situations in terms of access to patents and rights to data and make a conclusion as to whether the benefits of that outweigh some of the disadvantages in terms of the disincentives to the contractor.

Mr. FINE. In concluding, you state that the policies you have adopted could result in somewhat higher contract costs, but you feel it necessary to stimulate industry toward greater participation in achieving ERDA's goals.

Why is such stimulation necessary?

Mr. ROMATOWSKI. I believe the continuing theme in our enabling legislation is the demonstration and commercialization of energy technologies. Therefore, in approaching our contractual arrangements with the private sector, the idea of having relationship that encourages, motivates, and induces the private sector to adopt the demonstrated technologies for commercial use is paramount.

We are a R. & D. agency whose product has to find its place in the private sector of our economy.

Mr. FINE. Why isn't the use of more direct contracting adequate as a stimulant for industry?

Mr. ROMATOWSKI. That assumes a Government intelligence equal to that which goes into the composition and substance of all I.R. & D. programs in the private sector. I don't think we are that smart. I think that probably the minimal nature of our program makes it clear that for all of those efforts we think are directly related to our responsibilities, particularly in the nuclear area, we have in fact approached it basically from the standpoint of direct R. & D. funding.

As we move into the nonnuclear areas where the technology is different and where we want innovative ideas to spring from the private sector, I don't see why we should minimize that kind of innovation by deliberately inserting what could very well turn out to be a directed R. & D. activity, project by project.

Mr. FINE. In the nuclear area is your contracting done on a sole source basis or does it have any competition?

Mr. ROMATOWSKI. I will have to supply it for the record. While a number of operating contractors have been in place for some time, thereby reducing the potential for competition at the prime contract level, there is significant technological competition and furthermore, the subcontract activity is highly competitive.

I will supply for the record a figure of our nuclear expenditure.

[The information follows:]

COMPETITION IN THE NUCLEAR AREA

Contract statistics do not identify the energy source, so we are not able to identify the extent of competition in the nuclear area. However, assuming that AEC contracting was restricted to the nuclear area, the figures for the first half of fiscal year 1975 show the following breakdown into three categories: formally advertised, negotiated—competitive and negotiated—other.

SUMMARY OF PROCUREMENT ACTIVITY (AEC), PRIME CONTRACTS, JULY 1 TO DEC. 31, 1974

[Dollar amount in millions]

	Amount	Percent to total
Advertised	$15.5	0.6
Negotiated:		
Competitive	159.6	6.4
Other	2,331.9	93.0
Total	2,507.0	

A fuller picture of the extent of competition in the nuclear area is gained from the subcontract statistics which depict the procurement activity of the GOCO contractors which operate in Government-owned plants and laboratories. GOCO contractors historically have purchased many of the products and services of the type that show in the prime contract statistics of the agency which operates its own facilities. The figures for the first half of fiscal year 1975 show the following:

SUMMARY OF PROCUREMENT ACTIVITY (AEC), SUBCONTRACTS, JULY 1 TO DEC. 31, 1974

[Dollar amount in millions]

	Amount	Percent to total
Advertised	$4.1	0.9
Negotiated:		
Competitive	193.4	41.3
Other	270.8	57.8
Total	468.3	

Mr. FINE. In both your nuclear and nonnuclear efforts. Does the use of unsolicited proposals represent a significant basis for contracting?

Mr. ROMATOWSKI. In many areas unsolicited proposals do represent a substantial share of our work. In some of the new nonnuclear work, a good many unsolicited proposals have hit our agency. Some of that

is the pent up kind of techno'ogical activity in the private sector waiting for a Government sponsorship of energy-related R. & D.

On the other hand, the theme in our nonnuclear activity is competition. In addition to the regular RFP's and normal solicitations, we have program opportunity notices which are designed specifically to draw out innovative ideas from the private sector.

Mr. FINE. You would say that the device of contracting based on unsolicited proposals would provide a means whereby you would not be directing technology but rather responding to innovative ideas from your various contractors so this would make it somewhat more akin to I.R. & D. and you could achieve a stimulation through that device?

Mr. ROMATOWSKI. It 's not an analagous situation. In evaluating a proposal, the Government chooses to either support or not support a particular techno ogy effort. In the case of I.R. & D., except for the test of relevance to our entire program, that control is, by definition absent.

The thrust of the activity is quite different.

Senator MCINTYRE. A number of questions will be submitted to you on behalf of Senator Proxmire. What is your budget for research and development in the current year?

Mr. ROMATOWSKI. ERDA's R. & D. budget for fiscal year 1976 amounts to $2.5 billion. I will submit the details for the record.

[The information follows:]

ERDA R. & D. BUDGET, FISCAL 1976

[In millions]

	Basic research	Applied research	Development	Total
Industrial firms	$2.2	$68.2	$631.1	$701.5
Educational and nonprofit institutions	69.4	70.7	44.8	184.9
Operating contractors	217.3	236.7	950.8	1,404.8
Other	3.0	45.7	42.7	91.4
Total	291.9	421.3	1,669.4	2,382.6

Senator MCINTYRE. Do you have a specific office that Congressmen and Senators can refer as we travel? There is always somebody coming up with a new idea. I have a fellow following me in New Hampshire that can run an automobile with water. Do you have a specific office where you appra se these various ideas?

Mr. ROMATOWSKI. We have set up a very specific process which nvolves the National Bureau of Standards to help us evaluate the echnical and economic consequences of these proposals.

We have two control points for submission of unsolicited ideas and proposals. Individuals and organizations other than educational institutions should send proposals to ERDA's Division of Procurement. Educational Institutions should send research proposals to ERDA's Division of University and Manpower Development Programs. Both organizations are in Washington, D.C. and the zip code is 20545.

Senator MCINTYRE. Will you leave that with me?

Mr. ROMATOWSKI. Yes, sir.

Mr. FINE. Off the record.

[Discussion off the record.]

Senator McINTYRE. I thank you for your testimony. It is a very difficult problem to understand and to understand whether the secrecy that goes with it is bad.

I am convinced that we get the most dollars on R. & D. on independent R. & D. You are starting out with a $2 billion budget?

Mr. ROMATOWSKI. $2.5 billion.

Senator McINTYRE. Research takes you down a lot of blind alleys but you have to explore. I am a strong critic of the military but I am a great admirer of the military, too. I believe in a strong defense.

I am not not so sure, as rough as it may seem to Senator Proxmire and some of his associates, we lead the world. If we did not have an open society, I have often wondered in my mind what the world would be like.

Thank you.

Mr. ROMATOWSKI. Thank you, Mr. Chairman.

Senator McINTYRE. Our next witness will be Dr. Kenneth Oshman, president of the Rolm Corp. of Cupertino, Calif., on behalf of WEMA.

Dr. Oshman, your statement will appear in the record in its entirety. You have with you Mr. Tisdale and Mr. Hilly.

Dr. OSHMAN. Thank you, Mr. Chairman.

[The prepared statement referred to follows:]

PREPARED STATEMENT OF DR. KENNETH OSHMAN

Mr. Chairman and members of the committee, my name is Ken Oshman, and I am president of Rolm Corporation which is located in Cupertino, California. Our sales approximated $10 million last year and we employ 300 persons in California. My company manufactures general purpose digital computers for severe environmental applications which we sell to commercial and government customers.

I also serve on the Board of Directors of WEMA, and it is in behalf of its members that I am appearing today. WEMA is a trade organization consisting of 730 companies engaged in electronics and information technology located primarily in the Western United States.

Although WEMA members range from electronic divisions of large companies to small pioneering firms, the bulk of our membership is best defined as small-to-medium sized companies servicing both government and commercial markets. Many of the companies in this group are subcontractors supplying sophisticated components or equipment of their own design for incorporation into larger systems produced by its customers, many of whom are government prime contractors. I reemphasize the phrase "of their own design" because that is what IR&D is all about.

I am accompanied today by Chuck Hilly, assistant vice president for finance and administration at Stanford Research Institute and a member of WEMA's Government Affairs Committee, and Eben Tisdale, a WEMA staff vice president.

As we understand it, the purpose of these hearings is to review the functioning of existing legislation affecting independent research and development, to look at the future technical needs of DOD, and to consider whether or not new legislation or amendments in this area are needed. My testimony is structured along these lines, and I have included a few comments about the broader topic of the technical needs of the nation. In this context, we will review what IR&D means to the smaller and medium companies which make up the bulk of the WEMA membership. Perhaps with several examples, we can point toward the benefits that the government gains from the IR&D activities of these companies.

We will also discuss problems we see resulting from the current system of regulation and present our recommendations for improvement. Let me add at this point that we feel current legislation and regulations have generally achieved their initial objectives of providing the government with a managed and controlled program of IR&D.

I will refer primarily to IR&D and not to B&P in my testimony. In the component and instrument business, where elaborate proposals are not usually required, IR&D is the critical issue, although the law and current regulations tie

these two together so that it is impossible to address one without some mention of the other. As a practical matter to any business, the ability to perform new product development and the means to market the results go hand-in-hand. Our emphasis on IR&D is not intended to emphasize IR&D over B&P. I am confident that other industry witnesses who will be appearing before you—especially the Tri-Association representatives—will express the views in which we share that B&P expenses are not only equally essential to maintain a broad competitive base, but also contribute substantially to government planning.

In view of the considerable amount of testimony which is already a part of the record as a result of earlier Congressional hearings on independent research and development certifying as to the merits of contractor initiated IR&D, and in light of the fact that other industry witnesses will be testifying extensively to this issue later in these hearings, we will be brief in this area but no less emphatic. The several authoritative reports on this subject (the recommendations of the Commission on Government Procurement Policy; the DOD Working Group; the Tri-Association Report; the Report of the Defense Science Board; and the recent GAO Report) all present the unanimous finding that IR&D is a major contributor to the nation's technological base and stimulates competition.

As to the policy for the administration of IR&D, WEMA, as a member of the Council of Defense and Space Industry Associations, participated in CODSIA's submission to the GAO on this issue. We are in agreement with the following principles expressed by CODSIA in its letter to Mr. Gutmann of he GAO on December 9, 1974.

1. The Congress and all Government agencie should understand and fully recognize in their actions the vital nature of IR&D in support of our national interests.
2. The right of industry to exercise management discretion on the content, and the amount of IR&D should not be abridged by arbitrary laws and regulations.
3. The Government should be motivated to encourage industry to increase IR&D effort.
4. All Government departments and agencies should employ a common policy and practice of allowability of IR&D costs (independent of the agencies' parochial interests), which recognize their true nature as essential business costs.
5. The Congress should recognize that IR&D costs are not commodities to be purchased—or not purchased—but rather are normal costs of doing business.

Within this framework of general endorsement, there are several aspects of the IR&D issue that are of particular relevance to WEMA member companies, and we would like to use this opportunity to bring them to your attention.

In order to give you a better understanding of the reasons underlying our particular concerns, we would like to comment on the nature of WEMA's membership and the role of IR&D in these companies.

I.R. & D. in the electronics industry

As indicated in my introduction, a major effort of most WEMA companies is the development and production of electronic components, instruments, and equipment of advanced design and character. Many of these companies sell their products to a combination of markets including the government. Often, government sales are in the form of subcontracts with well-known companies building major weapon systems for our country's defense.

Beneath the huge and gleaming exterior of the finished product, be it a plane, ship, missile, or submarine, lie thousands of electronic components and systems, sometimes called black boxes, that control the weapon and its subsystems. These black boxes come from WEMA companies and the several thousand electronics companies across the country. In terms of overall system performance and function, these electronic systems and subsystems may be as essential as the wings or the engines.

Each black box has a function (sensing or receiving information, amplifying signals, processing data, sorting data, transmitting data, controlling mechanisms and so on). Each black box has its own technology.

By technology, I mean the engineering designs of current state-of-the-art hardware. I also mean the experimental designs and prototypes that are in the pipeline for tomorrow's needs, and the concepts and ideas that are in the scientific pool which feeds the technological pipeline.

Each company—or division of a larger company—involved in the manufacture of these devices is a specialist. Its people know the state-of-the-art for both the performance required of its kind of black box, and the technology needed to accomplish this output.

Our industry devotes considerable effort to the formulation of new concepts or theories. This is followed by company-sponsored research and development projects to demonstrate the feasibility of an idea, and to build a working prototype. As a matter of fact, in the components industry it is common to find the innovative companies developing new or improved items with highly desirable characteristics well in advance of stated requirements. This permits the design engineer to procure for the Government systems with improved performance based on the known availability of improved components.

It is worth reemphasizing that the objective of company-sponsored R&D or IR&D programs is to develop new concepts and improved products that will provide better service to the company's *customers*. The benefit to the customer is in the improved products; the benefit to the company—if the R&D program is successful—is in improved profits in the long term. Many studies have shown a high corelation between a company's investment in R&D and its growth in sales and long term profits. In the electronics industry, IBM and Hewlett-Packard are two notable examples of companies which have benefitted from a vigorous R&D program. Perhaps less well known are the benefits to a company's *customers* that result from a company's R&D program. The development of scientific electronic calculators by Hewlett-Packard, for example, resulted in a product that provided greatly improved usefulness to customers (who had been using electro-mechanical desk calculators) at one half the cost.

The same benefits result from independent R&D (IR&D) programs conducted by Government contractors. Those companies with strong IR&D programs tend to have good performance in sales and profits, and the Government agencies who are their customers benefit from improved products to a far greater degree than would be expected from the R&D program costs. One of our member companies developed an airborne direction finding system on its IR&D programs in 1971, 1972, and 1973 at a program cost of less than $300 thousand. These developments have led to awards to the company in 1974 and 1975 amounting to more than $10 million. Clearly, the company benefits from successful IR&D; but in this case, the Government obtained a greatly improved product which it considered uniquely filled its requirements. In particular, the application of this system to helicopters was the first time precision direction finding could be accomplished from a helicopter, which is the vehicle most commonly used in search missions.

Let me use the history of my own company as another example. Several other engineers and I felt there should be a market for small general-purpose computers which operated in the severe environments of planes, ships, and trucks and which were available as standard products with short delivery times and catalog prices. In 1969, when we began business, there were not such products available. The Department of Defense had developed a very large number of excellent rugged computers for specific weapon systems. Generally, these computers were either special purpose in nature, unavilable in any reasonable time frame, or obsolete because continuing product improvement had not been continued once the specific weapon system had been developed. All were quite expensive when compared to small computers in the commercial marketplace, even allowing for the cost of designing and building rugged computers.

So, we started a business to design, build, and market rugged computers.

We started with $75 thousand in June of 1969. That money, entirely contributed by the founders of the company, was all we had. We did not have any Government contracts to develop the product, and we did not have any orders for computers once they were designed. In March, 1970, we shipped our first computer. That computer had a sales price of less than $20 thousand and compared favorably in its performance with competition at more than $50 thousand. What we had been able to do was to respond quickly to the rapidly changing technology of the electronics industry. Undoubtly, we could never have responded with a new product in nine months if we had been burdened with complications of a Government contract.

In the five years since we shipped our first computer, we have continued to develop new and better computers. We have now announced our fourth generation computer. Our previous computer was approximately three times more capable than our first computer and sells for $7 thousand. We have shipped over 1,500 computers to date. They are used in a wide variety of military applications

including navigation, communications, fire control, reconnaisance, and electronic warfare. Many are also used in commercial applications such as factory automation, geophysical exploration, and process control.

I think our example illustrates two important points. First, IR&D supported by the Government produces effective results at a fraction of the cost of DOD supported R&D contracts. It is difficult to know exactly that the Government was paying for R&D contracts to develop computers at the time we began business, but I am sure it was much more than the money we had to spend. My guess is that the average contract at that time may have run about $1 million. At a very early stage, we were forced by the economics of the situation to learn what the managers of every WEMA company knew—it is extremely important to control and manage a successful and low-cost IR&D program.

Second, this example also shows that there can be substantial and continuing cost and performance benefits from IR&D. Through continuing IR&D, we have been able to dramatically improve the performance of our products while greatly reducing the cost. This has been a hallmark of the electronics industry over the last thirty years and still continues even in these days of substantial overall economic inflation.

It is also worth noting that, because IR&D programs profoundly affect the ability of a company to serve its customers and therefore to gain new business, these programs tend to be "highly leveraged"; that is, they are assigned top quality technical talent and achieve management visibility. As such, they tend to be highly productive, which means the Government gets an unusually good bargain in the money invested in IR&D.

Economics of a mixed company

As indicated earlier, most WEMA companies have mixed businesses—commercial customers as well as the Government. Products for both markets are either common or manufactured in the same facilities, thus gaining the cost advantages of the combined volume. These manufacturing operations are supported by such indirect functions as engineering, personnel, marketing, finance, etc.

As with all other indirect expenses, IR&D costs are budgeted at the level considered optimum by management to fill the company's needs in their functional area—new products. These and other indirect costs are collected in ovrehead pools and then distributed over the product lines benefitting from these functions. Excluding efforts which are identifiable to specific products, good accounting practice calls for the allocation of indirect costs evenly over all products. Obviously, it is necessary that the company recover its expenditures in support of technology through the sales to its customers, just as in the case of its other indirect expenses.

In terms of the WEMA membership and similar standard product-oriented companies, we would take issue with those who claim that company-managed R&D leads to widespread and random explorations and excess customer costs. New products are their life blood and effective R&D is essential to survival.

Many of these companies are highly creative and are in the forefront of world technology. Time after time the Government has found that their commercial products fill its needs. This is often followed by requests for specials, just slightly different, but suddenly falling under the sole-source negotiated contract rules. These can bring a whole new level of surveillance and IR&D controls.

WEMA believes that Government interests require the absolute minimum of control over these types of companies, otherwise their innovations will be lost through over-control.

This brings me to the heart of the recommendations which follow. WEMA believes the time has come for a more enlightened and discriminating approach to regulation. By this, we mean the use of objective techniques and thresholds to focus controls on problem areas, simultaneously relieving other segments of the burden of deadening, costly and unproductive regulations.

Our observations indicate the country is ready for this. The Administration is capitalizing on the public dislike of "Big Government" by starting reviews of independent regulatory agencies. We urge that Congress respond to this need and improve control techniques included in many items of legislation such as that under consideration today.

I.R. & D. problems and recommendations

We would like to feel that this Committee's examination of authoritative reports filed by so many contributors on this subject would lead it to adopt the conclusions that IR&D is essential to company and technological growth, and hence

is just another one of the many expenses which aggregate into a company's indirect expense pool. Additionally, we hope there would be recognition that these expense pools are currently under constant surveillance by cost auditors, and by the pressures of the marketplace, and new legislation or extensive administration of this non-dominant expense is not necessary. However, if the Committee cannot find the way clear to such a conclusion, we offer the following comments based on our experience with the current legislation to assist Congress in the design of a system which prevents significant abuses, but at the same time neither stifles technical progress not discourages competent commercially-oriented companies from doing business with the Government.

We are not proposing a whole new scheme. The present system contains many of the features needed to achieve this desired objective. However, we see four legislative problem areas which need correction by Congressional action.

1. The Act requires the negotiation of Advance Agreements with all companies which receive more than $2 million of IR&D and B&P from DOD through negotiated contracts without regard for the nature of a company's operations. WEMA believes that the negotiation of Advance Agreements with companies whose business is predominantly commercial or fixed price exacts heavy administrative effort and generates negligible benefits.

We recommend that the legislation be revised to permit the application of the DOD Contractor Weighted Average Share of Risk (CWAS) system to all IR&D and B&P.

I won't take the time to describe the CWAS system in detail, but will give a brief outline. It is an objective method of determining the degree of contractor risk vs. DOD risk through an analysis of the contract types of an individual contractor. Commercial and fixed price competitive government business have heavy weights (100%) while cost plus fixed fee contracts have low weights (0%). Incentive and other types of contracts fall in between. The logic, of course, is that in fixed price business the contractor has all the risk, while it is vice-versa for cost-type contracts. A company's CWAS rating is an excellent measure of its motivation to control its costs. For instance, a 75% rating means that 75¢ of every $1.00 of a firm's costs comes right out of the company's pocket—or profit to be more exact.

DOD has historically used CWAS only in connection with indirect costs. Contractors with CWAS ratings of 65% or more need not justify to DOD the reasonableness of their expenditures for various indirect costs, such as sales costs, training costs, maintenance, etc. CWAS also plays a limited role in the present IR&D system, and is applied to contractors who fall below the $2 million threshold.

CWAS is conceptually sound; CWAS is objective; CWAS focuses DOD surveillance resources on to the problem areas. The use of CWAS for all IR&D and B&P would reduce costs and unproductive work for both DOD and industry.

As you know, the Commission on Government Procurement majority position recommended that the reasonableness of IR&D and B&P costs be accepted if the contractor's fixed price business exceeds 50% of his total. WEMA views this as a simplified version of the CWAS concept. While the COGP 50% approach would be entirely satisfactory to us, it appears to be too loose a test for many, including several dissenting COGP commissioners. The proposed Executive Branch working group's position of 30 October 1974 on IR&D and B&P also rejects the 50% test but recommends that consideration be given to CWAS.

The Defense Science Board IR&D task force in its March 1975 analysis also recommends CWAS as an objective criteria for replacing administrative controls with competitive marketplace control. We concur with this view and urge an early application of CWAS to all IR&D and B&P.

2. Since it will still be necessary to separate non-CWAS-qualified contractors into major and minor categories, a threshold should be retained. WEMA believes, however, that the $2 million threshold of 1970 has been rendered obsolete by inflation and should be raised.

The impact of inflation on IR&D and B&P is, of course, not a new concept to this committee. We note that the General Accounting Office's Partial Report to you on August 1974 addresses this problem briefly on pages 21 and 22. The final sentence points out that, with continuing inflation, additional companies could exceed the $2 million threshold and that added administrative effort could then become necessary.

Recent data shows that inflation was even higher in subsequent months and is expected to continue at a significant level for the foreseeable future. Thus, in our view, it is timely to raise the threshold in order to restore the original level of IR&D and B&P effort at which the added administrative burdens are placed on the Government and contractors. We do not have any way of estimating the

precise number of contractors that will fall above and below the $3 million threshold. However, assuming a relatively level volume of negotiated defense contracts in real dollars, the result of a $3 million threshold in 1976–1977 should be approximately the same as for the $2 million level in 1970. There will, of course, be some changes because of variations in the business of individual contractors. Our proposed level of $3 million is based on the following factors:

A. Assuming the legislation is changed in 1976 and will be in effect for at least two years, a threshold based on the 1977 price level would be appropriate.

B. Lacking a specific index for IR&D and B&P, we have tried two alternative approaches:

GNP Deflator (as used by NSF):

1970 index (1958 base)	135. 24
1974 index (preliminary)	170. 05
Difference	34. 81
Percent increase	24. 7
4-year average annual rate (percent)	5. 9
1977 (7 years at 5.9%) (percent)	49. 1
1977 (adjusted threshold) (million)	$2. 98

NOTE.—This is conservative. The rate in 1974 was 10.2%, and is certain to be at least 8% for 1975.

Consumer Price Index (Salaries, which make up the largest portion of I.R. & D. and B. & P. costs, tend to parallel or slightly exceed the CPI):

1970 index (1967 base, all items)	116. 30
1974 index (approximate)	147. 50
Difference	31. 20
Percent increase	26. 8
4-year average annual rate (percent)	6. 1
1977 (7 years at 6.1%) (percent)	51. 1
1977 (adjusted threshold) (million)	$3. 02

NOTE.—This is conservative. The rate in 1974 was about 11%, and is certain to be at least 8% for 1975.

We believe this data clearly shows that a $3 million threshold is now appropriate.

We also recommend that the Act provide for future annual adjustment of the $3 million threshold through the use of a broad price index, such as the GNP Deflator or the Consumers Price Index.

There is, of course, another possible approach: i.e., simply adjusting the $2 million threshold for inflation (GNP Deflator or CPI) to date and then adjusting it up or down annually in the future.

This adjustment of the threshold to the 1970 level-of-effort would also yield financial savings for the Government. We note on page 40 of the GAO 5 June 1975 report on IR&D that it costs DOD about $2.1 million per year to administer Advance Agreements with 82 contractors (DOD report to Congress for FY '74), or an average in excess of $25 thousand each. Page 41 also reports that "some of the larger contractors have estimated their increased annual costs to have been between $500 thousand and $1 million." Smaller contractors with IR&D and B&P at the $2 million to $3 million level would not, of course, involve, administrative costs of this magnitude. However, we doubt that combined DOD/company costs of the least expensive Advance Agreement would be appreciably less than $50 thousand per year. How much better for all concerned if such companies could put this money into additional technical effort (or profit with 48% going to the Government) rather than pushing pieces of paper back and forth with DOD people.

3. Under WEMA's proposed system of increasing the current threshold because of inflation, Advance Agreements will still be required for companies with major IR&D programs who are not CWAS-qualified. We believe that the Advance Agreement negotiations are currently biased in favor of DOD. This is caused by the provision that, if no agreement is reached, DOD may pay "an amount substantially less than the amount—such company—would otherwise have been entitled to receive—."

This approach violates a principle of equitable negotiations which required that the parties have approximately equal economic positions. It is patently inequitable to provide that one party can sustain its position through unrealistic demands and/or delaying tactics.

We recommend that this provision be removed from the Act. In the event that Congress wishes to provide for the resolution of possible stalemates in

negotiations, it should specify an objective arbitration procedure—possibly by the Defense Science Board or the National Academy of Sciences.

4. The present relevancy test is not of any real value, and sets a procurement precedent that will become counterproductive if it spreads to other agencies. This has already started at ERDA which introduced its version of relevancy in a 29 July 1975 interim regulation.

Our opinion on its lack of utility is based on our understanding that the major contractors which negotiate Advance Agreements easily pass this test. This comes about because their proportion of DOD-relevant IR&D is greater than their proportion of DOD negotiated contracts. Their stake in the military market is sufficient motivation to insure relevancy; we don't need a law resulting in unproductive paper-pushing to achieve this. The country needs productive use of Government and contractor talent—not a lot of make-work.

Any contemplation of the spread of relevancy on an agency-by-agency basis leads to considerable alarm. NASA recognized the pitfalls of separate relevancy tests and wisely agreed to abide by the DOD test. ERDA's regulation at the present time is a simple statement that IR&D must be "of benefit to the ERDA program." We have no insight as to how ERDA plans to make this test. A prudent ERDA buyer will certainly require some showing of relevancy for his file—perhaps nothing more than a contractor statement. On the other hand, any any bureaucrat worthy of the name could create a lifetime job for himself and a number of associates in developing and administering a comprehensive ERDA relevancy test system. This system would also provide employment for hundreds of contractor personnel, especially since the ERDA rule has no threshold such as the $2 million; and every contractor, no matter how small, would become involved. Beyond ERDA loom the Departments of Transportation, HEW, Commerce, etc., and then the other independent agencies: EPA, NSF, and all the others.

In spite of the superficial appeal of any agency-related relevancy test, WEMA believes that persons who are truly knowledgeable in the IR&D field recognize its lack of true merit. We originally considered recommending that it be made Government-wide. However, since the Government buys essentially everything, that would mean the replacement of a useless/dangerous control with an exercise best characterized as a farce.

Let's face facts and give relevancy a decent burial.

The previous points have addressed the present legislation and administration of IR&D. Since the content and recommendations of the GAO Report have been extensively covered by previous Government witnesses, and will be addressed by other industry witnesses next week, we do not intend to review those findings in detail. However, we do wish, for emphasis sake, to comment on one point—the recommendation that the Government be granted patent and data rights. As mentioned earlier, WEMA companies are constantly bringing to the systems designer or manufacturer new and improved components which enhance the capability of that system. The company survives by protecting its data and techniques from the "fast buck operator" who does not contribute to technology by IR&D effort, but merely copies at marginal prices. If the innovative company is not going to be protected through the protection of *his* proprietary data, the motivation for the enterprising technological company—the WEMA-type company—will be destroyed along with a progressive industry.

In conclusion, WEMA would like to comment briefly on the broader implications of IR&D to the national interest.

There is growing recognition of the role of U.S. technology in achieving the nation's economic, political, and trade position. Technical innovation underlies our standard of living, our military position, our space accomplishments, our export posture, and the productivity of our economy.

In recent years we have lost ground in the international races in several of these areas: employment, productivity, and trade. Many observers attribute this to the atrophy of our R&D and want to do something about it, especially since we have discovered new problems such as energy and the environment. So far, the Government has a new Experimental Technology Incentives Program at the National Bureau of Standards and an Office of Experimental R&D Incentives at the National Science Foundation.

There is sporadic talk of tax credits for R&D and/or capital formation to increase productivity, as well as subsidies for the conversion of military plants to peaceful uses. There are increasing flows of public funds into both basic and applied research through NSF, NIH, DOD, and the new potential giant in town—ERDA.

In view of this and in view of Congress' involvement in all of these programs to increase R&D, wouldn't it be logical for Congress to determine that the legislative restrictions on IR&D which were adopted in 1970 have served their purpose and that DOD should now be mandated to encourage the sound growth of IR&D as a vital national resource?

STATEMENT OF DR. KENNETH OSHMAN, PRESIDENT, THE ROLM CORP., CUPERTINO, CALIF., ON BEHALF OF WEMA, ACCOMPANIED BY C. F. HILLY, JR., ASSISTANT VICE PRESIDENT, STANFORD RESEARCH INSTITUTE; AND EBEN TISDALE, STAFF VICE PRESIDENT, WEMA

Dr. OSHMAN. I am Ken Oshman, president of the Rolm Corp. which is located in Cupertino, Calif. Our sales are about $10 million, and we have about 300 employees in California.

My company manufactures general-purposes small digital computers for severe environmental applications, which we sell to commercial and Government customers.

I also serve on the board of directors of WEMA, and it is in behalf of its members that I am appearing today. WEMA is a trade association consisting of 730 companies engaged in electronics and information technology located primarily in the Western United States.

Although WMEA members range from electronic divisions of large companies to small pioneering firms, the bulk of our membership is best defined as small- to medium-sized companies servicing both Government and commercial markets.

Many of the companies in this group are subcontractors supplying sophisticated components or equipment of their own design for incorporation into larger systems produced by its customers, many of whom are Government prime contractors. I reemphasize the phrase of their own design because that is what I.R. & D. is all about.

As we understand it, the purpose of these hearings is to review the functioning of existing legislation affecting independent research and development, to look at the future technical needs of DOD, and to consider whether or not new legislation or amendments in this area are needed.

In this context, we will review what I.R. & D. means to the smaller and medium companies which make up the bulk of the WEMA membership.

Perhaps with several examples, we can point toward the benefits that the Government gains from the I.R. & D. activities of these companies.

We will also discuss problems we see resulting from the current system of regulation and present our recommendations for improvement. Let me add at this point that we feel current legislation and regulations have generally achieved their initial objectives of providing the Government with a managed and controlled program of I.R. & D.

I will refer primarily to I.R. & D. and not to B. & P. in my testimony. In the component and instrument business, where elaborate proposals are not usually required, I.R. & D. is the critical issue, although the law and current regulations tie these two together so that it is impossible to address one without some mention of the other.

As a practical matter to any business, the ability to perform new

product development and the means to market the results go hand in hand. Our emphasis on I.R. & D. is not intended to emphasis I.R. & D. over B. & P.

I am confident that other industry witnesses who will be appearing before you—especially the triassociation representatives—will express the views in which we share that B. & P. expenses are not only equally essential to maintain a broad competitive base, but also contribute substantially to Government planning.

As indicated in my introduction, a major effort of most WEMA companies is the development and production of electronic components, instruments, and equipment of advanced design and character.

Many of these companies sell their products to a combination of markets now including the Government. Often Government sales are in the form of subcontracts with well-known companies building major weapons systems for our country's defense.

Beneath the huge and gleaming exterior of the finished product, be it a plane, ship, missile, or submarine, lie thousands of electronic components and systems, sometimes called black boxes, that control the weapon and its systems and subsystems.

These black boxes come from WEMA companies and the several thousand electronic companies across the country. In terms of overall system performance and function, these electronic systems and subsystems may be as essential as the wings or the engine.

Each black box has a function, sensing or receiving information, amplifying signals, processing data, storing data, transmitting data, controlling mechanisms and so on. Each black box has its own technology.

Our industry devotes considerable effort to the formulation of new concepts or theories. This is followed by company sponsored research and development projects to demonstrate the feasibility of an idea, and to build a working prototype.

As a matter of fact, in the components industry it is common to find the innovative companies developing new or improved items with highly desirable characteristics well in advance of stated requirements.

This permits the design engineer to procure for the Government systems with improved performance based on the known availability of improved components.

Let me use the history of my own company as another example. Several other engineers and I felt there should be a market for small general purpose computers which operated in the severe environments of planes, ships, and trucks and which were available as standard products with short delivery times and catalog prices.

In 1969 when we began business there were no such products available. The Department of Defense had developed a very large number of excellent rugged computers for specific weapons systems.

Generally these computers were either special purpose in nature unavailable in any reasonable time frame or obsolete because continuing product improvement had not been continued once the specific weapons system had been developed. All were quite expensive when compared to small computers in the commercial marketplace even allowing for the cost of designing and building rugged computers.

So we started a business to design, build, and market rugged computers.

We started with $75,000 in June of 1969. That money, entirely contributed by the founders of the company, was all we had.

We did not have any Government contracts to develop the product, and we did not have any orders for computers once they were designed. In March 1970 we shipped our first computer. That computer had a sales price of less than $20,000, and compared favorably in its performance with competition at more than $50,000. What we had been able to do was to respond quickly to the rapidly changing technology of the electronics industry. Undoubtedly we could never have responded with a new product in 9 months if we had been burdened with complications of a Government contract.

I think our example illustrates two important points. First, I.R. & D. supported by the Government produces effective results at a fraction of the cost of DOD supported I.R. & D. contracts.

It is difficult to know exactly what the Government was paying for R. & D. contracts to develop computers at the time we began business, but I am sure it was much more than the money we had to spend. My guess is that the average contract at that time may have run about $1 million.

Second this example shows also that there can be substantial and continuing cost and performance benefits from I.R. & D. Through continuing I.R. & D. we have been able to dramatically improve the performance of our products while greatly reducing the cost.

This has been a hallmark of the electronics industry over the last 30 years and still continues even in these days of substantial overall economic inflation.

In terms of WEMA membership and similar standard product oriented companies, we would take issue with those who claim that comapny managed R. & D. leads to widespread and random explorations and excess customer costs. New products are their life blood of WEMA companies and effective R. & D. is essential to survival.

This brings me to the heart of the recommendations which follow. WEMA believes the time has come for a more enlightened and discriminating approach to regulation. By this we mean the use of objective techniques and thresholds to focus controls on problem areas, simultaneously relieving other segments of the burden of deadening, costly and unproductive regulations.

We would like to feel that this committee's examination of authoritative reports filed by so many contributors on this subject would lead it to adopt the conclusions that I.R. & D. is essential to company and technological growth, and hence is just another one of the many expenses which aggregate into a company's indirect expense pool.

Additionally we hope there would be recognition that these expense pools are currently under constant surveillance by cost auditors, and by the pressures of the marketplace, and new legislation or extensive administration of this nondominant expense is not necessary.

However, if the committee cannot find the way clear to such a conclusion, we offer the following comments based on our experience with the current legislation to assist Congress in the design of a system which prevents significant abuses, but at the same time neither stifles

technical progress nor discourages competent commercially oriented companies from doing business with the Government.

We are not proposing a whole new scheme. The present system contains many of the features needed to achieve this desired objective. However, we see four legislative problem areas which need correction by congressional action.

(1) The act requires the negotiation of advance agreements with all companies which receive more than $2 million of I.R. & D. and B. & P. from DOD through negotiated contracts without regard for the nature of a company's operations. WEMA believes that the negotiation of advance agreements with companies whose business is predominantly commercial or fixed price exacts heavy administrative effort and generates negligible benefits.

We recommend that the legislation be revised to permit the application of the DOD contractor weighted average share of risk system to all I.R. & D. and B. & P.

DOD has historically used CWAS only in connection with indirect costs. Contractors with CWAS ratings of 65 percent or more need not justify to DOD the reasonableness of their expenditures for various indirect costs, such as sales costs, training costs, maintenance, etc. CWAS also plays a limited role in the present I.R. & D. system and is applied to contractors who fall below the $2 million threshold. CWAS is conceptually sound. CWAS is objective. CWAS focuses DOD surveillance resources on the problem areas. The use of CWAS for all I.R. & D. and B. & P. would reduce costs and unproductive work for both DOD and industry.

2. Since it will still be necessary to separate non-CWAS-qualified contractors into major and minor categories, a threshold should be retained. WEMA believes, however, that the $2 million threshold of 1970 has been rendered obsolete by inflation and should be raised.

There is of course another possible approach, that is, simply adjusting the $2 million threshold for inflation (GNP deflator or CPI) to date and then adjusting it up or down annually in the future. This adjustment of the threshold to the 1970 level of effort would also yield financial savings for the Government. We note on page 40 of the GAO June 5, 1975 report on I.R. & D. that it costs DOD about $2.1 million per year to administer advance agreements with 82 contractors or an average in excess of $25,000 each.

Page 41 also reports that some of the larger contractors have estimated their increased annual costs to have been between $500,000 and $1 million. Smaller contractors with I.R. & D. and B. & P. at the $2 million to $3 million level would not, of course, involve administrative costs of this magnitude. However, we doubt that combined DOD/company costs of the least expensive advance agreement would be appreciably less than $50,000 per year.

How much better for all concerned if such companies could put this money into additional technical effort or profit with 48 percent going to the Government, rather than pushing pieces of paper back and forth with DOD people.

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In spite of the superficial appeal of any agency related relevancy test, WEMA believes that persons who are truly knowledgeable in the I.R. & D. field recognize its lack of true merit.

Let's face facts and give relevancy a decent burial.

The previous points have addressed the present legislation and administration of I.R. & D. Since the content and recommendations of the GAO report have been extensively covered by previous Government witnesses, and will be addressed by other industry witnesses next week, we do not intend to review those findings in detail.

However, we do wish, for emphasis sake, to comment on the point—the recommendation that the Government be granted patent and data rights. As mentioned earlier, WEMA companies are constantly bringing to the systems designer or manufacturer new and improved components to the systems designer or manufacturer which enhance the capability of that system.

The company survives by protecting its data and techniques from the fast buck operator who does not contribute to technology by I.R. & D. effort, but merely copies at marginal prices. If the innovative company is not going to be protected through the protection of his proprietary data, the motivation for the enterprising technological company—the WEMA type company—will be destroyed along with a progressive industry.

That concludes my statement, Mr. Chairman. I will be happy to answer any questions you may have.

Senator McINTYRE. What percentage of your corporation's sales with the Government and specifically with the Department of Defense——

Dr. OSHMAN. Last year I believe about 60 percent of our sales ultimately wound up in the hands of the Government, DOD.

Senator McINTYRE. Does your company fall into the category of small business?

Dr. OSHMAN. Yes.

Senator McINTYRE. You state that you feel current legislation and regulations have generally achieved their initial objectives of providing the Government with managed and controlled program of I.R. & D. Does this mean that your association would be satisfied if section 203, Public Law 91-441 was continued without change?

Dr. OSHMAN. We have made recommendations which we believe would improve the operation of I.R. & D. but in general we would be happy to see the law continued unchanged.

Senator McINTYRE. Yes, providing that the changes are noted and would improve the situation as you see it today?

Dr. OSHMAN. Yes.

Senator McINTYRE. You state your agreement with the five principles expressed by the Council of Defense and Space Industry Associations in a letter to GAO dated December 9, 1974.

Would you provide a copy of that letter for the record?

Dr. OSHMAN. Yes.

[See letter to GAO, p. 636]

Senator McINTYRE. Would you agree that these principles can be maintained without regard either to the method or the degree to which the Government pays for I.R. & D.?

Dr. OSHMAN. Yes, and to a degree if Congress accepts WEMA's recommendations. These principles certainly could not be maintained if I.R. & D. were made a line item in the budget.

Senator McINTYRE. You say that many studies have shown a high correlation between a company's investment in R. & D. and its growth in sales and long term profits. Isn't this equally true if the source of such funds is directly funded Government R. & D. contracts or recovery of such costs as allowable I.R. & D. under Government contracts?

Dr. OSHMAN. I think those are two very different questions, very different approaches to funding of R. & D. The I.R. & D. yes, that is what we are saying. To the extent that companies can recover their I.R. & D. expenses, their product development expenses in sales to the Government as a part of their overall expenses, yes, that contributes to the growth and long range profits of companies.

I don't believe that we have any evidence of correlation, similar correlation for long term growth and profits as a result of receiving R. & D. contracts of direct product development by the Government.

I have no data on that. We find in a company like ours, and companies like WEMA companies, that I.R. & D. is much more productive in terms of its end product than the R. & D. funding for a specific product by DOD.

Senator McINTYRE. Forty percent of your market is commercial?

Dr. OSHMAN. Yes.

Senator McINTYRE. Would it be equitable if Government payments for I.R. & D. were based on matching a company's investment up to a fixed ceiling?

Dr. OSHMAN. We would not support—we don't believe in fixed ceilings. A company invests in B. & P. and I.R. & D. in the hope that it can recover that through sales. I think it is a judgment that the company should make, a management judgment as to how much they should invest themselves.

Senator McINTYRE. You state that the example of success your company had with its original computer developed with company funds illustrates that I.R. & D. supported by the Government produces effective results at a fraction of the cost of DOD supported R&D contracts. What basis do you have for that statement?

Dr. OSHMAN. I think the basis is that we were able to develop a computer for on the order of $75,000 and bring that to the marketplace at a time when it was costing DOD an average of $1 million to develop a specific computer under contract.

Senator McINTYRE. You did not develop a computer with I.R. & D. funds?

Dr. OSHMAN. Those are I.R. & D. funds. Eventually we sold computers and on a continuing basis were investing in engineering work

and as a portion of sales price of every computer we sell there is effectively I.R. & D. recovered.

Senator McIntyre. In that original $75,000, you were not reimbursed by the Government, were you?

Dr. Oshman. No, we were not. It was only through sales of our products we were reimbursed. In the context of I.R. & D. that is an I.R. & D. program.

Senator McIntyre. You say that your example also shows that there can be substantial benefit from I.R. & D. Isn't this true irrespective of whether the Government pays for any of it?

Dr. Oshman. If the Government and other customers would not have paid for it (and if we did not believe the Government would have paid for it) we probably would not have invested the money. Am I answering your question?

Senator McIntyre. Yes.

Isn't it somewhat naive for WEMA to believe that government interests require the absolute minimum of control over companies who are highly creative and in the forefront of world technology? This implies that such companies will always act in the best interest of the Government.

Dr. Oshman. No, I don't. I think that they will always operate within the best interest of what they view the marketplace to be. To the extent the marketplace is the Government they will operate within the best interests of the Government.

Mr. Fine. Is that to say that the technical evaluations conducted by the Defense Department does not constitute an effective means of insuring it is in the best interests of the government?

Dr. Oshman. Yes, technical evaluations are probably beneficial in some cases. In the case of smaller and medium sized companies, however, these evaluations cause an unnecessary burden.

Senator McIntyre. You urge an early application of contractor weighted average share of risk system to all I.R. & D. and B. & P., citing support by the executive branch working group and the Defense Science Board I.R. & D. Task Force Analysis of March 1975.

Can you explain why neither DOD nor the Comptroller General support this recommendation?

Dr. Oshman. No, I don't know why they don't.

Senator McIntyre. Supply it for the record then, please.

Mr. Tisdale. With respect to your question Senator McIntyre; this is an area where we disagree with DOD. We can't speak for DOD as to why we disagree on that point. They are going to have to answer your question.

Senator McIntyre. You recommend raising the threshold for companies with smaller I.R. & D. B. & P. programs from $2 million to $3 million. Is there unanimous agreement among WEMA members supporting this increase?

Dr. Oshman. Unanimous is a strong statement but I would believe that there is almost unanimous support, yes.

Senator McIntyre. Wouldn't it increase Government payments for I.R. & D. and B. & P.?

Dr. Oshman. No, it would not. It might actually reduce Government spending for I.R. & D.

Mr. Fine. You may have been present this morning when Dr. Currie indicated that he thought $2 million was adequate and accept-

able based on his experience. In effect, you are disagreeing with his position?

Dr. OSHMAN. Yes.

Mr. KAUFMAN. Mr. Oshman, I would like to try to clarify a point about the sale of the computer that your company developed.

Would it be correct to try to clarify a point about the sale of the computer that your company developed? Would it be correct to say that because you sold your computer to the Government and you sold the computers which you later developed following that first sale that you were reimbursed by the Government for your I.R. & D.

Dr. OSHMAN. Yes.

Mr. KAUFMAN. Had you not sold that first computer to the Federal Government, would there have been any reimbursement from the Government for your I.R. & D. investment?

Dr. OSHMAN. That is correct.

Mr. KAUFMAN. Is that not a distinction between the way your company and other small companies must operate by risking investment in I.R. & D. and the way the larger companies must operate who through their advance agreements with the Department of Defense are guaranteed a return or reimbursement for their I.R. & D. regardless of whether they sell the product to the Government?

Dr. OSHMAN. Yes, I think there is a distinction. That is why we recommend the use of CWAS.

Mr. KAUFMAN. With regard to your computer, has the know-how that was developed by your company in the development of that computer been made available to other companies?

Dr. OSHMAN. I am not sure what you mean by has the know-how been made available. If you are getting to the point of proprietary data and patent rights, we retain proprietary rights and data in our products and in our patents.

I think that it is a very crucial issue and one very important to a company which is investing large amounts of its R. & D. resources in a highly competitive marketplace.

Mr. KAUFMAN. Do you know or can you estimate how many of the 730 member companies of WEMA receive any Government reimbursement for I.R. & D. through advance agreements?

Dr. OSHMAN. I don't know the answer to that. We can possibly supply it for the record. I would guess less than 10 percent of the WEMA companies are involved in negotiations of advance agreements.

Mr. KAUFMAN. Do you know or can you estimate how many of the WEMA companies receive any Government reimbursement for I.R. & D.?

Dr. OSHMAN. I would guess that probably 90 percent of the WEMA companies at least in part sell to the Government, and by virtue of I.R. & D. expenses being allocated to sales they are recovering I.R. & D. expenses.

Mr. KAUFMAN. Can you provide an estimate of the amount of I.R. & D. reimbursement that goes to these companies annually?

Dr. OSHMAN. I think that would be quite difficult. We could give you an estimate of the total sales of the divisions, approximate sales of the WEMA companies.

I think it is more or less typical of companies in our industry that they invest between 8 and 12 percent of their sales in R. & D. on a continuing basis.

Mr. KAUFMAN. Would you say that the majority of prime contracts and subcontracts awarded to WEMA companies are fixed price competitive or negotiated sole source or some other negotiated basis?

Dr. OSHMAN. I have no way to get that kind of data. I would say that most of the business that I am referring to of these 90 percent of companies who are doing business and selling the products on a routine basis to the Government, most of that is highly competitive but not the result of specific competitions for a product.

Mr. FINE. Referring to your exchange, in the incident of the initiation of your own company where you provided $75,000 in capital, in the absence of further private financing, if you had been unsuccessful in the marketing of that initial development, you would have failed?

Dr. OSHMAN. Absolutely.

Mr. FINE. In which case you would have had to start from scratch again to seek private capital in the normal course of events. One having been successful, you joined the ranks of the other companies who as a matter of business then are able to realize both from contracts with private industry as well as from the Government a recovery of the cost?

Dr. OSHMAN. Of course. That is the mark of a successful company. You either are able to continue to fund your ongoing R. & D. activities as well as all the activities of a company and all the expenses of a company by recovering those costs in the sale of your products or you will go out of business. It is that simple.

Mr. FINE. There must be some means to recover the cost of the I.R. & D. amounts that you expended on a sustaining level.

Dr. OSHMAN. Absolutely.

Mr. FINE. You contend that the current arrangement whereby DOD makes final determinations on advance agreements is unfair. You feel this approach violates a principle of equitable negotiations and that the parties should have equal economic positions.

I understand that this provision was adopted to offset the contractor's advantage in negotiations. Has this bias in favor of DOD created any actual problems? What specific evidence do you have?

Dr. OSHMAN. I think we are commenting more about a potential problem and our concern relates to potential problems more than it does to actual problems. It is just an area in the administration of the advance agreements that we think should be considered and revised.

I do not have specific evidence to date of any unequitable negotiations as a result of that.

Mr. FINE. The use of advance negotiations has existing—existing for 5 years and I would think if there were evidence it would have accumulated over the 5 years.

Dr. OSHMAN. Basically this is a general comment on the administration of the program. It is not a comment on abuses or malfunctioning of the program to date.

Basically it relates to our willingness to comment on the general aspects of the program. We believe philosophically there is a problem in this area. As a practical matter we have no data to substantiate that there has been a problem. On the other hand it would be difficult to project the future with any certainty.

Mr. FINE. Although you recommend disposing of the relevancy test, don't you agree that for DOD and NASA it does have the effect of discouraging major contractors from moving significantly away from Defense and NASA oriented I.R. & D?

Dr. OSHMAN. Well, I guess first of all it seems that in these days there are many, many areas of grave national concern and DOD and Defense are only one large segment. It seems to us that it would be important that the Government allow research in basically all areas.

I guess that is the basis of our position. Additionally the Government probably purchases everything so it is hard to find an area where the Government is not involved.

Senator MCINTYRE. Isn't your flat opposition to government right to patents and technical data rather extreme? Isn't there really a gray area where the Government should obtain nonexclusive, royalty free licenses when it pays significant smounts for I.R. & D.?

Dr. OSHMAN. I don't think so. The Government is a customer in the same sense you and I are customers of other commercial products.

Senator MCINTYRE. As you state there are increasing flows of public funds into basic and applied research in various Government agencies. But don't you agree that large infusions in R. & D. spending also have to be measured against the demands of other Federal programs and that a seriously unbalanced economy can be a real threat to this Nation's security?

Dr. OSHMAN. Yes, I agree.

Senator MCINTYRE. You make a concluding point that because of the need for the Nation to do more research and development and because section 203 has served its purpose it would be logical for the Congress to remove the legislative restrictions on I.R. & D. to encourage the sound growth of I.R. & D. as a vital national resource.

Wouldn't you agree, Dr. Oshman, that the greatest potential for maintaining our technological lead is not simply to relax Government controls, but rather to continue those controls needed to insure that Government spending for research and development is optimized to eliminate marginal work, to eliminate excessive duplication and excess industrial parochialism, and by emphasizing in house as well as contractor's efforts in those areas of technology which are critical to our future military superiority?

Dr. OSHMAN. Basically we think that our four recommendations would provide adequate controls and in fact remove a great burden of unproductive administrative work.

Senator MCINTYRE. Can you suggest any other means for Congress to exercise control over the total amount spent for I.R. & D. without interfering with freedom of enterprise?

Dr. OSHMAN. I guess I don't see that it is necessary for Congress to directly control I.R. & D. Surely the large portion of R. & D. which the Government spends is direct contract R. & D. And that clearly is under the direct control of Congress in the annual appropriations.

The I.R. & D. segment is one which is so fundamental and so necessary in the normal course of business that it is almost impossible for me to see a way you can improve the control of it over what is currently being done by industry.

Senator McINTYRE. Since the bulk of membership in WEMA consists of small to medium sized companies, they presumably are not required to enter into advanced agreements on I.R. & D.

How is allowance for I.R. & D. determined?

Dr. OSHMAN. For those not CWAS qualified and noncommercial companies without a commercial exemption, the formula method is currently used. This is a formula method under the $2 million limit.

Senator McINTYRE. It is the same method used for the subcontractor?

Dr. OSHMAN. Yes.

Senator McINTYRE. Does the bulk of your membership feel that the advance agreement procedure favors the large firm, and if so, why?

Dr. OSHMAN. No, we don't. On the other hand we are concerned that if a line item of the budget were to be I.R. & D. we would be quite concerned that that line item would favor the large firm.

Senator McINTYRE. Would you object to disclosure by the DOD of total amount of I.R. & D. and how much you recover from the Government.

Dr. OSHMAN. I would not like it. On the other hand I would do it anyway currently and I think most companies do through various SEC regulations report the amount of R. & D. that they internally spend.

Also generally companies now report the portion of their sales that goes to the Government in SEC disclosures with the result one can readily calculate what portion of the I.R. & D. is supported by DOD.

I would be quite unhappy to see DOD——

Mr. FINE. On this very same point you heard earlier discussion about the OSD report being made available and you heard the statements made by the Secretary that under the law this was considered to be proprietary data. Does the operation of the law leave the determination as to what is proprietary at the discretion of the contractor or the Department of Defense?

Dr. OSHMAN. I am not familiar with the law.

Mr. FINE. Would you look into that aspect? I think it is strongly on something that should be of concern to you. If it develops that individual companies have no objection to such information being made public, it would be hard to understand why the Department of Defense would take this position.

Dr. OSHMAN. I think the concern of most companies is that, especially in the negotiation of advance agreements, effectively companies are telling DOD their competitive plans for the next year.

In doing so they are subject to basically unfair competition if their competitors can see what they plan to do. I think that is the major objection of companies.

Mr. FINE. The issue does not involve any of the detail of the use of the dollars but merely the simple dollar amount total for a company spent for I.R. & D. and of that how much is reimbursed by the Government?

No further details.

Dr. OSHMAN. I guess the only other objection that companies would have is that if on a short-term basis one were to double his

R. & D. spending, in order to do some new thing, in a year, that he might not like made public. I think you can understand that in the sense of the strategic planning of a company.

On a long-term basis nobody doubles and triples his I.R. & D. for long.

Mr. FINE. DOD recognizes that creating and maintaining multiple-bidding sources in the various technologies leads to some duplicative efforts but feels that this duplication provides alternate approaches to a problem and is, therefore, beneficial to some degree. Do you agree that the Government should support the use of I.R. & D. funds for such purpose?

Dr. OSHMAN. Yes, I do

Senator PROXMIRE. I am sorry I am late but I had a very busy morning. I was delighted to have a chance to read your statement. One part of your statement that I understand seems to correct the information we have is that—contradicts it—is that you argue that I.R. & D. as presently constituted, it does not favor the big company.

Yet the facts are that 65 percent of I.R. & D. went to 25, the biggest contractors. In fact under the present system companies with the largest sales bases get the largest amount of independent research and development.

Smaller companies get reimbursed only through the price of the product they are able to sell. Wouldn't the association you represent support a policy that would include the small contractors who have high technical competence but not a big enough sales base to absorb the I.R. & D. through overhead?

Dr. OSHMAN. We don't feel that the small company is at a severe disadvantage. We are surely capable of competing. For example if DOD were to come to a company like mine and say here is $50 million for research on aircraft, I think it would be quite fooish. But on the other hand, it seems quite reasonable that somebody should be doing that kind of work.

Senator PROXMIRE. Nobody is proposing that this—that they come to your company and say that. Rather than just base it on the price of the product that you are able to sell, relate it to your sales base which would bring it down to a reasonable proportion.

Dr. OSHMAN. Even within the framework of a large company, I.R. & D. is only reimbursed only in proportion to how much they can sell. If for example I have a $1 billion company which is investing very large amounts of I.R. & D. funds, to the extent they are unable to sell $1 billion worth of those products, whatever they may be, they will not recover their I.R. & D. investment.

Senator PROXMIRE. For the big company the I.R. & D. would be totally unrelated to the products they sell. For the small company they are based on the particular product you sell and the price of it.

Dr. OSHMAN. They are always based on the product you designed before and not the one I am currently working on.

Senator PROXMIRE. When you have high technical competence, why shouldn't they be treated the same, that is related to the sales base rather than the particular product and the price of it.

Dr. OSHMAN. It boils down to that same thing ultimately. To be competitive, we must continue to spend about 10 percent of our sales dollars in a very effective and wise way in I.R. & D. or else our sales will be going down.

It all relates utlimately to our sales level.

Senator PROXMIRE. I understand you testified that a line item in the budget works to the disadvantage of the smaller firms. How do you reach that conclusion?

Dr. OSHMAN. If there is a line item in the budget and there is some fixed level of I.R. & D. which is going to be funded, there will be a queue and the small firms will be at the end of the queue and that is our concern.

Senator PROXMIRE. That is how it works right now, isn't it?

Dr. OSHMAN. Not at all. At the present time small firms are reimbursed whatever they spend in I.R. & D. to the extent they fall below the $2 million threshold.

Senator PROXMIRE. You gave an example of a company that spent less than $300,000 on research and development which resulted in awards to the company amounting to more than $10 million.

Were the prime contracts totaling more than $10 million negotiated and were the bases of this technology made available to other companies so that there would be competition for these awards?

Dr. OSHMAN. I believe it was a negotiated contract and I doubt whether this was made available to other companies.

Senator PROXMIRE. How does that increase competition?

Dr. OSHMAN. I would not be one to say that successful I.R. & D. increases competition. If you are good at your I.R. & D. you beat the competition. The question, of course, is do you then go rip off the Government and I think there are many controls to see that does not happen.

That is what I.R. & D does. It gives you a competitive edge. That is why it is the life blood of companies.

Senator PROXMIRE. I disagree with the Pentagon on that.

Dr. OSHMAN. I can proceed by saying if companies are unable to see a vehicle for improving their competitive edge, they are probably not going to compete. In that sense it does increase competition because more people are willing to get into the game.

They believe that if they are successful and more creative and better than the rest of the world, then they will have a ready market and the opportunity to make a profit and a sale.

Senator PROXMIRE. I still can't understand why if it is a line item, you are handicapped. It is important for us to be as responsible as we can for every nickel of the taxpayers' money we spend.

For that reason, there should be a clear, understandable, powerful case against making it a line item. The GAO recommended we make it that. If you have a line item, you have a base for discussion, debate, and understanding, and we can increase it and reduce it.

There was a reduction in the defense budget. There will be a $750 million cut in research and development this year. I can't understand how we can make that cut and then the Pentagon can come along and they can restore it, the whole cut, and undo everything Congress did with I.R. & D.

Dr. OSHMAN. I think from the point of view—there are two answers to your question.

First, most companies don't view I.R. & D. as a separate program. It is part—everybody has said this, and I think it is a very difficult thing to understand unless you have been involved in trying to run companies somehow.

It is a necessary part of doing business and having a position in the marketplace and continuing your sales base. Companies really don't have the option of do they do I.R. & D. or not.

They must do it, I.R. & D. The question is therefore how much of that gets paid for ultimately by the Government. Ultimately, you can reduce profits if that is the direction you would go.

Back to the question of the line item through, I think except for this philosophical disagreement that I.R. & D. is something which should be budgeted and under the control of Congress, except for that, it would not hurt small contractors, I believe, if I.R. & D. were a line item of the budget to the extent you accept our other recommendations; that is, that the $2 million threshold be raised to $3 million, CWAS-rated companies be exempt——

Senator PROXMIRE. As I understand it, the General Accounting Office would require that it be made a line item only for companies above the threshold of $2 million so that the smaller firms would not be affected by that provision.

Dr. OSHMAN. $2 million in I.R. & D. for a company to spend that amount, it does not have to be that large a company. A $20 million, company, a company doing $20 million worth with the Government, could spend $2 million on I.R. & D. Our company spends——

Senator PROXMIRE. Perhaps we could modify it and make it a little higher than that. That was their recommendation.

Dr. OSHMAN. We suggest the threshold be raised to $3 million.

Senator PROXMIRE. Would you still object if the threshold were raised to $3 million?

Dr. OSHMAN. I would not object in the context of high CWAS qualified companies, those that are really involved in risk and are not guaranteed something. To the extent we were to exempt high CWAS-rated companies and to raise the threshold to $3 million, I believe the average WEMA company would not be affected by the line item legislation.

Senator PROXMIRE. Thank you very much.

Senator MCINTYRE. Thank you very much, Dr. Oshman and your associates. We will have questions that you will be asked to supply answers for the record.

We will adjourn now to reconvene September 29, at 9:30 a.m. I will place in the record various documents pertaining to today's hearing, without objection.

Thank you, gentlemen.

[The documents referred to follow:]

COUNCIL OF DEFENSE AND SPACE INDUSTRY ASSOCIATIONS (CODSIA),
Washington, D.C. December 9, 1974.

Mr. R. W. GUTMANN,
Director, Procurement and Systems Acquisition Division,
U.S. General Accounting Office,
Washington, D.C

DEAR MR. GUTMANN: The Council of Defense and Space Industry Associations wishes to thank you for the opportunity given us in your letter of September 27, 1974 to comment on fourteen alternative methods of reimbursing contractors' independent research and development costs.

To prevent a misunderstanding, we note that you have excluded consideration of bid and proposal (B&P) costs from this study and have concentrated on alternative methods of reimbursing only independent research and development costs. Were you to have included B&P costs, some additional and very different considerations would have been brought to bear in analyzing the proposed alternatives; for instance, the very important consideration that contractors' solicited B&P efforts are to a very great extent beyond their control.

There appears to be a fear on the part of some that it is dangerous to let our free competitive economy alone direct and control the scientific and advanced technology process. In their minds, there is a basic distrust of how much reliance can be placed on the natural competitive forces of the marketplace to penalize "mismanagement", "abuses", "unnecessary duplication of effort", and "excessive expenditures". As a result, there remains a nagging fear that, in negotiated procurement, free competition doesn't exert adequate controls when the Government is the customer.

Some hold that, since the Government is a buyer using public funds, it is obligated to use its monopsonistic powers to add artificial controls on industry, in addition to those automatically provided by the free competitive economy. They believe that, since Government is elected to govern, it must directly govern its suppliers. The painful truth is, of course, that the more artificial controls that are applied, the less effective are the natural controls of free competitive enterprise.

Senator Lawton Chiles, in a recent speech, said:

"We need to reinstitute effective competition, which means—giving contractors the chance to independently create new products and be responsible for their own business and technical judgments, challenging them to demonstrate that they have the best product. As it stands today, it looks as though we don't trust them to compete because it costs too much money.

(Still Quoting . . .)

One message we all have to get across is that when we pay the price for hard competition, we're not only buying better odds that we'll get a better product at a lower cost but we're also buying accountiability at a cost a lot lower than paperwork, audits and Government plant representatives crawling all over each company."

A recent industry study culminated in a statement of principles, which included, briefly stated, the following:

1. The Congress and *all* Government agencies should understand and fully recognize in their actions the vital nature of IR&D in support of our national interests.

2. The right of industry to exercise management discretion on the content, and the amount of IR&D should not be abridged by arbitrary laws and regulations.

3. The Government should be motivated to encourage industry to increase IR&D effort.

4. All Government departments and agencies should employ a common policy and practice of allowability of IR&D costs, (independent of the agencies' parochial interests) which recognize their true nature as essential business costs.

5. The Congress should recognize that IR&D costs are not commodities to be purchased—or not purchased—but rather are normal costs of doing business.

Having stated these principles, and recognizing that even the present method of handling IR&D costs does not fully conform to them, some specific recommendations were made for consideration by the Congress, the Department of Defense and all Government agencies with whom the industry does business. Some have a direct bearing on the subject of this letter and are as follows:

1. The requirement for potential military relationship in Public Law 91–441 should be eliminated as unworkable.

2. The requirement for establishing ceilings on IR&D costs should be eliminated because it is in basic conflict with stated Government objectives to encourage competition and maintain a strong industrial capability.

3. Line items should not be established in any agency budgets for funding IR&D costs as though these efforts were commodities to be priced.

4. Any committee or agency considering "alternative methods" of funding IR&D should remember that IR&D are normal indirect business expenses and should be fully recognized in the pricing of Government contracts, so that full allowance of the portion of IR&D allocated to Government contracts can keep the U.S. Government on an equal footing with other customers.

Over many years, the benefits derived from Independent Research and Development (IR&D) in relation to their costs have been carefully reviewed. These reviews have been instigated by the Congress, the GAO, the Department of Defense and various individuals within these activities on a sporadic basis and for a variety of reasons. In spite of the many benefits shown, the reviews have resulted in the recommendation, and even the adoption in a few cases, of alternative methods of Government reimbursement of IR&D costs that do not support the broad objectives that must be met in the national interest. These objectives are:

(*a*) The security and economic well-being of the United States which in large measure depend upon a healthy, dynamic and creative defense/space industry. Essential to these goals is the continuous advancement of U.S. technology.

(*b*) The procurement of a multiplicity of Government needs including defense weaponry by methods and processes which foster rather than undermine the competitive free-enterprise system upon which our national economy is based.

(*c*) The Government acquisition of its needs within the budgeted amounts for that purpose. This requires product pricing that includes all of the legitimate and necessary costs of conducting a prudent business, but at the same time reflects cost-effective design, development, and manufacture of those products at the lowest reasonable price.

Appraisal of the several alternative methods of reimbursing IR&D costs must be based on careful analysis of how well each supports or fails to support these general objectives. A series of criteria were developed by industry some months ago that will serve effectively as indications for measurement and comparison purposes. Comparison of all alternatives under a single set of criteria is essential in order to arrive at that alternative that qualifies most advantageously for all parties against the greatest number of criteria. The enclosed Tab A gives a brief statement of twelve criteria which we feel should be used in evaluating alternative methods of effecting contractors' recovery of incurred IR&D costs. Also enclosed as a part of Tab A is a Matrix which shows application of those twelve criteria to the fourteen alternative methods enclosed with your letter and to the present method (with the potential military relationship test either removed or appropriately revised).

In addition, as you will see in Tab B, we have addressed each of the fourteen alternatives and the pros and cons related to each as set out in your letter of September 27, 1974.

We urge your careful review of the alternatives in the light of a single set of criteria on which to base consideration of all of the alternative methods for reimbursement of IR&D costs. We sincerely believe that without such depth of careful consideration against a single baseline of objectives and criteria, the furnishing of multiple pros and cons for each alternative, as set forth in your letter, is very misleading. There is a serious danger that a particular alternative could be accepted as the ultimate answer without the ability to compare it with the other alternatives.

Our evaluation of the fifteen alternative methods (including the present method) on the basis of the listed criteria leads to the following conclusions:

1. The method described on Enclosure 2 is the one method which best satisfies the stated criteria and is most likely to achieve all of the stated national objectives. It therefore follows that for those contractors meeting the "50%" or CWAS threshold, the methods described in Enclosures 1 and 3 provide identical results.

2. The method presently used by DOD (provided the PMR requirements is removed or appropriately modified) meets many of the criteria reasonably well. The methods described in Enclosures 1 and 3 require the use of the Present Method for contractors not meeting the 50% or CWAS threshold. Thus, for methods 1 and 3, the extent to which the criteria are satisfied can vary between companies, dependent upon the implementation and/or individual company circumstances. The viability of Enclosure 4 is highly variable depending upon several factors; e.g., the mathematics of the formula finally selected, the amount and extent of flexibility allowed in its implementation, and the nature of the IR&D work being performed by the individual company.

3. The methods covered by the other enclosures to your letter fail to satisfy the criteria to any meaningful extent and, therefore, they would produce results adverse to our national objectives and best interests.

In closing, we wish to express our appreciation for the opportunity to provide these comments as the consensus of the opinions expressed by the member associations of CODSIA. We know that they will receive your careful consideration prior to submission of your final report concerning IR&D/B&P.

Sincerely,

J. A. CAFFIAUX,
Staff Vice-President, Electronic Industries Association.
JOSEPH M. LYLE,
President, National Security Industrial Association.
FRANCIS P. ROONEY
Manager, Defense Liaison Department,
Motor Vehicles Manufacturers Association.
EDWIN M. HOOD,
President, Shipbuilders Council of America.
KARL G. HARR, Jr.,
President, Aerospace Industries Association.
RALPH C. BLACKWELL,
National Aerospace Services Association.
JOHN C. BECKETT,
WEMA.

PREPARED QUESTIONS FOR THE RECORD

RESPONSES FOR THE HEARING RECORD TO QUESTIONS ASKED BY SENATOR THOMAS MCINTYRE TO DR. KENNETH OSHMAN

Question. You state that B&P expenses contribute substantially to government planning. What do you mean?

Answer. I was referring primarily to unsolicited proposals where industry has taken the initiative to identify gaps or weaknesses in currently available technology or products, and to outline research and development projects which have a high potential for solving those problems. These unsolicited proposals provide a substantial contribution to the Government agencies in planning the accomplishment of their missions.

Question. Pages 56 and 57 of the GAO report of June 5, 1975 present unfavorable comments on the use of CWAS. Will you comment on the use of CWAS? Will you review these and add your comments for the record?

Answer. As I have testified, CWAS is conceptually sound in that it brings into play an objective test regarding the reasonableness of costs. A CWAS qualified contractor is one who is contributing the predominant, or at least an equal share of his own dollars to these exploratory programs. Accordingly, he is highly motivated to apply his best efforts in the prudent planning and management of these programs involving such a high percentage of his dollars, as well as his company's future. I believe the General Accounting Office in its reports has expressed a lack of understanding of this basic fundamental of the CWAS system, and has down graded it as merely a convenient administrative formula.

GAO has commented that CWAS would perpetuate high expenditures by large companies. I do not have access to data on company expenditures as the GAO does, but I would say that if a major company with large dollar investment in IR&D were to qualify under CWAS by acceptance of a substantial share in the expenditures, the government would not be remiss in its responsibilities by eliminating the audit type surveillance of such a contractor and relying upon its managerial skills. Government personnel could then apply their time more productively in other areas.

As to visibility, there is no reason to anticipate a loss of visibility under CWAS qualified programs, as the General Accounting Office has inferred, for true constructive visibility can be maintained through means such as the DOD data bank.

Question. You suggest that greater use be made of the CWAS (Contractor's Weighted Average Share of Risk) system to minimize administration of IR&D. I understand that many firms have not applied for CWAS ratings and that no agency other than DOD will accept the CWAS system? Are you in a position to comment on the reasons for the disinterest in CWAS?

Answer. Many companies have been reluctant to apply the amount of their effort necessary to develop the data package essential to becoming CWAS qualified since the regulations to date have not offered sufficient reward; that is, there has not been a removal of controls and surveillance to the degree a CWAS qualified contractor would anticipate. I believe this subject we are discussing, the reluctance to apply CWAS to IR&D, is a case in point.

Question. The Comptroller General feels that agencies will be able to reduce IR&D costs and get better control if early in the R&D cycle, they make their problems known to industry without stating preconceived solutions.

Answer. (a) Are the military departments and DDR&E doing this now?

I believe the military departments and DDR&E are presently disseminating to industry, in a timely fashion, their general problems as known to them, within the limits of technical manpower available for this purpose. I do not agree with the position inherent in the Comptroller General's question that increased effort by the technical planners within government can substitute for the vast innovative scientific and technological base throughout industry.

(*b*) Is too much guidance being given by DOD in directing contractors' IR&D efforts?

I am not aware that DOD is providing excessive guidance in DOD contract efforts, but the presence of a military relevancy determination does have the effect of unduly influencing efforts in that direction. That is why we have suggested the elimination of the relevancy factors, such as whether such projects are sound, within a company's capabilities, and in the interests of its customers.

Question. The technical evaluation of a large firm's proposed IR&D program involves considerable manpower and expense for the company as well as the government. Does the bulk of your membership feel that such cost is worth incurring, or do they believe that the present savings in cost should be continued?

Answer. I assume this question is asking whether technical evaluation should be extended to small companies. If so, I believe the cost would be prohibitive both to these companies and to the government.

Question. The GAO report on IR&D in response to question 1 of the 22 questions shows an increase in government IR&D and B&P payments compared with declining sales. Part of this increase is due to explained changes, but the remaininng increase is still significant. Can you explain why this occurs and why it shouldn't follow the trend of sales to DOD?

Answer. I believe the Comptroller General states in his report that the annual figures for IR&D and DOD sales should not be used for making absolute comparisons of one year to another. Several reasons are given for this conclusion, including the different classifications of expenses during the years involved and the application of overhead burden during later years.

However, addressing the sense of this question, we again refer to the communications by the Council of Defense and Space Industry Associations to the General Accounting Office while this subject was under review, wherein we pointed out that on the basis of applied technical manpower IR&D efforts were actually declining.

[Whereupon, at 4 p.m. the joint hearing of the subcommittee adjourned, to reconvene at 9:30 a.m., Monday, September 29, 1975.]

INDEPENDENT RESEARCH AND DEVELOPMENT

MONDAY, SEPTEMBER 29, 1975

U.S. SENATE, SUBCOMMITTEE ON RESEARCH AND DEVELOPMENT OF THE SENATE ARMED SERVICES COMMITTEE, AND THE SUBCOMMITTEE ON PRIORITIES AND ECONOMY IN GOVERNMENT OF THE JOINT ECONOMIC COMMITTEE,
Washington, D.C.

The subcommittees met, pursuant to notice, at 9:35 a.m. in room 1114, Everett M. Dirksen Senate Office Building, Hon. Thomas J. McIntyre (chairman).

Present: Senators McIntyre (presiding) and Proxmire.

Also present: Hyman Fine, professional staff member, Senate Armed Services Committee; and Richard F. Kaufman, general counsel, Joint Economic Committee.

Senator MCINTYRE. The hearing will come to order. Today we will conclude the current series of hearings on independent research and development. The need for any further hearings will be determined upon completion of the review of all of the testimony obtained during the 3 days of hearings.

This morning we are pleased to welcome representatives from the Tri-Association Ad Hoc Committee on I.R. & D. and B. & P., who will present their views on behalf of three industry associations. These are the Aerospace Industries Association, Electronic Industries Association, and the National Security Industrial Association.

This will be followed by appearances of Adm. Hyman Rickover, Mr. Frederick Long, Dr. Judith Reppy, Mr. Hugh Witt, Administrator for Federal Procurement Policy, and Mr. David Soergel, in that order.

Senator Proxmire.

Senator PROXMIRE. This hearing was called because of the concern in Congress over the independent research and development program. There are a number of peculiarities in the program. First, about $1 billion is being spent annually for I.R. & D. without any specific authorization or approval from Congress.

There is no line item budget for I.R. & D. To that extent the budget fails in its primary purpose of informing Congress and the public of how the funds are being spent.

The funds are determined by negotiation. Congress has no way of knowing what projects are being supported and no way of reviewing.

Congress has abdicated responsibility for $1 billion of the taxpayers' money. The Pentagon admits that the funds do not include the smaller contractors. In addition, there is a serious question as to whether the full amount spent by the larger contractors are being properly accounted for.

The Pentagon and the contractors are collaborating to keep from the public how much is spent for I.R. & D. Congress never intended that the law would extend to information about Government expenditures. The bulk of I.R. & D. funds go to defense firms. The facts show that the I.R. & D. program increases the concentration of the defense business in the hands of a relatively few firms.

In view of the fact that budgetary resources are scarce, Congress must make the ultimate determinations about resources, and there is a strong reason to discontinue any program of this sort.

This program bears all the trademarks of a Government subsidy and giveaway. It takes the risks out of research and out of bidding for new business. It guaranties that the large contractors will stay large because they are placed in a preferred position to obtain new business.

The Government does not even have a right to patents or data obtained with public I.R. & D. firms. There is no incentive for contractors to control their I.R. & D. costs. The Government has no access to contractors' commercial records, no way of determining whether these funds are being spent for Government or commercial purposes.

It is not a matter of whether we are for research and development. The case for research and development is irrelevant to the case for independent research and development. I hope to see the flaws in this program corrected as a result of this hearing.

In the absence of corrective action, there ought to be a line item in the budget for I.R. & D. and all of it should be placed under specific contracts.

I don't see how Congress can close its eyes to what might be called a $1 billion leak in the Federal budget.

Senator McINTYRE. Thank you, Senator Proxmire.

Mr. Thomas J. Murrin, president of the Public Systems Co., Westinghouse Electric Corp., will lead off. Mr. Murrin, will you please introduce your two associates who will follow and then proceed with your statement?

STATEMENT OF THOMAS J. MURRIN, PRESIDENT, WESTINGHOUSE PUBLIC SYSTEMS, CO., ACCOMPANIED BY DR. RICHARD DE LAUER, EXECUTIVE VICE PRESIDENT, TRW; AND THOMAS G. POWNALL, PRESIDENT, MARTIN MARIETTA AEROSPACE

Mr. MURRIN. Senator McIntyre, Senator Proxmire, and members of the subcommittee:

I am Thomas J. Murrin, president of Westinghouse Public Systems Co.—and chairman of the Tri-Association Ad Hoc Committee on Independent Research and Development and Bid and Proposal.

Prior to these hearings, your staff asked if some of the industry associations could combine their testimony to save time and eliminate redundancy. Accordingly, the Aerospace Industries Association, Electronic Industries Association, and the National Security Industrial Association will make a single presentation.

In 1973, these three associations formed a Tri-Association Ad Hoc Committee on I.R. & D. and B. & P. to represent a broad spectrum of industry, to avoid repetition and, particularly, to correct some

erroneous impressions regarding I.R. & D. and B. & P. This committee—consisting of high-level officials from member companies—has coordinated the efforts of the three associations in conducting an in depth study on the allocation of I.R. & D. and B. & P. costs to Government contracts.

Before proceeding with our specific presentations, Mr. Chairman, what are these our three associations?

The Aerospace Industries Association represents almost 50 of the Nation's leading developers and manufacturers of advanced aircraft, spacecraft, and missiles, including their powerplants and other key components. This aerospace industry employs approximately 1 million people with annual sales of about $26 billion.

The Electronics Industry Association represents about 260 manufacturers of electronic parts, equipment and systems. Its member companies, located in virtually every State of the Union, employ approximately one and a half million people. This industry annually produces more than $35 billion worth of products.

The National Security Industrial Association is an association of approximately 250 American industrial and research companies representing all segments of the defense industry in every part of the United States. NSIA promotes effective working relationships and two-way communications between Government—primarily DOD and NASA—and the industry which supports it.

The three association presidents are here today: Dr. Karl G. Harr, Jr., of the Aerospace Industries Association; Mr. V. J. Adduci, of the Electronic Industries Association, and Vice Admiral J. M. Lyle, USN (retired), of the National Security Industrial Association.

They have asked me, on behalf of their memberships, to express their appreciation for the opportunity to place industry's views before this distinguished body on so vital a subject as I.R. & D. and B. & P.

Also present are two other members of the Tri-Association Committee—Thomas G. Pownall, president, Martin Marietta Aerospace, and Dr. Richard D. DeLauer, executive vice president, TRW, Inc.—who with your permission, will make presentations following mine.

My colleagues will cover specific aspects of our Tri-Association Industry study. In this regard, Mr. Chairman, our three presentations are intended to complement each other and because the latter two may answer many of the questions you have, you may wish to hold your questions until all three of our presentations are complete.

There are two general aspects of research and development which will help put my colleagues' comments in broader perspective.

What are they?

First, the crucial dependence of our national economic health on adequate R. & D. expenditures—and second, the role that I.R. & D. plays in this total picture.

Most of us recognize that R. & D. has played an important role in the progress of our nation. The R. & D. investments made by the United States in earlier decades have made a substantial positive impact on our standard of living and on our competitive position in the international marketplace. Also the R. & D. investment in our defense technology has been vital to our national security.

But we seem to have a paradox. Eiehter we don't really recognize the importance of R. & D.—or we just don't practice what we preach,

as you can see our country has steadily reduced its expenditures for R. & D. as a percentage of gross national product since 1964—and since 1967 R. & D. expenditures have virtually leveled off in constant dollars.

In addition, while we as a country are reducing our R. & D. expenditures, most of our major economic competitors are increasing theirs at significant rates.

Since 1963 the United States has lagged such progressive countries as Japan, West Germany, and France in the growth rate of R. & D.

This deemphasis on R. & D. compared to our past expenditures and compared to our economic competitors should be of great concern to us all.

And it is equally worrisome as this chart illustrates that as our R. & D. expenditures decrease, our rate of growth in both productivity and GNP also is markedly lower than these other countries.

We respectfully solicit your help in getting R. & D., one of our most promising investments in the Nation's future, back on track in a planned and orderly manner which will encourage industry to commit funds with confidence for innovative technology.

In addition to its economic significance, an adequate R. & D. program helps avoid dangerous technological surprises, as Prof. Robert Gilpin stated recently in his report for the Subcommittee on Economic Growth of the Joint Economic Committee:

> On at least two occasions the United States has found itself dangerously deficient in basic capabilities. The first was after the launching of the Soviet Sputnik when the United States discovered it lacked the applied mathematics, heat-resistant materials, and propulsion technology to launch its own space program. The other occasion is the present situation with respect to energy.

and,

> As we move into a highly uncertain future, the likelihood of other surprises comparable to Sputnik or the energy crisis is fairly great. Domestic or foreign events may necessitate the development of new technological capabilities. To be prepared, the United States must undertake basic capabilities R&D across a broad spectrum of science and technology.

We in industry are not doing all the R. & D. we would like to do even though, for the past several years, industry has contributed a growing percentage of the total national R. & D. funds—increasing from 33 percent, in 1965, to 43 percent in 1974. During the same time period, the Government R. & D. expenditures have dropped from 62 to 52 percent of the total.

These R. & D. expenditures by industry have become increasingly burdensome because of the depressed business climate in which virtually all of our industries are operating.

Relative to national security, DOD-directed R. & D. has actually been trending downward when measured in constant dollars.

This is of particular concern, since according to the Secretary of Defense, the Soviets are substantially increasing their investments in military R. & D. and now exceed the United States by 20 percent in current military R. & D. expenditures.

While for many years the United States had unquestioned leadership in developing new and innovative technology, this may not be the case in the future.

Just as the reduced level of our overall R. & D. investments explains in part the deterioration of the U.S. position relative to Japan

and other nations in an industrial sense, it is probable that similar reductions in defense R. & D. spending can result in serious deterioration in our relative military position.

Now how does this relate to independent research and development, which is our principal topic this morning, we see that there has been a significant reduction in I.R. & D. allowances accepted by the DOD in recent years—down from 51 percent in 1969 to 40 percent in 1974. In our judgment, this may result in disastrous consequences in the future.

It is clear that the low profit levels of the defense and aerospace industry—averaging only 3.0 percent of sales in 1974—preclude the possibility that reductions in defense I.R. & D. allowances can be offset by increased expenditures of company funds.

To put I.R. & D. expenditures in perspective, the DOD's annual costs for I.R. & D. are only one twentieth the size of the total R.D.T. & E. budget—and are only about 1½ percent of the total national R. & D. effort. On the other hand, I.R. & D. has, over the years, contributed invaluable advances to our Nation's security, and to our national technology base, which heretofore has been second to none.

I.R. & D. has helped gain and maintain our position as inovator and leading developer of superior military equipment.

Incidentally, in these and prior hearings, it has been stated that the letters I.R. & D. have been used to include both independent research and development costs, and bid and proposal costs. For clarity, our Tri-Association witnesses will use I.R. & D. to include only I.R. & D. expenditures and will use B. & P. to mean only B. & P. expenditures.

To illustrate the value of I.R. & D., there is a brief case study based partly on development work of our own company. This is just one of innumerable projects, large and small, in which I.R. & D. has played a significant role.

The example concerns the evolution of several electro-optical systems—some of which are just now entering the military inventory.

The work dates back to the 1940's when our Central Research Laboratories undertook studies of image amplification using electrons instead of light. The intention at that time was to develop a more effective way of taking medical X-rays with increased clarity and reduced exposure to the patient.

This work was successful—and raised the possibility of further developments that might permit seeing in the dark. Up to this point, the work had been supported entirely by company funds.

Anticipating that this might have significant defense applications, we sought and received support from the DOD for additional research in this new direction. This led to the development of a photo-sensitive imaging tube used in low-light level television systems.

The Government has gained many demonstrated benefits from this effort—such as guidance systems for more accurate delivery of weapons; viewing systems which help pilots fly aircraft safely at extremely low altitudes, and the Apollo TV cameras used to view man's first steps on the moon.

Also some unanticipated nondefense benefits are being derived from these IR&D investments in electro-optical systems. A particularly

heartening one concerns aid to the blind. Using an active imaging tube—with individual miniaturized sensors on its face—it is now possible to help blind persons read such more easily.

The tube picks up multiple images from the braille page—and using electronic signals—enhances the braille patterns so that the fingers of the blind reader detect impulses in the letters, speeding identification.

As further advances are made in electro optical technology, we expect more useful systems to develop—both for defense and non-defense applications.

Here both Government and non-Government users share the fruits of the I.R. & D. work—after they have, appropriately, shared the risks and the costs, Here we also see how how the DOD benefits from company funded research and development work.

There is an additional point I would like to make on behalf of my own company, Westinghouse Electric Corp.

Because of the very modest profits realized from the defense portion of our total business activities—and because R. & D. is essential to the future success of this high technology business—it is clear that any significant reduction in IR.. & D. and B. & P. funds will require us to carefully evaluate whether continuing our defense business activities can make a meaningful contribution to national security, and an adequate return to our stockholders.

I have to say that any severe reduction in I.R. & D. and B. & P. would probably force us out of the defense business.

I prefer to be more positive. We are convinced that continued and increasing I.R. & D. expenditures are invaluable to the Nation; are a necessary expense of doing defense business; and should be more adequately supported by the Government. My two colleagues will present information to support this conviction.

Mr. Chairman, are there any questions at this time, before I introduce Mr. Thomas C. Pownall, president, Martin Marietta Aerospace and a member of our Tri-Association Ad Hoc Committee?

Senator McIntyre. You are talking about the national effort on I.R. & D. and not just Defense R. & D.?

Mr. Murrin. Yes, sir, intended to put in context the comments we will now make and suggesting, Mr. Chairman, that I.R. & D. is a key part of that overall R. & D. effort. If ther are no other questions I would like to proceed with Mr. Pownall.

Mr. Pownall. Mr. Chairman and members of the subcommittees, I am Thomas G. Pownall. I welcome the opportunity to describe the membership and structure of the Tri-Association Committee and the reasons for its formation.

This is the membership of the committee. It is unusual for undustry to organize in such a fashion to address an issue, but we did so because of our conviction that I.R. & D./B. & P. is absolutely vital to industry, to DOD and NASA, and to our Nation.

Independent research and development, or I.R. & D. is, essential to industrial viability and growth. A vigorous industry requires the continued development of new or improved products and services and the recovery of the related costs in the prices of its products and services. It is our firm opinion that technology based companies cannot exist in our economy without on-going I.R. & D.

Effective competition requires that more than one company be in a position, technologically, to respond to a customer's requirements. The Government encourages, and in fact is required by law to capitalize on, the benefits of effective competition among its suppliers.

Bid and proposal, referred to simply as B. & P., is that effort required by a contractor to describe and integrate the results of his precursor I.R. & D. work with all other pertinent data, including that derived from his commercial and Government-funded programs, in a manner that will permit a customer to evaluate the contractor's potential to meet the customer's requirements. Adequate data must be generated to substantiate the predicted performance and to establish the credibility of the proposer.

It seems to us that I.R. & D. and B. & P. are not well understood. For many years industry's procurement and technical specialists, accountants and lawyers have worked with their DOD and NASA counterparts to develop and implement policies and procedures which properly reflect congressional mandates.

Senator Proxmire's suggestion in September 1973 that I.R. & D. and B. & P. costs allocable to DOD contracts might be reduced by 50 percent, and the 22 questions subsequently asked of the GAO by Senators McIntyre and Proxmire forced industry to the realization that widespread misconceptions still existed regarding the nature and importance of I.R. & D./B. & P.

We then decided that a systematic, analytical effort by industry could be helpful in order to more fully expose the true worth of these efforts. To this end the ad hoc committee that you saw in the earlier slide was assembled in December 1973 and has studied the problem continuously, right up to this moment.

This examination has included a careful review of all relevant prior studies conducted by both industry and the Government. Two principal subcommittees were established:

The Industry Perspective Subcommittee chaired by Irving Kessler, had the task of generating the material on I.R. & D./B. & P. that would make the total subject more visible and understandable. Dr. DeLauer, our next witness, will elaborate on this aspect shortly. The result, we believe, is the most thorough and comprehensive report to date on the subject.

The Communications Subcommittee, which I chair, is charged with making the study and its conclusions available to both government and industry.

We were aware then from the outset that much of the confusion and controversy centered on the need to demonstrate the benefits of I.R. & D. In particular there have been repeated requests to identify those benefits which the government derives from I.R. & D.

We are sure you recognize that there are benefits from I.R. & D.; the question perhaps is whether they are sufficient and understandable.

We think "emphatically yes" but recognize that they are not demonstrable over a very short time span. As the GAO Report cites, a National Science Foundation study of ten innovations determined their average time from conception to realization as being some 19 years.

There are several different kinds of I.R. & D. outputs. While discoveries and great innovations are an exciting and important product,

they comprise only a part of the total value of a contractor's I.R. & D. program. Other kinds of results derived from I.R. & D. work are shown in this slide.

Technology advancement is a significant category of I.R. & D. A prevailing impression is that all I.R. & D. ultimately results in the design of products suitable for sale to a broad spectrum of customers.

In fact much I.R. & D. work is used to acquire the knowledge necessary to maintain a company's competitive capability in key technologies vital to the continued pursuit of its business.

The nature and technical thrust of the I.R. & D. work performed by any company is strongly influenced by the nature of its products, by the company's own estimate of its technical abilities, and by its perception of the longer term business opportunities in its field.

System and other concept formulation studies are another definable product of I.R. & D. They represent industry's views of alternative approaches to satisfying its customers' requirements. Often as a result of such studies industry volunteers creative innovations for resolving critical deficiencies in existing systems or for effecting significant cost reductions.

A "successful failure" implies a piece of I.R. & D. work which is unsuccessful in that it fails to achieve its desired objectives, yet nevertheless demonstrates at low cost that a given approach to the resolution of specific problems, or meeting specific needs, is inadequate or uneconomical.

Early identification of nonviable approaches significantly minimizes the risks to both government and industry which are attendant to all R. & D. undertakings, including DOD's contracted R. & D. effort.

Lastly a major portion of I.R. & D. effort is aimed at evolving superior hardware and systems which offer either significantly improved performance, lower cost, or both. However, it is the exception rather than the rule that the attainment of a dramatically increased operational capability or cost reduction is directly or uniquely traceable to one specific piece of I.R. & D. work.

In practice the results of many segments of I.R. & D. work interact synergistically in the evolution of a new or improved system. This fact is uniquely responsible for the difficulty of furnishing a brief response to what appears to be a reasonable question, namely, "provide examples of the benefits of I.R. & D."

As you can readily imagine, tracing the flow of I.R. & D. results to end-products is difficult when one considers the complexity and diversity of DOD's end-items, ranging from armed helicopters to advanced ablative heat shields.

Prior attempts to identify benefits of I.R. & D. avoided the burden of tracing the interacting contributions of many I.R. & D. tasks. Instead examples were sought on a company-by-company basis, where recent I.R. & D. work had had a readily identifiable and quantifiable result.

This was also the approach taken by the GAO in the course of its pilot study of four DOD contractors, which was described in the recent GAO report. The GAO's awareness of the fallibility of this approach is discussed in the body of its report, and predictably, it proved impossible to quantify the benefits of the I.R. & D. by this method.

The final chapter on Conclusion and Recommendations in the GAO Report conveys the impression that the benefits of I.R. & D.

were found not worthy of their cost, whereas the fact is the approach taken was fundamentally incapable of determining this question.

In the examples cited in the Tri-Association study, industry has taken the arduous but more meaningful approach of taking specific DOD end-items, in the four categories of technology advancements, components, subsystems and major systems and tracing the contributions of I.R. & D. over a period of several years.

Also R. & D. contracts awarded for continuation and expansion of the original I.R. & D. work are shown to illustrate the synergism — the manner in which I.R. & D. complements DOD's own R.D.T. & E. program.

By presenting 48 examples in considerable detail our study illustrates both the large numbers of benefits flowing from I.R. & D. work, and the difficulty of tracing all such benefits.

Mr. Chairman, I respectfully call your attention to the comprehensive studies to which Mr. Murrin and I have referred. We respectfully request that they be incorporated into the record of these hearings, or that they be incorporated by reference.

Senator McIntyre. Without objection we will include this in the record by implication.*

Mr. Pownall. I would now like to introduce Dr. Richard DeLauer, executive vice president, TRW, Inc., and a member of our Tri-Association Committee. He will describe in more detail the content and organization of our study, and discuss its conclusions and findings.

Senator McIntyre. Mr. DeLauer, I notice your statement runs 19 pages.

Dr. DeLauer. I am going to hit some highlights.

Senator McIntyre. Your entire statement will appear in the record, along with the previously mentioned material. I hope some of the 19 pages can be precised and cut down.

Dr. DeLauer. Rather than read my formal statement, I will highlight key aspects of it. First, I'll highlight the Tri-Association Report, and then I would like to couple up our findings and recommendations with those of the GAO report made to your subcommittee. At the outset, I would like to distinguish between contract R. & D., I.R. & D. and B. & P. All companies, in particular those companies in the advanced technology business whether they are commercial or government or both, must do their own self-initiated research and development "homework" in order to maintain their technical leadership and capabilities in their particular fields and thereby maintain ability to respond competitively to their customer's future needs and requirements. Otherwise they will not survive.

Such R. & D. homework is called by various names. But in government procurement circles, it is called "independent research and development." It is important to distinguish this I.R. & D. from R. & D. performed under direct contract. I.R. & D. is self-initiated, self-directed and self-funded by the company. For contract R. & D. the customer calls the tune and is in the driver's seat.

Bidding and proposal (B. & P.) is the term used in government procurement circles to describe a company's effort at preparing and submitting proposals, whether they are solicited or unsolicited, to its customers to meet an identified customer requirement.

*Retained in subcommittee files.

I.R. & D. and B. & P. should not be lumped together and treated as the same kind of effort simply because the same or similar technical experts are called in to support them. They are different in purpose and are performed for very different reasons. I.R. & D. is aimed more to future needs, whereas B. & P. is aimed at the present customer requirements.

Now I would like to address myself to some of the misconceptions that have been floating around the environment in regard to I.R. & D. and B. & P.

Misconception 1: I.R. & D. and B. & P. are commodities offered for sale. In both commercial and government markets, the price of the product or service includes a pro rata share of the cost of I.R. & D. and B. & P. (by whatever name you call it). A company's own research and development and selling costs associated with future products are represented in the price of today's products.

In government contracting the main issue is whether the government as a customer will accept its pro rata share as part of the contract price. This really is the issue. Since these costs are part of the indirect cost of doing business, it is illogical to think that I.R. & D. and B. & P. can be ordered and bougth "by the pound." Rather than being commodities offered for purchase, they are normal costs of doing business. If a company selects and performs its I.R. & D. poorly, you don't stay in business.

It is unrealistic to suppose that any single point in the government could perceive all of the areas in which the I.R. & D. and B. & P. effort might pay off and then decide just how much and to whom such contracts should be awarded for such efforts. This would really destroy the free enterprise aspects of the situation. Misconception 2: I.R. & D. and B. & P. costs are increasing in an abnormal way. Misleading cost data is at the heart of today's misunderstanding of I.R. & D. and B. & P. trends.

As Senator McIntyre pointed out when introducing the DOD's 1974 annual report on I.R. & D. and B. & P., the total dollar amount for 1974 was essentially the same as for 1973, but if inflation during that period of time were considered, the amount for 1974 was actually lower than for 1973.

Even more important—since 1968 the levels of industrial manpower expended on I.R. & D. and B. & P. has decreased by 28 percent. This very critical fact is hidden by the preoccupation of looking only at the dollar figures. The costs are higher not only due to inflation but also due to the Government directed changes in accounting practices whereby we now have to apply overhead burden to I.R. & D. and B. & P. costs. These costs have been increased although the technical manpower has actually decreased.

Misconception No. 3: The controls over I.R. & D. and B. & P. are ineffective.

The truth, in our view, is that I.R. & D. and B. & P. are very much overcontrolled under current legislative and DOD regulations. Even the recent GAO report recommends that technical reviews be less structured and be made less burdensome, and the recent Defense Science Board report on I.R. & D. also makes several recommendations aimed at reducing the administrative complexities of overcontrol.

It is hard for us to believe that controls are ineffective when there has been a 28-percent reduction in the level of manpower expended

on I.R. & D. and B. & P. since 1968. Perhaps the controls are overly effective and are really counterproductive. Misconception No. 4: reimbursement of I.R. & D. and B. & P. costs is an industry subsidy. It is also claimed that small companies and nondefense activities are discriminated against.

Such allegations demonstrate a complete lack of knowledge of the reimbursement process. The Government does not pay any contractor a cash sum to perform I.R. & D. and B. & P. The contract price includes overhead of which these costs are a part. Whether you're a small or large company, it is still included in the contract price. If you don't win any DOD contracts, DOD does not absorb any of your I.R. & D. and B. & P. costs. It's that simple.

Even in the case of large defense contractors who are required to negotiate advance agreements, there is no direct payment, no advance payment whatsoever to the contractor. Reimbursement is obtained only through the contract price which includes allocation to your contracts) of the pro rata share of the I.R. & D. and B. & P. costs. Misconception No. 5 the benefits of I.R. & D. and B. & P. have not been demonstrated. Mr. Pownall has covered this already so I will not go into detail.

I'll only cover the point regarding traceability and relevancy. About 8 years ago we had some good propulsion chemists who were out of work because of the fact that the NASA lunar program was coming to an end.

These boys were good and they developed under I.R. & D. a method for desulphurization of coal. That was considered nonrelevant to the Department of Defense and we were not allowed the cost of that research as part of our indirect costs applied to defense contracts.

We continued anyway with company funds and this method now, with the establishment of ERDA, is considered a very, very promising process, and we are in the throes of developing a pilot plant operation on the desulphurization of coal. This is a direct fallout of I.R. & D.

ALTERNATIVE METHODS

Regarding alternate methods of reimbursing I.R. & D. and B. & P., I refer you to a summary matrix on page 30 of our triassociation position paper on I.R. & D./B. & P. This large matrix covers every possibility you could think of for handling this.

Our conclusion is that the very first column of the matrix—marked A—is the best. Let competitiveness of the marketplace take charge.

However, if forced to use it, I think that the present method would work pretty well if the relevancy problem is resolved, which I'll discuss later.

I.R. & D. BENEFITS

Our triassociation report identifies these categories of benefits:

I.R. & D. stimulates competition and creates technical alternatives for satisfying Government requirements.

I.R. & D. provides contributions to the national technological base and helps avoid costly technical surprises.

I.R. & D. provides more technology per dollar since the work is done independently by the contractor and is not surrounded by the

costly administrative complexities required by Government contracting.

I.R. & D. permits diversification of a company's products and enables a company to meet its changing customer needs.

I have referred earlier to the current military relevancy requirement. Although well intended from a defense budget economic viewpoint, this relevancy test serves as an effective barrier from the realization of greater benefits from I.R. & D.

At the very time when public policy should spur greater activity in important nonmilitary areas, this restrictive military relevancy constraint discourages industry from broadening its capabilities to meet such critical Government needs in such areas as energy, transportation, health care, pollution control, and scarce material substitutes.

B. & P. BENEFITS

In the recent GAO report, the Comptroller General stated:

> B&P effort is generally shorter range than IR&D effort. A contractor uses the techniques and know-how acquired under IR&D to prepare a technical package designed to convince the customer of the merits of the proposal. The B&P activity helps the customer to make an award on the basis of the demonstrated capabilities of competing suppliers.

While it would be difficult to improve on this statement of the benefits of bidding and proposal efforts, we might add the following observations:

B. & P. assures a continuing competitive environment in which better equipment and services can be acquired at a lower price;

B. & P. makes available to the Government, via unsolicited proposals, fruitful sources of innovative ideas; and

B. & P. facilitates industrial diversification, the benefits of which flow to all other Government agencies and the Nation as a whole. My earlier coal example is a case in point.

FOREIGN NATION SUPPORT

Mr. Murrin covered the topic of U.S. and foreign nation support of the industrial-technical effort, so I won't go into any further detail on this part of our report.

AGREEMENT ON BASIC PRINCIPLES

I'll now discuss the triassociation's key recommendations by coupling them with those of the GAO report. There is substantial agreement on the most fundamental aspects of I.R. & D. and B. & P. by all who have studied the issue: GAO, Commission on Government Procurement, Interagency Group, Defense Science Board, and the triassociation. Specifically, we agree with the following findings from GAO report (p. 89), which should be reflected in a congressional declaration of basic principles:

Recognition of I.R. & D. and B. & P. expenditures "as being in the Nation's best interests to promote competition, advance technology, and foster economic growth";

Establishment of a policy "recognizing I.R. & D. and B. & P. efforts as necessary costs of doing business"; and

Provision for "uniform treatment of I.R. & D. and B. & P., Government-wide, with exceptions treated by the Office of Federal Procurement Policy."

In view of its congressionally mandated charter, the Office of Federal Procurement Policy appears to be the proper vehicle for formulation of the common policy and practice under which all Federal agencies will operate.

GAO RECOMMENDATIONS FOR CONGRESSIONAL GUIDANCE

The GAO report recommends (p. 88) that, if financial support for I.R. & D. and B. & P. is to be continued, the Congress should establish guidelines which set forth the purposes, the appropriate amount, and the degree of control to be exercised.

We offer the following comments on these three topics for your consideration.

PURPOSE

We can hardly improve on the statement of purpose included in the recent GAO report; that is, "The contractor decides on the independent research and development areas undertaken to maintain and improve its ability to compete for future products and services."

Industry suggests that the congressional declaration, advocated above, incorporate fulfillment of this essential purpose.

In the testimony before this body on another day it is my understanding the Comptroller General, Mr. Staats, stated that I.R. & D. and B. & P. are necessary for the underpinning of our society and economy. We likewise concur in this view of the vital nature of I.R. & D. and B. & P.

Finally, I would like to quote from the first principle stated in our triassociation position paper for consideration in the congressional declaration advocated above:

> Relative to programs of key national importance, these activities play a major role in advancing the technological capabilities of those industries most directly involved in the support of the government. Examination of the benefits of these activities suggests that a substantial part of many technological advances that have resulted in the U.S. position of world leadership in defense and space, have had their genesis in I.R. & D.

AMOUNT

We believe the Congress should be motivated to encourage industry to increase I.R. & D. and resulting B. & P. effort. In the view of the need for increased effort for the United States to stay in the lead in competition between nations, and the major source of technological innovation represented by I.R. & D., it seems obvious that this effort should not be allowed to decrease as it has in recent years.

An administrative nightmare could be created if I.R. & D. and B. & P. effort were subjected to the establishment of an annual amount of effort through a line item in the budget.

A company cannot efficiently conduct its I.R. & D. activities without the ability to confidently plan in advance. Advancements in technology don't go by the calendar. They go by the little gray cells in people's heads. We have to plan I.R. & D. in advance from a technical standpoint and from a cost standpoint.

Not knowing in advance which projects will be acceptable or to what degree, creates choas. Incorporating these indirect costs of doing business into a budgetary line item every year would destroy the independence of judgment which the heart of free enterprise.

DEGREE OF CONTROL

The right of industry to exercise management discretion on the content and amount of I.R. & D. and B. & P. should not be abridged by arbitrary laws or regulatory controls. Each company must be able to evaluate its needs for the future in the light of its own capabilities. The Government should jealously be guarding the independent aspects to avoid the loss of great ideas.

Special legislative controls on I.R. & D. and B. & P. are unnecessary in view of the already existing controls inherent in responsible internal management, in the competitive marketplace, and in the Government's existing rights to audit, question, and disallow on grounds of reasonableness and allocability of I.R. & D. and B. & P.

The Government can examine the records. They are available to Congress. They are not available to the public. They are not subject to public disclosure, but any time Congress wants to review the company's activities in an executive session, the information is certainly available to Congress.

These existing controls give more than adequate assurance that there will not be runaway costs in these areas. Aside from other factors, there is no question the Government has a responsibility for employing adequate methods for the purpose of public accountability of Government funding. However, the indirect costs for I.R. & D. and B. & P. included in the price of all products and services sold, have been singled out for overcontrol beyond any sense of reason.

This has caused more formalized, more complex, and much more costly methods for controlling these indirect costs than for any other indirect cost with similar or greater magnitude. We have to bring back reason and simplicity in responding to this need for public accountability.

GAO RECOMMENDED SPECIFICS

Assuming a uniform Government-wide policy for the administration and reimbursement of I.R. & D. and B. & D. expenses, the GAO made several specific recommendations. I'll briefly comment on each.

1. One face to industry

We agree with the GAO's concept of having the Government present "one face to industry"; that is, one overhead rate and a joint technical review.

We object to the excessive redtape of advance agreements, but we would certainly prefer to see a single advance agreement rather than different understandings with each agency. The Office of Federal Procurement Policy would be the key in achieving the one face for the Government.

2. Retain DOD approach

We advocate less controls on I.R. & D. and B. & P., not more. However, the degree that uniform adoption of the DOD approach

would advance the one-face concept, we would not have an objection to the DOD method except for the relevancy problem which I will now discuss.

3. Agency relevancy test

The GAO has recommended that allowable projects be required to have a potential relationship to an agency function or operation, in the opinion of the agency head.

We strongly oppose this. It would ignore the totality of the Government's interests and multiply by agency relevancy tests, as we understand it, it would mean multiple reviews, multiple agreements, and multiple overhead rates. What could be more of a direct contradiction to the GAO's one face recommendation? Perhaps it is for this reason that the GAO states that, if there is a uniform treatment, the desirability of a government-wide relevancy test will have to be considered.

We have concluded that the relevancy test concept is basically unsound and favor elimination completely of any such requirement. At the very least, if relevancy is nevertheless applied, it should be in terms of the totality of the Government's needs.

4. Patent and technical data

The GAO recommends that advance agreements should include patent and technical data provisions giving the Government royalty free rights.

We submit that the Government should not receive free rights to patents or data resulting from these I.R. & D. efforts. These efforts are company initiated and company funded. When a customer buys a TV or automobile, he does not expect nor does he get the patent or data rights to that commercial product. Why should the Government, as a customer, be treated differently?

5. Access to commercial records

The GAO report recommends that the Government have access to contractor's commercial records when needed to determine that I.R. & D. and B. & P. costs are allowable. This issue goes far beyond the specific matter of I.R. & D. being examined here today, and has far reaching legal implications. Therefore, I prefer not to make any comments on this particular issue except to call your attention to Title 18, paragraph 1905, which talks about the disclosure of confidential information, which is defined to include trade secrets, processes, and operations.

SUMMARY

Government policy regarding I.R. & D. and B. & P. should stimulate, not constrain, the competitive forces in the Government marketplace. Companies should be attracted to enter the Government marketplace, and not be turned away by narrow minded constraints. A company, to remain competitive and survive, must conduct self-initiated R. & D. homework at an adequate level and continuing basis.

Congress should specifically express positive support for I.R. & D and B. & P. and reverse the current motivation to continually reduce the effort.

Full cost recovery of I.R. & D. and B. & P. through contract prices would place the U.S. Government on equal footing with all other

customers, and would place U.S. industry on equal footing with foreign competitors.

Anything less than full reimbursement of these costs in Government contracts is, in effect, a subsidization of the U.S. Government by American industry. That is the situation today. We look to the Congress of the United States to correct this inequitable situation.

Senator McINTYRE. We will now proceed with questioning, gentlemen.

On the part of your company, would you have any objection if the Department of Defense authorized public release of the total amount spent each year for I.R. & D. and B. & P. and the portion of that amount which is repaid by the Government?

This would be done for all companies with whom the Government has advance agreements but would provide no other detail concerning these amounts.

Mr. MURRIN. Would you repeat the question?

Senator McINTYRE. On the part of your company, would you have any objection if the Department of Defense authorized public release of the total amount spent each year for I.R. & D. and B. & P. and the portion of that amount which is repaid by the Government? This would be done for all companies with whom the Government has advance agreements but would provide no other detail concerning these amounts.

Mr. MURRIN. My reaction, sir, is the following. To the extent that this information would compromise competition between our firm and others working in the same area of research and independent research and development and I can't anticipate exactly what that would be, not having ever seen the data in its totality, but to the extent that it would compromise our competitive posture vis-a-vis other contractors, we would greatly resist this recommendation.

I might add as a citizen perhaps rather than an executive, I question sincerely the amount of additional information of any value that the Congress would derive from these generalized types of data. I would suggest that someone ponder that.

It might represent a considerable administrative task that would in the long run gain little value and merit.

Mr. POWNALL. I specifically would object to it, Senator McIntyre.

Dr. DELAUER. I would object because I think you are comparing apples and oranges. These advance agreements are set up under a particular set of circumstances. No matter how hard anybody would try, or would like to be objective about it, there would be no way you could keep them from trying to be comparative about it. These comparisons would lead to more trouble than you would ever gain by trying to have such information in the public domain.

Mr. MURRIN. If I might complement Dr. DeLauer's point, let's say that company A reviews our data, and we have access to company B's data, and we find that in an area of crucial competitive technological undertaking, our competitor is recovering from the Department of Defense a much higher percentage than we have been able to do. I assure you, sir, that this would spur us to achieve the same, and I would volunteer on behalf of DOD this would produce something of a problem to them administratively in trying to reconcile these two—or more—competing firms.

Mr. POWNALL. I believe that it would be contrary to the total interest of the United States to reveal this data to all of those with whom we are competing around the world and provide them with the knowledge of where we are placing our emphasis and how far we are getting in that area.

Aside from the local competitive posture that we worry about, I would worry about the international implications.

Senator MCINTYRE. Would you be satisfied if the Congress decided to continue the provisions of section 203, Public Law 91–441 without change?

Mr. MURRIN. Yes, sir. We have advocated as you have heard from Dr. DeLauer a position that is more extreme and which we view as more in the total interest of the country and industry. As a practical matter, we have little hope, short term, for achieving that position and therefore we would support continuing the situation as it now is.

Mr. POWNALL. I think it should be pointed out that in all cases of which I am aware, the companies now doing business with the Department of Defense are indeed exceeding—out of profit—their ceilings as a regular matter, heavily and considerably.

I don't know whether that is well understood but it is fact of life. We are down to the profit level of 3 percent. We can argue about risks and other things, but I think it ought to be clear that we are now subsidizing heavily the present program.

The answer is yes, we have been in it up until now. We will probably continue to stay in it. I think it could be improved.

Dr. DELAUER. With the changes that I recommend, the relevancy and the "one face," yes. If you modify those two, we will go along with the present law.

Senator MCINTYRE. Would you favor a continuation of the present separate policies and procedures for I.R. & D. by the various Government agencies, or the establishment of a single set of rules for Government-industry relations?

Mr. MURRIN. I think in principle we would favor the single set of rules and the single agency. As a practical matter, Mr. Chairman, not knowing exactly what is proposed, we would rather reserve final comment until we could see a more definitive statement as to how it would be effected.

Mr. POWNALL. I would much favor it and I think it would greatly reduce the administrative burden we have.

Dr. DELAUER. The same.

Senator MCINTYRE. Mr. Pownall, last year I visited your plant in Orlando, Fla., and noticed that there was a substantial area that was not being used, partly because the Sprint II missile program has not turned out as planned.

Would that have any effect on your I.R. & D. program?

Mr. POWNALL. It would inspire us to use the maximum effort, however it were made available to us, to bring additional work into the plant.

The fact that an empty space represents cost is an enormous drag on one's competitiveness. So the object of the exercise is to fill the space with productive work or get rid of it. In a great many instances getting rid of it is exactly what we have done.

Mr. FINE. To the extent that that situation represents a decline in sales for that particular location, does that mean that the fact of it

in terms of what you might expect to recover in the way of I.R. & D. and B. & P. payments to the Government would necessarily be lower because your contract price would be lower?

Mr. POWNALL. It is true that when the base is lowered, the recovery is also lower at about the same rate. On the other hand, empty space cannot be programmed very cleverly. We programmed its utilization, but the anticipated requirement ("Sprint" production) ended well in advance of the time anyone had anticipated. Indeed one does come by these dry spells periodically and it does have an effect on your recoverability.

Mr. FINE. Does this also mean if the Orlando facility is a specific cost center, that if it became important to the company to increase competitive posture in the areas of military equipment, the decision would have to be made by the company to put out more of its own resources beyond what it might expect to recover otherwise.

Mr. POWNALL. The company is now spending considerably above the ceiling allowed in that plant for its current I.R. & D. program.

Senator MCINTYRE. Would you favor a continuation of the present separate policies and procedures for I.R. & D. by the various Government agencies or the establishment of a single set of rules for Government-industry relations?

Mr. POWNALL. Well——

Dr. DELAUER. I would have to answer in the following way: The nature of the work could very well be of the same character i.e., the same people and everything else are used in doing the particular work. Normally universities, as I understand from being associated with a few, apply for grants in such a fashion that they outline the areas in which they would like to work. The work statement is not very specific to the same degree as that for an R. & D. contract for a particular piece of technical work would be.

The nature of the effort by universities in their grant type research activities and the nature of the effort by industry in our independent research and development are very similar. However, there is a critical difference as to purpose. University research under grants has as its end objective the expansion of knowledge. To industry, I. R. & D. leads to future product sales, and hence is vital to a company's survival.

The fact that one is an indirect expense to a corporation where the other is a grant to a university, is an accounting difference.

Really they are not comparable at all. You have to compare the nature of work and who works on them and not the procurement process.

Senator MCINTYRE. Senator Proxmire?

Senator PROXMIRE. We have now heard the Department of Defense, NASA, the Atomic Energy Agency, the small contractors, everybody who benefits either from being able to get a billion dollars or give away a billion dollars has testified before us.

You gentlemen are brilliant, successful businessmen. If anybody could make a good case for getting that money under the terms you do, I think you could. I have not heard any arguments that defend the terms under which you get this. I don't understand why the firms that get money from the Federal Government should not be identified.

Nothing in the world proprietary about that aspect of it. I.R. & D. should be a budget item. We did get testimony from the small con-

tractors that they thought it should be a budget item. You gentlemen—I have one vague, general argument that I recall clearly as to why it should not be made a budget item.

You said it would be contrary to established principles of free enterprise. We are all in favor of free enterprise. It is inconceivable to me why making an item that the Federal Government spends in the budget identified as such, how in the world that could contradict free enterprise is beyond me.

Furthermore, the lack of detail with respect to the military relevance or the space or energy relevance. When we spend money, we have a responsibility to the taxpayers to know that that money is spent for the most productive possible purpose, that it has a priority better than other priorities which have been denied funds.

I would like to just take the opportunity to read to you from a witness who is going to appear a little later, Dr. Reppy and Dr. Long, a short paragraph for your comment.

Comparability changes are needed on technical evaluation. Procedures used by DOD for evaluation must be made sufficiently clear so they can be explained and justified to Congress. Congress should be able to understand the reasons for supporting a given R&D project and must be assured that support is related to the project's relevance. How can DOD possibly know whether the IR&D program is cost effective unless it evaluates and details the efforts of its cost effectiveness against its own IR&D programs?

You gentlemen are saying we should provide these funds to contractors, enormous sums, $1 billion altogether or more and then not have an evaluation at any point, even from 5 years ago or 10 years ago as to whether or not those funds were well spent.

Would you like to spend—would you like to comment?

Dr. DeLauer. Yes, sir. Senator, let me just read to you the following, and I will submit it for the record.

The following TRW proposed IR&D projects for 1975 have been declared unallowable due to the relevancy test. 1, energy data management system. 2, energy resources development cost models. 3, energy systems optimization, to support the ability to be able to trade off different kinds of enrgy solutions.

Four, energy R. & D. funding evaluation. Five, chemical energy technology. Six, system for vertical mass movement of high temperature corrosive fluids. Seven, investigation of solar collection devices, the biggest mess that has been in the country——

Senator Proxmire. Let me ask you, I only have 10 minutes to question you. I don't want you to take the whole time reading a list.

Dr. DeLauer. You made the point that the tests are not being controlled and implemented. The DOD administers the relevancy test in a very specific fashion.

Senator Proxmire. We don't know whether that is relevant or not because we don't have that information. We don't know how much you wanted for this. Let me ask you, how much were you paid last year at TRW by the Federal Government for I.R. & D.?

Dr. DeLauer. I can submit it to the committee if you would like to have it.

Senator Proxmire. Can you give us a ballpark figure?

Dr. DeLauer. You said "I.R. & D." but I assume you are also interested in B. & P. We are currently reimbursed about $18 million annually through DOD contracts for both I.R. & D. and B. & P. costs. But I'd better clarify this. I.R. & D. and B. & P. costs are not "paid" to TRW in a lump sum or in advance, or in any form separate

from or in addition to TRW's contract prices. As is the normal practice, our I.R. & D. and B. & P. costs are recovered through our contract prices; that is, they are part of the indirect costs spread across all business, commercial and government alike.

Under our advance agreement with DOD, TRW's defense contracts provided for recovery of about $18 million of our I.R. & D. and B. & P. expenses last year, which was less than their fair share of the actual costs. The disallowed portion, of course, comes out of profits. There's no such problem, of course, with our commercial customers.

If TRW didn't have any defense contracts, then DOD wouldn't absorb any of TRW's I.R. & D. and B. & P. The advance agreement only determines the level of allowability when and if TRW performs defense contracts; it doesn't provide us with an advance payment, and it doesn't guarantee a fixed sum for I.R. & D./B. & P. irrespective of the volume of our defense business.

Senator PROXMIRE. Why would that be proprietary? Why shouldn't we get that kind of figure for every firm? We are making some progress this morning.

Dr. DELAUER. You and Senator McIntyre can have that information any time you want to go into executive session. Do you need it?

What does the public need to know for?

Senator PROXMIRE. The public pays for it.

Dr. DELAUER. They also pay for the R. & D. that the cheese company in Wisconsin gets as a portion of the price when they sell cheese to the DOD. You don't make that public and you make that payment.

Senator PROXMIRE. We don't pay I.R. & D. for cheese.

Dr. DELAUER. You pay for it every time you go out and buy cheese.

Senator PROXMIRE. Who paid for I.R. & D. for the Edsel?

Dr. DELAUER. The people who bought Fords after the Edsel.

Senator PROXMIRE. Who paid for the automobiles that failed in the first 20 or 30 years of this century? There was research and development that did not work out. In this you shift the burden, the risk to the taxpayer.

You don't take any risk.

Dr. DELAUER. You do take risks.

Senator PROXMIRE. Not if the Federal Government has to pay for it.

Dr. DELAUER. That does not have anything to do with whether you make or lose money on a contract, sir.

Mr. MURRIN. If you think I am starting to go on ad nauseum, let me know. You see, sir, to characterize our special administration of I.R. & D. as something of a boondoggle——

Senator PROXMIRE. Let me say that I don't know whether it is or not and I don't known how anybody else can unless they get much more detail than we have. I don't know. You can make a case for I.R. & D. although a fine expert is going to testify right after you who thinks you can't.

Whether we can or not, we don't have the data to know. We can't evaluate it.

Mr. MURRIN. May I take a moment on that? I can assure you that the matter of the management of I.R. & D. in our firm, and I think ours is representative of our industry, receives as much scrutiny as any matter of our entire business spectrum. The reason for that is

simple. It involves the creativity and genius of the best resources we have, a relatively few imaginative engineers and scientists whose productivity determine the viability or nonviability of our enterprise.

Senator PROXMIRE. I am sure you have extremely able people. It is essential to Westinghouse. But we don't know what you are doing with our money that we are making available from the taxpayer. We have a responsibility to the taxpayer to know that in detail.

Mr. MURRIN. Your Department of Defense representatives, in the persons of large teams of very professional and discerning and seemingly critical and objective advisors, scrutinize regularly all of these programs, the commitments against the starts, and progress and problems, and elaborate reports are written on those subjects.

Also, symposia are conducted regularly. All this is aggregated in a meaningful form which gets to you.

Senator PROXMIRE. You are telling us that we should take what the DOD does on faith. We don't take any other thing on faith. You are telling us trust the DOD. Well, you gentleman have people who used to work for the DOD who now work for you.

It goes back and forth. You can't blame us for wanting to have an effective check on it.

Mr. MURRIN. I am trying to communicate that this is an area that already gets a great deal of scrutiny by us and we think also by our customers.

If that is not adequate in you judgment, we will respect that, but I wanted you to know how we feel.

Senator PROXMIRE. I would—I know how I would feel if I were getting $1 billion with no strings.

Mr. POWNALL. There are tests that go into this review. In addition to that we are supplementing that budget by something between—something on the order of about 20 percent across the industry out of pocket.

We are spending more than is being allowed in order that we should do what we think is a good job in the maintenance of our postures in in our industries.

Senator MCINTYRE. Mr. Murrin, what is your opinion of the reason for the paradox you describe whereby the United States is declining in its R. & D. expenditures while countries such as Japan, West Germany, and France, and I might add Russia, are increasing?

Mr. MURRIN. If I may characterize that as a profound question and myself not as a Solomon-like man so I start out saying I can't adequately respond.

Having observed this phenomena for quite a few years, I think frankly that it is not until recent years that we in the United States have begun to appreciate fully the critical impact of R. & D. on our economic and military and total posture.

It is quite fascinating to find that one cannot see in the learned writings of economists and scholars in earlier decades any suggestions that R. & D. is crucial to the development of a country.

In effect, I think we are running an *"experiment"* in which we are demonstrating painfully that when you reduce these investments, you slow down the economic progress of the country. I think alternatively very discerning countries like Japan, West Germany, and France have realized the tremendous value of research and development and have increasingly made investments in this area.

I think it is a paradox. I think it is a reality that is growing on us. Hopefully through the leadership in the Congress and increasing awareness of this in the constituency, this will be reversed and we can regain our preeminent position in the world.

Senator McINTYRE. From an overall industry point of view, do you believe that total government expenditures for research and development are tilting too far in the direction of nonmilitary programs at the expense of military-related programs?

Mr. MURRIN. Increased expenditures are necessary and should be made both in the short- and long-term interests of the country.

Senator McINTYRE. Except for the independent nature of I.R. & D. is there any distinction in your mind between the type of technology conducted under the R. & D. appropriation and that under the I.R. & D. program?

Mr. POWNALL. Yes. The I.R. & D. program covers several facets. One is the maintenance of one's competitive posture. One is a discovery of things that will not work. One is systems study. Another is innovations in new systems. They are quite different and lead only to the next phase and that is what is the next step.

What R. & D. should the Department of Defense afford? We provide and stock to some extent their knowledge of R. & D. through our independent research and development program. So I think there is a considerable difference in their management, in their structure, and in their result.

Senator McINTYRE. You state that the significant reduction in DOD's share of contractor I.R. & D. costs from 51 percent in 1969 to 40 percent in 1974 may result in disastrous consequences in the future. How do you explain then why, in actual dollars, industry spending which was not repaid by the Government increased from $173 million in 1972 and to $281 million estimated for 1973?

Doesn't this prove that competition and future profits are the predominant influence for industry I.R. & D. spending and not government repayments?

Mr. POWNALL. In that aspect it does. The report was narrow and in that sense did not go back through a number of years to research the end product to determine what I.R. & D. benefits could be expertly related. It took a very narrow, very short term view of it. As a result, it was unable to come up with what the benefits actually are. We reported that in the 48 items we provided to you.

I think you will find that that is the most comprehensive report ever conducted on the whole subject of I.R. & D.

Senator McINTYRE. To what extent do you believe that industries' level of investment in I.R. & D. would be affected in each of the following situations:

If existing I.R. & D. legislation was eliminated?

Mr. MURRIN. Senator, if I follow you, you are suggesting the situation in which all of the current ASPR regulations and procedures relating to I.R. & D. would be eliminated and we would have then, in a pristine fashion, a free enterprise system.

Senator McINTYRE. What would happen?

Mr. MURRIN. I can only speculate that after decades of evolving what we now have with a good deal of give and take on both sides I think that we are quite close to a fairly practical solution to the

situation. I would doubt that there would be dramatic changes in I.R. & D. one way or the other under the situation you postulate.

Senator McINTYRE. Do you other gentlemen agree or want to comment further on that?

Mr. POWNALL. I would have to observe that I believe that the costs would increase were that to be the case for no other reason than I have already testified to the fact that we are spending more money than the ceiling permits now. Were there no such ceiling, we would spend more money. The question is how much more money and I think that might be something on the order of a 15-percent increase.

Mr. FINE. If the rules and regulations were completely thrown out, this would enable industry to recover a greater amount of money from the Government, I would believe. If you agree that—with that, couldn't that result in industry actually paying out less of the total I.R. & D. from its own resources that would not be recovered?

Dr. DELAUER. I think you are right, but, I think that we are pretty much structured in order to be competitive. It does not take much to lose a competition. Therefore your overhead rates are figured in.

If they balloon too much, you are all of a sudden out of the game. Therefore you have to be competitive. In commercial business, there is no government watching over your shoulder and yet we are very careful about what we spend there.

Mr. POWNALL. It is a fact that we are uncontrolled, if you will, except by our own abilities to maintain our competitiveness. Then we would indeed unburden ourselves administratively very considerably.

This is not an inexpensive proposition to maintain some margin of control on.

Senator McINTYRE. To what extent do you believe that industry's level of investment in I.R. & D. would be affected if the Congress established a ceiling for fiscal 1977 equal to the amount paid by DOD for I.R. & D. and B. & P. during calendar year 1974?

The figure we are talking about is $800 million.

Mr. MURRIN. Senator, I guess the most obvious result of what I view from my admittedly parochial standpoint, would be a net reduction in the actual creative manpower invested in this important area in that of course all of us, as you well know, are burdened with increasing labor and material and other costs.

If a ceiling is fixed on an absolute dollar amount, one of the results that would seem to follow, per se, is that the amount of actual effort in the area would trend downward.

Viewed from an international perspective and considering what we think we know about the posture of the Soviets in the same area, as a citizen, I would greet that with some alarm; particularly if the spirit of the question is that this might continue into the future.

Senator McINTYRE. Senator Proxmire?

Senator PROXMIRE. I think we have something of a problem here because as I understand it, Admiral Rickover was going to testify next. These gentlemen are excellent witnesses and you and I both have other questions for them. I wondered if it would be possible to bring Admiral Rickover up and have them remain?

I think it might be an interesting situation. We might get some useful give and take.

Mr. MURRIN. We would be happy to stay if you would like us to and we would be happy to return later.

[See additional testimony, p. 724.]

Senator MCINTYRE. The prepared statements of the witnesses for the Tri-Association Ad Hoc Committee will be inserted at this point in the record.

[The statements follow:]

PREPARED STATEMENT OF THOMAS J. MURRIN

Senator McIntyre, Senator Proxmire, and Members of the Subcommittee: I am Thomas J. Murrin, President of Westinghouse Public Systems Company—and Chairman of the Tri-Association Ad Hoc Committee on Independent Research and Development and Bid and Proposal.

Prior to these hearings, your staff asked if some of the industry associations could combine their testimony to save time and eliminate redundancy. Accordingly, the Aerospace Industries Association, Electronic Industries Association and the National Security Industrial Association will make a single presentation.

In 1973, these three associations formed a Tri-Association Ad Hoc Committee on IR&D and B&P to represent a broad spectrum of Industry, to avoid repetition, and particularly to correct some erroneous impressions regarding IR&D and B&P. This Committee—consisting of high-level officials from member companies—has coordinated the efforts of the three associations in conducting an indepth study on the allocation of IR&D and B&P costs to government contracts.

Before proceeding with our specific presentations, Mr. Chairmen, I would like to describe briefly our three associations.

The Aerospace Industries Association represents almost 50 of the nation's leading developers and manufacuters of advanced aircraft, spacecraft, and missiles, including their power plants and other key components. This aerospace industry employs approximately one million people with annual sales of about $26 billion.

The Electronic Industries Association represents about 260 manufacturers of electronic parts, equipment and systems. Its member companies, located in virtually every state of the Union, employ approximately 1½ million people. This industry annually produces more than $35 billion worth of products.

The National Security Industrial Association comprises approximately 250 American industrial and research companies representing all segments of the defense industry in every part of the United States. NSIA promotes effective working relationships and two-way communications between Government—primarily DOD and NASA—and the Industry which supports it.

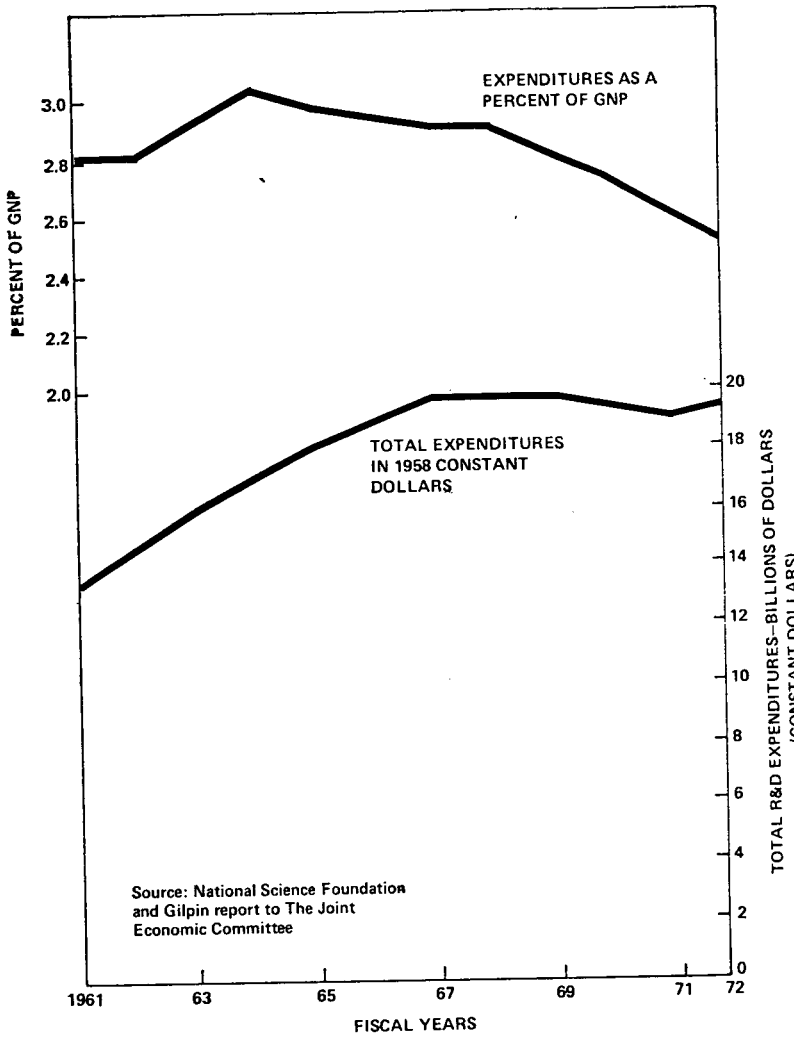
The three association presidents are here today: Dr. Karl G. Harr, Jr., of the Aerospace Industries Association; Mr. V. J. Adduci, of the Electronic Industries Association, and Vice Admiral J. M. Lyle, USN (Retired), of the National Security Industrial Association. They have asked me, on behalf of their memberships, to express their appreciation for the opportunity to place industry's views before this distinguished body on so vital a subject as IR&D and B&P.

Also present are two other members of our Tri-Association Committee—Thomas G. Pownall, president, Martin Marietta Aerospace, and Dr. Richard D. DeLauer, executive vice president, TRW, Inc.—who with your permission, will make presentations following mine.

Before my two colleagues cover specific aspects of our Tri-Association Industry study, I would like to comment on two broader aspects of research and development—to help put their comments in broader perspective: First, the crucial dependence of our national economic health on adequate R&D expenditures—and second, the role that IR&D plays in this total picture.

Most of us recognize that R&D has played an important role in the progress of our nation. The R&D investments made by the United States in earlier decades have made a substantial positive impact on our standard of living and on our competitive position in the international marketplace. Also, the R&D investment in our defense technology has been vital to our national security.

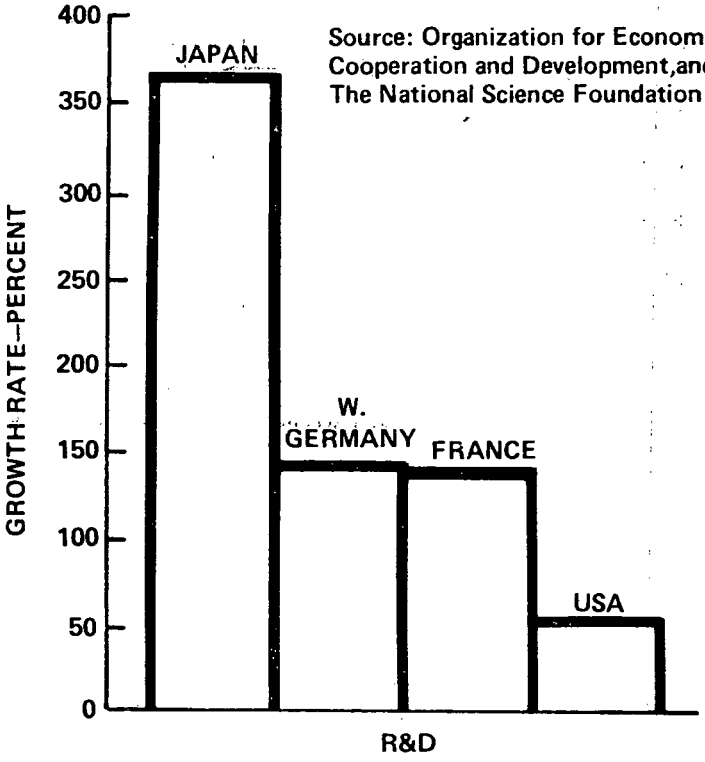
Total R&D Expenditures



SLIDE No. 1

But we seem to have a paradox. Either we don't really recognize the importance of R&D—or we just don't practice what we preach, because our country has steadily reduced its expenditures for R&D as a percentage of Gross National Product since 1964—and since 1967 R&D expenditures in constant dollars have virtually leveled off.

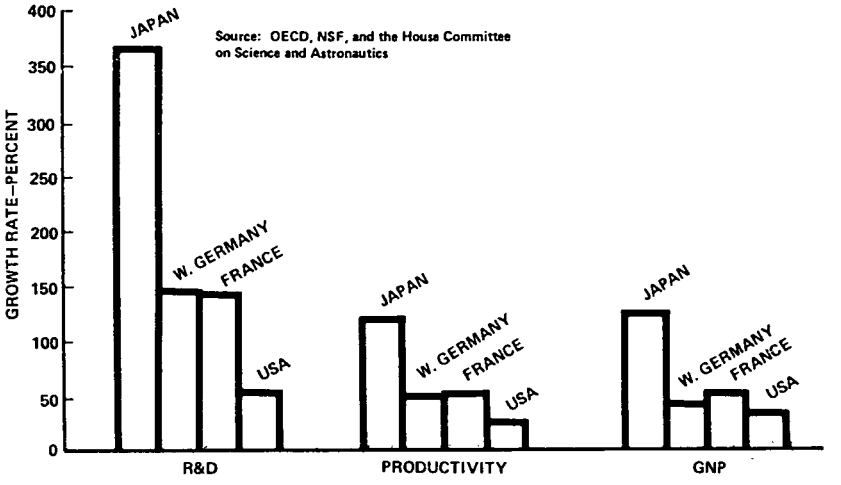
Comparative Growth Rates of R&D 1963–1971



SLIDE No. 2

While we as a country are reducing our R&D expenditures, most of our major economic competitors are increasing theirs at significant rates. Since 1963, the U.S. has lagged such progressive countries as Japan, West Germany, and France in the growth rate of R&D.

Comparative Growth Rates of R&D, Productivity and GNP



SLIDE NO. 3

This de-emphasis on R&D compared to our past expenditures and compared to our economic competitors should be of great concern to all of us. It is equally worrisome that as our R&D expenditures decrease, our rate of growth in both productivity and GNP is markedly lower than these other countries.

We respectfully solicit your help in getting R&D, one of our most promising investments in the nation's future, back on track in a planned and orderly manner which will encourage Industry to commit with confidence funds for innovative technology.

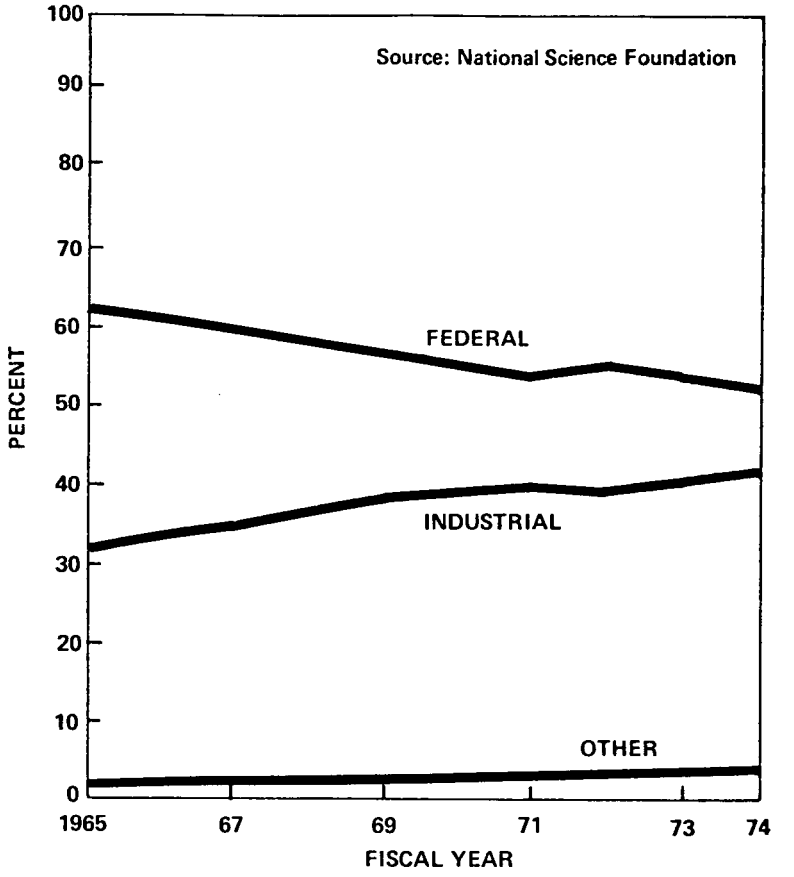
In addition to its economic significance, an adequate R&D program helps avoid dangerous technological surprises, as Professor Robert Gilpin stated recently in his report for the Subcommittee on Economic Growth of the Joint Economic Committee:

> —on at least two occasions the United States has found itself dangerously deficient in basic capabilities. The first was after the launching of the Soviet Sputnik when the United States discovered it lacked the applied mathematics, heat-resistant materials, and propulsion technology to launch its own space program. The other occasion is the present situation with respect to energy . . .

and . . .

> —as we move into a highly uncertain future, the likelihood of other surprises comparable to Sputnik or the energy crisis is fairly great. Domestic or foreign events may necessitate the development of new technological capabilities. To be prepared, the United States must undertake basic capabilities R&D across a broad spectrum of science and technology.

Trends In National R&D Funding By Major Source

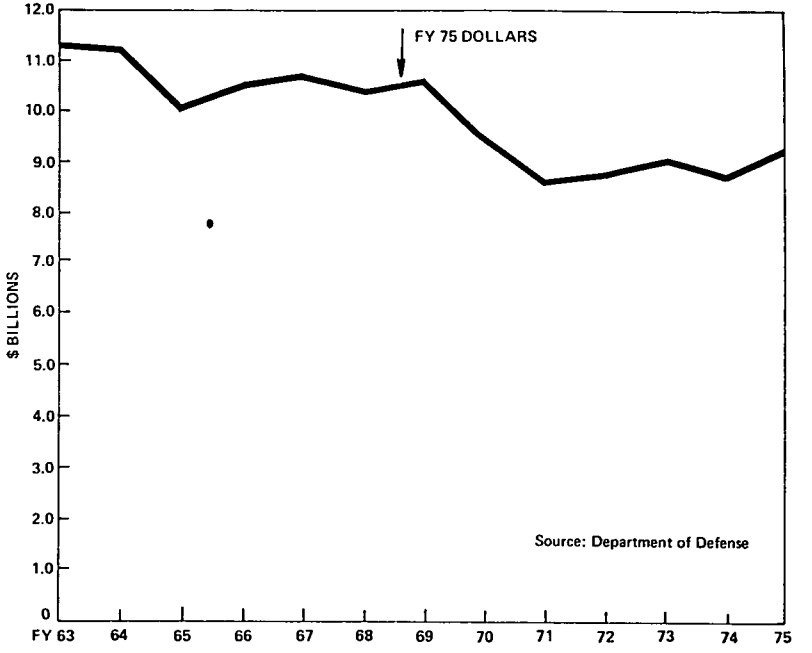


SLIDE No. 4

We in the Industry are not doing all the R&D we would like to do even though for the past several years, Industry has contributed a growing percentage of the total national R&D expenditures—increasing from 33 percent in 1965 to 42 percent in 1974. During the same time period, the Government R&D expenditures dropped from 62 to 52 percent of the total.

These R&D expenditures by Industry have become increasingly burdensome because of the depressed business climate in which virtually all of our industries are operating.

DOD RDT&E In FY 75 Dollars



SLIDE No. 5

Relative to national security, DOD-directed R&D when measured in constant dollars has actually been trending downward.

This is of particular concern, since according to the Secretary of Defense, the Soviets are substantially increasing their investments in military R&D and now exceed the U.S. by 20 percent in current military R&D expenditures.

While for many years, the United States had unquestioned leadership in developing new and innovative technology, this may not be the case in the future.

Just as the reduced level of our overall R&D expenditures explains in part the deterioration of the U.S. position relative to Japan and other natlons in an industrial sense, it is probable that similar reductions in defense R&D spending can result in serious deterioration in our relative military position.

Turning now to independent research and development, our principal topic this morning, we see that there has been a significant reduction in DOD's share of contractor IR&D costs in recent years—down from a 51 percent share in 1969 to only 40 percent in 1974. In our judgment, this may result in disastrous consequences in the future.

It is clear that the low profit levels of the defense and aerospace industry—averaging only 3.0 percent of sales in 1974—preclude the possibility that reductions in defense IR&D allowances can be offset by increased expenditures of company funds.

To put IR&D expenditures in perspective, the DOD's annual costs for IR&D are the equivalent of about 5 percent of the total RDT&E budget—and are only about 1½ percent of the total national R&D effort. On the other hand, IR&D has, over the years, contributed invaluable advances to our nation's security, and to our national technology base, which heretofore has been second to none. IR&D has helped gain and maintain our position as leading developer of superior military equipment.

To illustrate the value of IR&D, I would like to cite briefly a case study based on development work of our own company. This is just one of innumerable developments, large and small, in which IR&D has played a significant role.

The example concerns the evolution of several electro-optical systems—some of which are just now entering the military inventory.

The work dates back to the 1940's when our Central Research Laboratories at Pittsburgh undertook studies of image amplification using electrons instead of light. The intention at that time was to develop a more effective way of taking medical X-rays with increased clarity and reduced exposure to the patient. This work was successful—and raised the possibility of further developments that might permit "seeing in the dark." Up to this point, the work had been supported entirely by company funds.

Anticipating that this might have significant defense applications, we sought and received support from the DOD for additional research in this new direction. This led to the development of a photo-sensitive imaging tube used in low-light-level television systems.

The Government has gained many significant benefits from these efforts—such as guidance systems for more accurate delivery of weapons; viewing systems to fly military aircraft safely at extremely low altitude; and the Apollo TV cameras used to view man's first steps on the moon.

Additional nondefense benefits are being derived from these IR&D investments in electro-optical systems. A partiuclarly heartening one concerns aid to the blind. Using an active imaging tube—with individual miniaturized sensors on its face—it is now possible to help blind persons read much more easily. The tube picks up multiple images from the braille page—and using electronic signals—enhances the braille patterns so that the fingers of the blind reader detect impuses in the letters, speeding identification.

As further advances are made in electro-optical technology, we expect more useful systems to develop—both for defense and nondefense applications.

Here both government and nongovernment customers share the fruits of the IR&D work—after they have, appropriately, shared the risks and the costs. Here also we see how the DOD benefits from company-funded research and development work.

In concluding, I would like to make one final point on behalf of my own company, the Westinghouse Electric Corporation.

Because of the very modest profits realized from the defense portion of our total business activities—and because R&D is essential to the future seccess of this high-technology business—it is clear that any significant reduction in IR&D funds would require us to carefully evaluate whether continuing our defense business activities can make a meaningful contribution to national security, and an adequate return to our stockholders. I have to say that any severe reduction in IR&D would probably force us out of the defense business.

However, in a more positive vein, we have the conviction—and we are hopeful that the Congress shares this conviction—that continued and increasing IR&D expenditures are invaluable to the nation; are a necessary expense of doing defense business; and should be more adequately supported by the Government. My two colleagues will present information to support this conviction.

If you have no question or comments at this time, Mr. Chairmen, I would like to introduce Mr. Thomas C. Pownall, President, Martin Marietta Aerospace, and a mamber of our Tri-Association Ad Hoc Committee.

Prepared Statement of Thomas G. Pownall

Mr. Chairman and Members of the Subcommittee: I am Thomas G. Pownall. I welcome the opportunity to describe the membership and structure of the Tri-Association Committee and the reasons for its formation.

Tri-Association Ad Hoc Committee On IR&D/B&P

Mr. T. J. Murrin (Chairman)
President, Public Systems
Westinghouse Electric Corporation

Dr. Richard E. DeLauer
Executive Vice President
TRW, Inc.

Mr. J. R. Dempsey
Vice President & Group Executive
AVCO Corporation

Mr. John B. Jackson, President
Federal Systems Division
IBM Corporation

Mr. Irving K. Kessler
Executive Vice President
Government & Commercial Systems
RCA Corporation

Mr. James Knott
Vice President & General Manager
Detroit Diesel Allison Division
General Motors Corporation

Mr. A. Ray McCord
Executive Vice President
Texas Instruments, Inc.

Mr. S. N. McDonnell
President & Chief Executive Officer
McDonnell Douglas Corporation

Mr. Mark Morton
Vice President & Group Executive
Aerospace Group
General Electric

Mr. Thomas G. Pownall
President
Martin Marietta Aerospace

Mr. William F. Schmied
Group Vice President
Aerospace & Marine Systems Group
The Singer Company

Mr. Robert C. Wilson
President
Collins Radio Company

SLIDE NO. 1

This is the membership of the Committee. It is unusual for Industry to organize in such a fashion to address an issue, but we did so because of our conviction that IR&D/B&P is absolutely vital to Industry, to DOD and NASA, and to our Nation.

- IR&D IS ESSENTIAL
- B&P IS FUNDAMENTAL IN A COMPETITIVE SYSTEM
- IR&D & B&P ARE NOT WELL UNDERSTOOD

SLIDE NO. 2

Independent Research and Development, or IR&D, is essential to industrial viability and growth. A vigorous Industry requires the continued development of new or improved products and services and the recovery of the related costs in the prices of its products and services. It is our firm opinion that technology-based companies cannot exist in our economy without on-going IR&D.

Effective competition requires that more than one company be in a position, technologically, to respond to a customer's requirements. The Government encourages, and in fact is required by law to capitalize on, the benefits of effective competition among its suppliers. Bid and Proposal, referred to simply as B&P, is that effort required by a contractor to describe and integrate the results of his precursor IR&D work with all other pertinent data, including that derived from his commercial and government funded programs, in a manner that will permit a customer to evaluate the contractor's potential to meet the customer's requirements. Adequate data must be generated to substantiate the predicted performance and to establish the credibility of the proposer.

It seems to us that IR&D and B&P are not well understood. For many years, industry's procurement and technical specialists, accountants, and lawyers have worked with their DOD and NASA counterparts to develop and implement policies and procedures which properly reflect congressional mandates. Senator Proxmire's suggestion in September 1973 that IR&D/B&P costs allocable to DOD contracts might be reduced by 50 percent, and the twenty-two questions subsequently asked of the GAO by Senators McIntyre and Proxmire forced Industry to the realization that widespread misconceptions still existed regarding the nature and importance of IR&D/B&P. We then decided that a systematic, analytical effort by Industry could be helpful in order to more fully expose the true worth of these efforts. To this end, the Ad Hoc Committee that you saw in the earlier slide was assembled in December 1973 and has studied the problem continuously, right up to this moment. This examination has included a careful review of all relevant prior studies conducted by both Industry and the Government.

Tri-Association Ad Hoc Committee On IR&D/B&P Sub-Committee Structure

INDUSTRY PERSPECTIVE SUB-COMMITTEE

IRVING K. KESSLER, CHAIRMAN

COMMUNICATIONS SUB-COMMITTEE

THOMAS G. POWNALL, CHAIRMAN

SLIDE No. 3

Two Principal subcommittees were established:

The Industry Perspective Committee, chaired by Irving Kessler, had the task of generating the material on IR&D/B&P that would make the total subject more visible and understandable. Dr. DeLauer, our next witness, will elaborate on this aspect shortly. The result, we believe, is the most thorough and comprehensive report to date on the subject.

The Communications Subcommittee, which I chair, is charged with making the study and its conclusions available to both Government and Industry.

Benefits of IR&D

SLIDE No. 4

We were aware from the outset that much of the confusion and controversy centered on the need to demonstrate the benefits of IR&D. In particular, there have been repeated requests to identify those benefits which the Government derives from IR&D.

We are sure you recognize that there are benefits from IR&D; the question perhaps is whether they are sufficient and understandable. We think "emphatically yes," but recognize that they are not demonstrable over a very short time-span. As the GAO Report cites, a National Science Foundation study of ten innovations determined their average time from conception to realization as being some 19 years!

The Different Kinds of Technical Outputs From IR&D

- TECHNOLOGY ADVANCEMENT
- SYSTEMS AND OTHER CONCEPT FORMULATION STUDIES
- "SUCCESSFUL FAILURES" OR RISK REDUCTION AT LOW COST
- INNOVATION OF SUPERIOR (LOWER COST, HIGHER PERFORMANCE) SYSTEMS OR HARDWARE

SLIDE NO. 5

There are several different kinds of IR&D outputs. While discoveries and great innovations are an exciting and important product, they comprise only a part of the total value of a contractor's IR&D program. Other kinds of results derived from IR&D work are shown in this slide.

Technology advancement is a significant category of IR&D. A prevailing impression is that all IR&D ultimately results in the design of *products* suitable for sale to a broad spectrum of customers. In fact, much IR&D work is used to acquire the knowledge necessary to maintain a company's competitive capability in key technologies vital to the continued pursuit of its business. The nature and technical thrust of the IR&D work performed by any company is strongly influenced by the nature of its products, by the company's own estimate of its technical abilities, and by its perception of the longer term business opportunities in its field.

System and other concept formulation studies are another definable product of IR&D. They represent Industry's views of alternative approaches to satisfying its customers' requirements. Often, as a result of such studies, Industry volunteers creative innovations for resolving critical deficiencies in existing systems or for effecting significant cost reductions.

A *"successful failure"* implies a piece of IR&D work which is unsuccessful in that it fails to achieve its desired objectives, yet nevertheless demonstrates at *low cost* that a given approach to resolution of specific problems, or meeting specific needs, is inadequate or uneconomical. Early identification of non-viable approaches significantly minimizes the risks to both Government and Industry which are attendant to all R. & D. undertakings, including DOD's contracted R. & D. effort.

Lastly, a major portion of IR&D effort is aimed at *evolving superior hardware and systems* which offer either significantly improved performance, lower cost, or both. However, it is the exception rather than the rule that the attainment of a dramatically increased operational capability or cost reduction is directly or uniquely traceable to one *specific* piece of IR&D work. In practice, the results of many segments of IR&D work interact synergistically in the evolution of a new or improved system. This fact is uniquely responsible for the difficulty of furnishing a brief response to what appears to be a reasonable question, namely, "provide examples of the benefits of IR&D." As you can readily imagine, tracing the flow of IR&D results to "end-products" is difficult when one considers the complexity and diversity of DOD's end-items, ranging from armed helicopters to advanced ablative heat shields.

- TRACING THE FLOW OF IR&D
- GAO APPROACH
- INDUSTRY'S APPROACH

SLIDE NO. 6

Prior attempts to identify benefits of IR&D avoided the burden of tracing the interacting contributions of many IR&D tasks. Instead, examples were sought, on a company-by-company basis, where *recent* IR&D work had had a readily identifiable and quantifiable result. This was also the approach taken by the GAO in the course of its pilot study of four DOD contractors, which was described in the recent GAO Report. The GAO's awareness of the fallibility of this approach is discussed in the body of its report and, predictably, it proved impossible to quantify the benefits of IR&D by this method. The final chapter on "Conclusions and Recommendations" in the GAO Report conveys the impression that the benefits of IR&D were found not worthy of their cost, whereas the fact is the approach taken was fundamentally incapable of determining this question.

In the examples cited in the Tri-Association study, Industry has taken the arduous but more meaningful approach of taking *specific DOD end-items*, in the four categories of technology advancements, components, subsystems, and major systems, and tracing the contributions of IR&D over a period of several years. Also, R&D contracts awarded for continuation and expansion of the original IR&D work are shown to illustrate the synergism—the manner in which IR&D complements DOD's own RDT&E program.

By presenting 48 examples in considerable detail, our study illustrates both the large number of benefits flowing from IR&D work and the difficulty of tracing all such benefits.

Mr. Chairman, I respectfully call your attention to the comprehensive studies to which Mr. Murrin and I have referred.

We respectfully request that they be incorporated into the record of these hearings, or that they be incorporated by reference.[1]

I would now like to introduce Dr. Richard DeLauer, who will describe in more detail the content and organization of our study, and discuss its conclusions and findings.

PREPARED STATEMENT OF RICHARD D. DELAUER

Mr. Chairman and Members of the Subcommittee: I am Richard D. DeLauer, Executive Vice President, Systems and Energy, TRW Inc., and a member of the Tri-Association Committee which Mr. Pownall has described to you.

Tri-Association Ad Hoc Committee On IR&D/B&P Study Content

- ECONOMIC CONSIDERATIONS REGARDING IR&D AND B&P EXPENSE
- ALTERNATIVE METHODS OF IR&D AND B&P COST REIMBURSEMENT
- BENEFITS DERIVED FROM IR&D EFFORT
- BENEFITS DERIVED FROM B&P EFFORT
- U.S. AND FOREIGN NATION SUPPORT OF INDUSTRIAL TECHNICAL EFFORT
- INDUSTRY RESPONSE TO 22 McINTYRE-PROXMIRE QUESTIONS

SLIDE NO. 1

I want to describe briefly five of the six major topics we addressed in the Tri-Association studies and cite some of the highlights of the Tri-Association report pertaining to each topic. Each major topic is discussed in further detail in the Tri-Association studies which Mr. Pownall requested be incorporated into the record of these hearings.

The first topic deals with economic considerations regarding IR&D and B&P expense. First, let me emphasize the *difference between R&D, IR&D and B&P Independent Research and Development* (*IR&D*) is a term utilized by the government to differentiate between a contractor's research and development technical effort performed under a contract, grant, or other arrangement (R&D) and that which is *company-initiated, company-directed,* and *company-funded* (IR&D).

[1] "Tri-Association Ad Hoc Committee on IR&D/B&P, A Position Paper on Independent Research and Development and Bid and Proposal Efforts, AIA/EIA/NSIA, March 22, 1974" and "Tri-Association Ad Hoc Committee on IR&D/B&P, Technical Papers on Independent Research and Development and Bid and Proposal Efforts, AIA/EIA/NSIA, March 1974." Copies of the studies may be obtained from any of the three associations.

Common Misconceptions Regarding IR&D/B&P

- IR&D AND B&P ARE MISTAKENLY CONSIDERED TO BE PROGRAMS OFFERED FOR SALE

Common Misconceptions Regarding IR&D/B&P

- IR&D AND B&P ARE MISTAKENLY CONSIDERED TO BE PROGRAMS OFFERED FOR SALE
- IR&D/B&P COSTS ARE ALLEGED TO BE INCREASING ABNORMALLY

Common Misconceptions Regarding IR&D/B&P

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- IR&D/B&P COSTS ARE ALLEGED TO BE INCREASING ABNORMALLY
- CONTROLS ON IR&D/B&P ARE SAID TO BE INEFFECTIVE

Common Misconceptions Regarding IR&D/B&P

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- IR&D/B&P COSTS ARE ALLEGED TO BE INCREASING ABNORMALLY
- CONTROLS ON IR&D/B&P ARE SAID TO BE INEFFECTIVE
- IR&D/B&P SUBSIDIZES ONLY A SEGMENT OF INDUSTRY—SMALL INDUSTRIES AND NON-DEFENSE INDUSTRIES ARE CLAIMED TO BE DISCRIMINATED AGAINST

Common Misconceptions Regarding IR&D/B&P

- IR&D AND B&P ARE MISTAKENLY CONSIDERED TO BE PROGRAMS OFFERED FOR SALE
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- IR&D/B&P SUBSIDIZES ONLY A SEGMENT OF INDUSTRY–SMALL INDUSTRIES AND NON-DEFENSE INDUSTRIES ARE CLAIMED TO BE DISCRIMINATED AGAINST
- **IR&D/B&P BENEFITS TO THE GOVERNMENT ARE ALLEGED NOT TO HAVE BEEN DEMONSTRATED**

SLIDE NO. 2

IR&D and R&A are Not Similar Programs, and One Does Not Replace Nor Duplicate the Other. R&D includes research and exploratory development to *customer specified requirements.* IR&D is company-initiated and directed exploratory effort aimed not necessarily toward any specific customer, but toward advancing technology in those areas that each company believes will be essential to fulfilling the needs of its current and future customers.

On the other hand, Bid and Proposal (B&P) is a term utilized by the government to describe a contractor's technical and supporting effort directed at preparing and submitting proposals (solicited and unsolicited) to meet an identified customer requirement.

In the controversy over IR&D and B&P, some of the current misconceptions that are of concern are:

IR&D and B&P Can Be Programs Offered for Sale.—As a customer, the government, and this includes the Defense Department, is not buying independent research and development as a commodity. Instead, the DOD customer buys goods and services the prices of which contain a proportionate allocable share of most indirect costs, including IR&D/B&P.

IR&D/B&P Costs Are Alleged to be Increasing Abnormally.—This allegation is misleading. Mr. Chairman, you pointed out in the Congressional Board of April 9, 1975 (p. 5561), when introducing DOD's annual report on IR&D/B&P expenditures for 1974, that the amounts for 1974 were essentially the same as for 1973 and if inflation is considered the 1974 level would be below that for 1973. This aspect, we believe, should be a matter of concern. As limitations on IR&D/B&P recovery level off and inflation continues, is the current recovery adequate to support essential IR&D/B&P? Industry has previously reported our concern to the GAO that actual IR&D man-power technical efforts were declining [Council of Defense and Space Industry Associations (CODSIA) letter dated February 11, 1974 to Mr. Harold Rubin, Deputy Director, Procurement and Systems Acquisition Division, U.S. General Accounting Office.

Controls over IR&D/B&P costs are alleged to be ineffective.—Quite the reverse of this allegation is true. The truth is that IR&D and B&P are over-controlled by current government regulations. In fact, the recent GAO report suggests, for example, that technical reviews of IR&D projects be less structured and not as administratively burdensome. Also, the recent Defense Science Board IR&D Task Force in its report "An Analysis of IR&D/B&P" recommends reduction in some administratively burdensome controls.

Reimbursement of IR&D/B&P (costs are alleged to be subsidizing a segment of private industry. Further, small industries and non-defense industries are allegedly not reciving the IR&D/B&P advantges of large spac and defense industries.—This contention is erroneous in several respects. First, reimbursement by the government of its allocable share of IR&D/B&P costs in the prices of products it buys from industry cannot be considered subsidization. Second, any company

or industry that produces or supplies products needed by the government has complete freedom and is, in fact, encouraged to solicit business from the government. Any government contract winner, whether large or small, defense or non-defense, receives the same "advantages" as any other winner of a government competition. To the extent that its IR&D/B&P costs are considered allowable by the government they will be recovered in the price of the products sold to the government customer.

Thus, the reverse of the allegation of subsidization by the government is actually true. Those companies who do sell to the government are being denied full recovery of IR&D/B&P costs because of current ceiling and relevancy limitations. To this extent it might properly be said that a segment of private industry is actually subsidizing the U.S. Government.

The benefit to the government from IR &D and B &P expenditures has allegedly not been demonstrated.—As Mr. Pownall our previous witness pointed out, this allegation appears to stem from the mistaken view that "benefits" flowing from IR&D can be quantified on a one-to-one ratio, and can be tracked out through the multifold branches of IR&D projects to the end result. Overall benefits have been demonstrated over and over again by examples presented to Congress by DOD and NASA—and by the comprehensive Tri-Association report "Technical Studies on IR&D and B&P Efforts".

Our second major topic looks at possible alternative methods of IR&D and B&P cost reimbursement. The study examined rather thoroughly nine major alternative methods of IR&D and B&P funding, measuring them against 12 criteria of desirability both to the government and to industry. The complete matrix is provided you on page 30, figure 2, of the Position Paper and can be studied at your leisure. This slide is shown only to indicate the depth to which alternates were considered.

As you examine our matrix, please remember an important corollary of the competitively driven marketplace: anything *less* than *full* reimbursement of IR&D/B&P costs is, in effect, a subsidization of the U.S. Government by American industry, insofar as the government's failure to absorb its full allocable share of these essential business expenses is concerned. We believe that the government should not seek to establish, through legislation, preferred customer status over all other customers.

Probably the most important subject covered by the GAO report is its summarization of opinions received concerning 14 alternative methods of reimbursing IR&D costs. The Comptroller General does not recommend any specific approach.

As you have heard in the testimony of the previous industry witnesses, we believe that IR&D costs are essential costs of doing business and as such should be fully recoverable by appropriate allocation to the prices of products sold to all customers. Therefore, we strongly recommend your favorable consideration of the recovery method described in the GAO Report as "No Constraint on Recovery Except Reasonableness and Allocability."

Evaluation of Alternative Methods For Government Recognition of IR&D and B&P Costs

Criteria \ Method	A	B		C	D	E	F		G	H	I
	Inherent Economic Constraints In Competition	CWAS Plus Present Method w/o PMR (1) CWAS	CWAS Plus Present Method w/o PMR (1) Non-CWAS	Present Method w.o PMR (3)	Present Formula Universally Applied	Present Method	Budget Line Item (2) 1. Direct * Contract	Budget Line Item (2) 2. Level of * Effort Contract	Recovery Through Profit Negotiation	Recovery of Development Costs Deferred to Related Sales	AEC Method
1. Effort Required for Financial Accountability	Accountability Normal and Cost Effective	⟵	⟶	Accountability Normal: Effort Reasonable	Normal Accountability: Effort Acceptable	Accountability Normal; Effort Acceptable	Accountability Normal: Effort Prohibitive	Accountability Normal: Effort Reasonable	Govt. Accountability not Required	Accountability Impossible: Effort Prohibitive	Accountability Normal: Effort Reasonable
2. Effort Required for Technical Accountability	Accountability Normal and Cost Effective	⟵	⟶	Accountability Normal: Cost Effective	Normal Accountability: Effort Reasonable	Accountability Excessive: Effort not Cost Effective	Accountability Excessive: Effort Prohibitive	Accountability Normal: Effort Reasonable	Govt. Accountability not Required	Accountability Impossible: Effort Prohibitive	Accountability Normal: Effort Reasonable
3. Reimbursement of IR&D Costs Sufficient to Motivate Continuance in Government Business	Excellent	⟵	⟶	Good	Excellent	Moderate	Poor	Poor	Very Uncertain	Very Poor	Very Poor
4. Administrative Economy and Practicality	Excellent	⟵	⟶	Good	Good	Moderate	Prohibitive	Poor	Excellent	Prohibitive	Good
5. Allocation Equitable to Total Business	Automatic	⟵	⟶	Automatic	Automatic	Automatic	Non-existent	Non-existent	Allocation Equitable· Recovery Very Uncertain	Non-existent	Non-existent
6. Contractor Flexibility with Respect to Resource Utilization	Excellent	⟵	⟶	Good	Good	Moderate	Non-existent	Depends on Latitude in Work Statement	Excellent	Good	Non-existent
7. Accommodation of Substantial Changes in Contractor Sales Levels	Excellent	⟵	⟶	Moderate	Moderate	Moderate	Unrelated	Good	Automatic	Good	Non-existent
8. Accommodation for Unavoidable Cost Changes, e.g., Inflation, etc.	Automatic	⟵	⟶	Moderate	Moderate	Moderate	Depends on Type of Contract	Good	Very Poor	Good	Non-existent
9. Consistent Govt. Funding to Permit Year-to-Year Program Continuity	Automatic	⟵	⟶	Good	Moderate	Good	No Assurance	No Assurance	Very Poor	Very Uncertain	Non-existent
10. Maintenance of Maximum Competitive Base in Govt. Procurement	Excellent	⟵	⟶	Good	Good	Moderate	Very Poor	Moderate	Very Uncertain	Poor	Very Poor
11. Promotion of the Survival of the Fittest Contractor	Excellent	⟵	⟶	Good	Good	Moderate	Very Poor	Poor	Excellent	Poor	Non-existent
12. Safeguards Against Excess Charges on Govt Contracts	Controlled by Competition	⟵	⟶	Good	Good	Good	Excellent	Good	Avoids Issue	Very Poor	Excellent

(1) CWAS - The Contractor Weighted Average Share of Risk (CWAS) concept evaluates and assigns weighted ratings to sales commitments of contractors based upon competition prior to award and financial/technical risk in performance. Commercial and Government fixed price contracts receive a 100% rating and Government level-of-effort cost reimbursement type contracts, at the lower end receive a 0 rating. Each contractor is then given an annual average CWAS rating. The Armed Services Procurement Regulation (ASPR) specifies those costs to which the CWAS rating is applicable or inapplicable. Where CWAS applies and where a contractor has a sufficiently high CWAS rating (65%) his costs are subjected only to review for allocability.

(2) Inapplicable to B&P

(3) Potential Military Relationship

SLIDE NO. 4

Benefits Derived From IR&D

- IR&D PROVIDES THE BASIS FOR MEANINGFUL COMPETITION
- IR&D HELPS AVOID COSTLY TECHNICAL SURPRISES
- IR&D PROVIDES MORE TECHNOLOGY PER DOLLAR
- IR&D PERMITS DIVERSIFICATION OF PRODUCT TO MEET CHANGING CUSTOMER NEEDS

Our third topic dealt with the benefits derived from IR&D effort. Allow me to list for you the categories of these benefits. The details are contained in the report.

IR&D stimulates competition and creates technical alternatives for satisfying government requirements.

IR&D provides major contributions to the national technological base and helps avoid costly technical surprises in later development and production phases.

IR&D provides more technology per dollar in that the work is done independently by the contractor and not surrounded with the same degree of costly administrative complexities required by government contract performance.

IR&D permits diversification of a company's product mix to enable the company to meet its changing customers' needs.

Our fourth topic discussed the benefits derived from bid and proposal effort: As the GAO succinctly stated in its recent report:

"B&P effort is generally shorter range than IR&D effort. A contractor uses the techniques and know-how acquired under IR&D to prepare a technical packaged designed to convince the customer of the merit of the proposal. The B&P activity helps the customer to make an award on the basis of the demonstrated capabilities of competing suppliers."

The benefits derived by the government from B&P efforts, beyond the fundamental aspects of its absolute necessity for survival and growth of a business, include—

Benefits Derived From B&P

- B&P IS VITAL TO THE COMPETITIVE PROCESS
- B&P, VIA UNSOLICITED PROPOSALS, IS FRUITFUL SOURCE OF INNOVATIVE IDEAS
- B&P PERMITS INDUSTRIAL DIVERSIFICATION

SLIDE NO. 5

a. assurance of a continuing competitive environment in which better products or services can be procured at lower prices;

b. availability, via unsolicited proposals, of a fruitful source of innovative ideas; and

c. industrial diversification, the benefits of which flow to all other government agencies and the Nation as a whole.

Our fifth major area of investigation concerned U.S. and foreign nation support of industrial technical effort. Based on available statistics, we found that many of the world's industrialized nations are giving greater recognition to research and development than the United States. Generally, they are increasing their ratio of R&D to Gross National Product while ours is lagging. Numerous foreign governments have developed far reaching and generous R&D incentive policies, while our Government is perhaps the only advanced nation in the free world which, until quite recently, had not undertaken significant national programs to stimulate technology development in the civilian sector.

The impact of technology-intensive endeavors upon our balance of trade has been discussed by Mr. Murrin. Clearly, our national technology base can be a vital factor in determining the United States' position in world markets. Two counteracting forces are operating here. First, the economies of western Europe, Canada and Japan have recovered from World War II and are now capable of supporting significant R&D efforts. These efforts, have created price-competitive products. Conversely, the United States has retrenched from the aggressive federally funded R&D policies of the early 1960's to more limited federal support at levels below increases in the inflation index, i.e., a declining level of real effort. We have long enjoyed large exports in areas of high technology. Maintaining a favorable balance of trade now requires strengthening of our efforts in this high technology area.

The important thing to note from this review of international trends in R&D is the greater aggressiveness of most industrialized foreign countries compared with the United States. Having seen the U.S. attain a position of world leadership through military and industrial strength based upon superior technological capability, other nations have reacted with vigorous support of R&D. These governments have recognized the need to encourage industry to conduct research and development in order to provide a necessary technological base to compete in the international marketplace. In many cases, such encouragement is in the form of direct subsidies. *However, U.S. companies neither seek nor believe that subsidies or direct payments for IR&D are desirable.*

COMPTROLLER GENERAL'S REPORT

Having discussed very briefly some of the subjects covered by our study of last year, I believe, Mr. Chairman, that you will agree it is appropriate for us to comment on and discuss the major points raised in the Comptroller General's Report of June 5, 1975 to the Subcommittee on Research and Development, Senate Committee on Armed Services and the Priorities and Economy in Government Subcommittee of the Joint Economic Committee. In doing so I will present Industry's views on these points as they are expressed in the recommendations and conclusions contained in our study.

We agree with most of the report and will address ourselves to certain specific points. We proceed directly to the section of the report entitled "Recommendations To The Congress" (p. 88).

In this regard, we believe it important that Congress have in mind certain of the recommendations contained in the Commission on Government Procurement Majority Position and Dissenting Position 1, which are reported and supported by the GAO, as follows:

Recognizing IR&D and B&P expenditures as being in the Nation's best interest to promote competition, advance technology, and foster economic growth.

Establishing a policy recognizing IR&D and B&P efforts as necessary costs of doing business.

Uniform treatment of IR&D and B&P, Governmentwide, with exceptions treated by the Office of Federal Procurement Policy.

These recommendations are further supported by the Defense Science Board IR&D Task Force Report dated March, 1975 entitled "An Analysis of Independent Research and Development/Bid and Proposal (IR&D/B&P)." For example, Conclusion I states:" The major benefits from IR&D are derived principally

from the "I," namely, the independence of choice and execution by the contractor. Conclusion II states: "CTE (IR&D/B&P) is a legitimate cost of doing business and is logically an overhead expense" and Conclusion III states: "The treatment of CTE (i.e. IR&D/B&P) expense and the test for reasonableness should be closely coupled to commercial practice and as free from technical audit judgement as possible."

In further reference to the recommendations contained in the GAO Report, I quote:

"We recommend that, if financial support for IR&D and B&P is to be continued, the Congress clarify for Federal agencies and industry the policy for such support by establishing guidelines which set forth:

The purpose for which the government supports IR&D and B&P costs.

The appropriate amount of this financial support.

The degree of control to be exercised by the government over contractors' supported programs.

As to the first point "the purpose for which the government supports IR&D and B&P costs," I call your attention to the definition of IR&D as expressed on Page (i) of the Digest of the GAO Report, which states, "The contractor decides on the independent research and development areas undertaken to maintain and improve its ability to compete for future products and services." Industry strongly supports this definition and suggests that the Congress, if it sees fit to respond to the GAO recommendatiion, express its support of IR&D as being essential "to maintain and improve (the contractor's) ability to compete for future products and services."

Industry Recommendations to The Congress

- EXPRESS ITS SUPPORT OF IR&D/B&P AS BEING ESSENTIAL TO MAINTAIN AND IMPROVE (THE CONTRACTOR'S) ABILITY TO COMPETE FOR FUTURE PRODUCTS AND SERVICES.

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- RECOGNIZE THAT IR&D/B&P ARE NOT COMMODITIES TO BE PURCHASED BUT ARE VITAL COMPANY ACTIVITIES GENERATING NORMAL COSTS OF DOING BUSINESS THAT SHOULD BE REIMBURSED WITHOUT CONSTRAINT ON RECOVERY OTHER THAN ALREADY ESTABLISHED TESTS OF REASONABLENESS.

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- RECOGNIZE INDUSTRY'S RIGHT TO EXERCISE MANAGEMENT DISCRETION ON THE AMOUNT AND CONTENT OF IR&D/B&P

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- RECOGNIZE INDUSTRY'S RIGHT TO EXERCISE MANAGEMENT DISCRETION ON THE AMOUNT AND CONTENT OF IR&D/B&P.
- **EITHER ELIMINATE COMPLETELY ANY REQUIREMENT FOR POTENTIAL RELATIONSHIP TO INDIVIDUAL GOVERNMENT AGENCY INTERESTS OR EXPRESS IT IN TERMS OF THE TOTALITY OF POTENTIAL U.S. GOVERNMENT NEEDS**

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- RECOGNIZE INDUSTRY'S RIGHT TO EXERCISE MANAGEMENT DISCRETION ON THE AMOUNT AND CONTENT OF IR&D/B&P.
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- **THE GOVERNMENT SHOULD PRESENT ONE FACE TO INDUSTRY.**

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- RECOGNIZE THAT IR&D/B&P ARE NOT COMMODITIES TO BE PURCHASED BUT ARE VITAL COMPANY ACTIVITIES GENERATING NORMAL COSTS OF DOING BUSINESS THAT SHOULD BE REIMBURSED WITHOUT CONSTRAINT ON RECOVERY OTHER THAN ALREADY ESTABLISHED TESTS OF REASONABLENESS.
- RECOGNIZE INDUSTRY'S RIGHT TO EXERCISE MANAGEMENT DISCRETION ON THE AMOUNT AND CONTENT OF IR&D/B&P.
- EITHER ELIMINATE COMPLETELY ANY REQUIREMENT FOR POTENTIAL RELATIONSHIP TO INDIVIDUAL GOVERNMENT AGENCY INTERESTS OR EXPRESS IT IN TERMS OF THE TOTALITY OF POTENTIAL U.S. GOVERNMENT NEEDS.
- THE GOVERNMENT SHOULD PRESENT ONE FACE TO INDUSTRY.
- **RECOGNIZE THAT IT WOULD BE CONTRARY TO AND DESTRUCTIVE OF THE AMERICAN FREE ENTERPRISE SYSTEM FOR THE GOVERNMENT TO HAVE PREFERENTIAL PATENT, TECHNICAL DATA, OR COPYRIGHT PRIVILEGES.**

SLIDE NO. 6

The Congress and all government agencies should understand and fully recognize in their actions the vital nature of IR&D and B&P in support of our national interests. Relative to programs of key national importance, these activities play a major role in advancing the technological capabilities of those industries most directly involved in support of the government. Examination of the benefits of these activities suggests that a substantial part of many technological advances that have resulted in the U.S. position of world leadership in defense and space have had their genesis in IR&D. Congress, in the national interest, should specifically express positive support for IR&D and B&P and reverse the current trend to continually reduce this effort.

The second GAO recommendation states that "the Congress should establish guidelines setting forth the appropriate amount of its financial support of IR&D." We find it difficult to understand how a specific amount could be budgeted for an indirect cost element (IR&D and B&P) which is not susceptible to direct purchase as an end item. This cost is an acknowledged necessary cost in the conduct of business and as such should be fully recovered to the extent that it is reasonable.

Congress should recognize that IR&D and B&P costs are not "commodities to be purchased", but rather are normal "costs of doing business". As such, they are appropriately allocated to all produces and services, and are included in the purchase price. On government contracts, industry is required to negotiate overhead rates. In the process, all indirect costs are reviewed and judgments are made as to the reasonableness of these costs. Legislation which singles out IR&D and B&P costs for undue scrutiny at the Congressional level wrongly implies that these efforts are "commodities to be purchased" and jeopardizes a company's ability to plan and manage its total business activities.

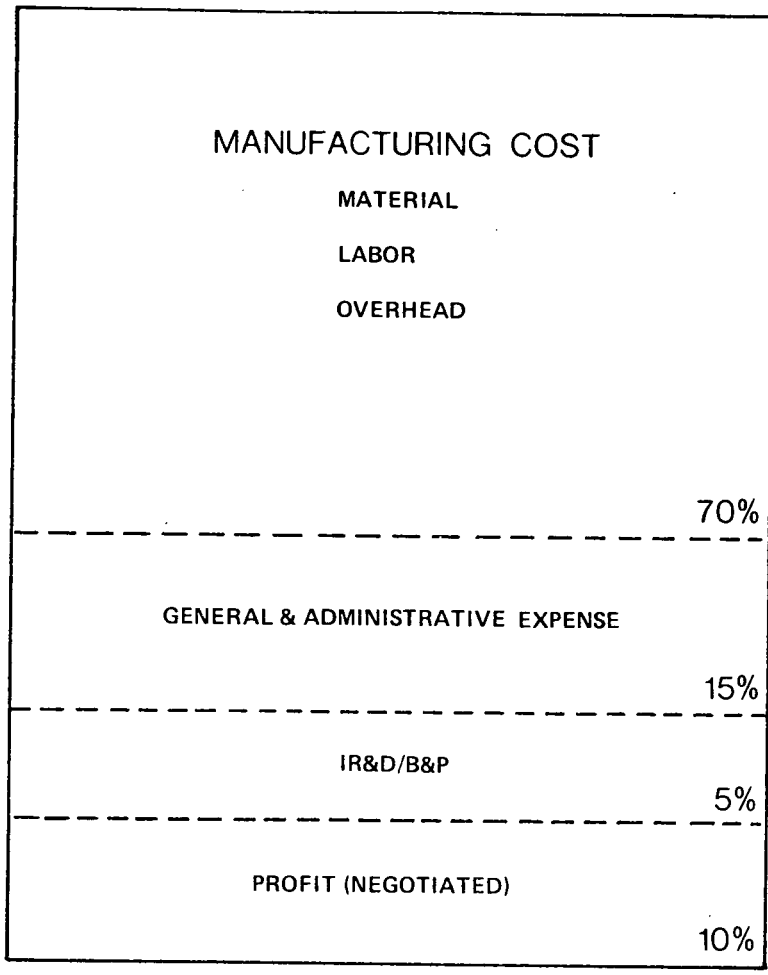
At this point in the consideration of IR&D/B&P as normal business costs let me call your attention to a fundamental difference in the pricing of commercial products as opposed to the pricing of products sold to the U.S. Government. Commercial products are priced at the manufacturer's discretion within the limits imposed by competition.

Generally the commercial producer is in a position to cover *all* of his costs, including IR&D/B&P which are vital to his survival, with a margin left over for a reasonable profit. The government contractor on the other hand is not free to set his own price but must justify each element of cost to the buyer and negotiate a final price based upon allowable costs. I would like to illustrate how this pricing situation affects the performance of IR&D/B&P with a very simple chart showing the breakdown of price negotiated in a typical government contract. I don't think there is any disagreement that Bid and Proposal effort is essential in government business, as it is in commercial business, in order to respond to requests for proposals; and that IR&D is necessary not only to advance the state-of-the-art but specifically to enable a company to meet the requirements of its government and commercial customers. You will note on the chart that at this time IR&D/B&P are allowable costs and for the most part recovered as such in prices negotiated with the government. Unfortunately, the 10 per cent negotiated profit is severly and adversely affected by absorption of currently unallowable costs such as advertising, interest on borrowing and contributions as well as by unforeseen cost growths. Approximately half of the "going in" profit is absorbed by these non-recoverable expenses, leaving something less than 5 per cent profit before taxes.

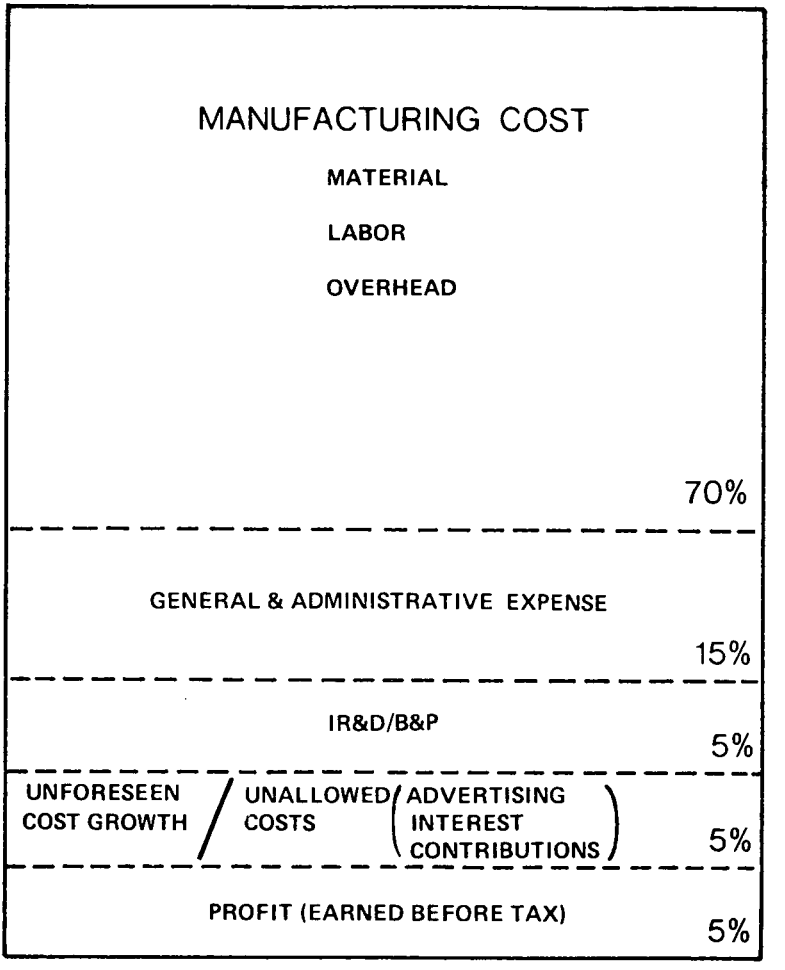
It is not my purpose at this time to address the small profit return from government work or to argue the need for rectifying this situation. I only want to show as clearly and simply as possible that there is no way in government work gene ally, or defense and space work specifically, for industry to pay for IR&D/B&P unless these costs continue to be allowable in the negotiation of prices for government products and recoverable as they are in commercial business. Any further restrictions in the allowability of IR&D/B&P costs will emasculate or eliminate industry's ability to be responsive to government requirements. IR&D and B&P *must* be performed and *must* be paid for.

As to the third GAO recommendation that Congress establish guidelines which set forth *"the degree of control to be exercised by the government over contractors' supported programs"*, we submit additional controls are unnecessary. One must remember, in addition to effective controls placed on a company by the competitive marketplace and internal company management such as periodic financial and

Typical Government Contract Pricing



Typical Government Contract Pricing



SLIDE No. 7

technical review, the government has the right to question, and if appropriate, deny the reasonableness and allocability of IR&D/B&P costs. These controls give more than adequate assurance that there will not be any runaway costs in this respect. Further, DOD technical personnel make on-site visits to contractor facilities to review and evaluate contractor work and discuss it with the contractor's technical people. Industry believes marketplace and management controls coupled with audits for reasonableness and allocability, are sufficient to assure the government that costs are being controlled.

The right of industry to exercise management discretion on the content and amount of IR&D should not be abridged by constraining laws or regulations. It is essential that each company be able to evaluate the needs of the future in light of its own special capabilities and product interests. This is not only basic to the continued development of vigorous competition in a strong industrial base, but also provides the most prolific generation of new technology and concepts to address problems of major significance to the Nation. Rather than consideration of means to control and constrain the scope of IR&D and B&P efforts. the government should be jealously guarding the "independent" aspect to avoid the loss of creative and productive ideas.

The requirement for establishing ceilings on IR&D and B&P costs should be eliminated because it is in basic conflict with stated government objectives to encourage competition and maintain a strong industrial capability.

With further reference to the GAO's support of the views expressed in Dissenting Position 1 of the Commission on Government Procurement, we now address the recommendation that would require "*allowable projects have a potential relationship to an agency function or operation in the opinion of the agency head*". Industry recommends very strongly that any requirement for establishment of potential relationship to a specific agency interest be eliminated completely from the law.

If we understand the GAO support of Dissenting Position 1 correctly, it includes a requirement that each individual government agency, prior to support of industrial IR&D/B&P, determine whether or not all or part of that IR&D/B&P bears a potential relationship to that agency's interests. We respectfully submit, Mr. Chairman, that such an agency by agency requirement would be an administrative and accounting nightmare both from the government as well as the industrial point of view.

The requirement for potential military relationship in Public Law 91–441 should be eliminated as unworkable and susceptible to an ever narrowing interpretation calling for relationship to *current* military requirements and contracts. Defense-related technology is aimed toward future military needs and does not exist in isolation, but is part of the main stream of knowledge generally described as the national technology base. Relevancy tests are fundamentally incompatible with the nature of IR&D and B&P and invite hindsight judgments. If such tests must be included in legislation, they should appear only in the broadest context and be expressed in terms of the totality of potential future U.S. Government needs.

The GAO also recommends that if a Government-wide policy is adopted, that the "*Government present one face to industry.*" We support this recommendation.

This brings us to the GAO recommendation that new legislation also provide for "including in advance agreements patent and technical data provisions granting the government royalty-free licenses and data rights, based on a scale of the agencies' cost participation."

Industry's views are already well known to the Congress with respect to the acquisition of rights by the government in privately developed and owned inventions and new technology. Industry has frequently stated that where the government seeks such rights, competition is reduced because many competent companies will choose not to compete if they have to give up such rights. The GAO recommendation would, if adopted, have these adverse impacts on the Government procurement process. One of the essential foundation stones of the private enterprise system is the retention of rights in technical innovation conceived in the performance of work initiated and funded by a company and charged as an indirect cost to all work. The concept that any single customer should have preferential patent, technical data, or copyright privileges because it accepts its allocable share of company sponsored effort in the price of that company's products is directly contrary to and actually destructive of our American competitive free enterprise system. We believe very strongly that no individual customer, including the U.S. Government, has any more right to private patents and technology than any other customer. When a man buys a TV or an automobile he does not get, nor does he expect, patent or license rights.

Mr. Chairman, in closing our presentation, we express for Industry its appreciation for the opportunity to express its views on the subject of IR&D/B&P.

As both a major executive of a large corporation and as a private citizen, I have concern that if adverse legislative action is taken on these very essential technical efforts it will not only seriously affect every company's ability to continue in government business but would also have a very negative effect on our present and future national strength.

I respectfully urge that favorable consideration be given to the Industry recommendations we have made both here and in our study. This study entailed a tremendous effort on the part of many many contributors and never in my many years in this business have I seen such an exhaustive consideration and treatise on a critical subject. I urge that it be studied in its entirety before legislative action, if any, is taken. Additional copies are readily avilable from any of the three Associations represented here today.

Senator McINTYRE. I am going to comply with the Senator's request.

Senator PROXMIRE. It is my understanding that the gentleman wants to testify by himself. The admiral wishes to testify by himself.

Senator McINTYRE. The committee is glad to welcome you here this morning. We have your statement. Why don't you go right ahead and testify in any fashion that you desire?

We appreciate your coming here today, Admiral Rickover, very much.

STATEMENT OF ADM. HYMAN G. RICKOVER, USN, DEPUTY COMMANDER FOR NUCLEAR PROPULSION, NAVAL SEA SYSTEMS COMMAND, ACCOMPANIED BY MR. T. L. FOSTER, ASSISTANT TO THE DEPUTY COMMANDER (NUCLEAR PROPULSION) FOR FISCAL MATTERS

Admiral RICKOVER. Thank you, Mr. Chairman, for the opportunity to testify. I have testified frequently this year, and some people may be getting the idea that this is all I do. I would like to say for the record that about 95 percent of my time at work is spent on technical matters. I have to spend nights and weekends in order to prepare for these congressional appearances. In so doing, I am trying to give you the benefit of my experience with defense procurement. I think I am closer to the actual firing line than many other witnesses because I am responsible for making contracts, seeing that they are carried out, designing the propulsion plants of the ships, and continually monitoring the way they operate.

Therefore, you are getting a sort of omnibus view of procurement from the man upon whom you depend to carry out the entire naval nuclear propulsion program. From that standpoint, I believe this testimony should be of some practical value to you. It is not at all theoretical.

I feel that it is my responsibility to do my job with as little waste of Government funds as is possible. In Government there is obviously considerable waste of funds, and inevitably so. But as far as I am concerned, I permit no outside pressure to influence me to make decisions on any basis other than what I consider to be the best interest of the United States. I try to act responsibly as a servant of the people of the United States.

I felt I had to make this statement so you could get some concept of my philosophy toward my job. With your permission, sir, I will now read my statement.

Mr. Chairman, you have asked me to testify before this joint session of the Senate Armed Services Committee and the Joint Economic Committee on the topic of independent research and development. I know of no area of defense procurement that is more in need of congressional attention and action.

Senator McINTYRE. What about the Navy shipbuilding program? Does that range anywhere near?

Admiral RICKOVER. I am talking about procurement policy, sir, especially in relation to Defense Department research and development. As far as attention and action is concerned, this is an area where we are spending a lot of money relative to the amount of scrutiny given. It is a field that I think requires your attention, sir.

Senator McINTYRE. Go ahead.

Admiral RICKOVER. I will not argue that this matter is more important than shipbuilding, because we must have shipbuilding regardless of the money wasted elsewhere. In fact, I think money is wasted in general in many aspects of Defense Department's operations. I have said this frequently but unfortunately, in my opinion, Congress has not always listened.

Do you have your answer, sir?

Senator McINTYRE. Go ahead.

Admiral RICKOVER. We are devoting scarce Government funds on a program that is, in my opinion, ill-founded and wasteful. For convenience I will refer to independent research and development and bid and proposal expense as I.R. & D. since the distinction as to which category the work falls into is largely a matter of semantics.

Over the years defense contractors have vigorously defended the I.R. & D. program on the basis that they must develop new concepts to be able to compete in the defense market; that companies are most innovative when they are free to explore promising ideas without Government interference. They conclude that I.R. & D. is a necessary business expense which benefits the Government and which therefore should be recognized and reimbursed by the Government, but with rights to technical data and inventions to be retained by them.

Some of these arguments might have more validity if there were true competition in defense procurement. However, the vast majority of defense procurement is actually noncompetitive, with only a few large firms competing for major weapons systems because of the large amount of technical, financial, and productive resources required. Even when more than one firm is capable, prior experience, shop loading, or other factors can effectively insulate the successful bidder against competitive pressures.

One of the problems with I.R. & D.—the lack of incentive to control costs—stems from this situation. When there is no true competition, prices are based on the actual costs incurred and these costs generally can be passed on to the Government. Thus contrary to what industry spokesmen might claim, the Government cannot safely rely on competition in the marketplace to insure I.R. & D. expenditures are reasonable.

The Defense Department exercises practically no surveillance over I.R. & D. expenditures. These I.R. & D. costs are charged through overhead. Thus at predominantly defense oriented plants, the Government ends up paying most or sometimes all I.R. & D. costs. Yet the

Government has no say in how the money is spent. Therefore we have developed a system where public funds are spent without proper accountability.

Today the Defense Department is having increasing difficulty obtaining the funds necessary for national defense. After lengthy study, the General Accounting Office concluded that it could not determine whether the benefits to the Government from contractor's I.R. & D. effots are worth the cost to the Government.

From my experience in charge of a major defense program, I believe the I.R. & D. program is a waste of taxpayers' money. Here are some of the important considerations which determine my belief:

COST OF I.R. & D.

I.R. & D. costs have increased as a percentage of total defense sales from 2.73 percent in 1968 to 3.73 percent in 1974. In fiscal year 1974 the Defense Department reported I.R. & D. expenditures of $808 million. These reported figures are significantly less than the amount actually spent because they cover only 90 of the largest defense contractors. The total figure for all contractors probably exceeds $1 billion.

Year after year, before the budget request has been submitted to Congress, the Navy has had to eliminate important submarine research and development projects due to a shortage of funds. Congress then makes even further cuts. In fiscal year 1973 for example, Congress cut the DOD research and development budget more than $800 million. In fiscal year 1974 Congress cut more than $400 million, and in fiscal year 1975 nearly $800 million. When actual defense needs are not funded, why should we spend up to a billion dollars a year financing I.R. & D. projects because of the vague hope that someday something of value will result?

IMPACT ON COMPETITION

Rather than enhancing competiton as large defense contractors claim, I.R. & D. actually inhibits competition. Since the largest defense contractors generally receive the largest I.R. & D. payments, this helps them to perpetuate their domonant position in the market. Furthermore, these contractors can charge Government contracts for developments they hope to exploit in their commercial business. Obviously the smaller the company the less advantage it gets from I.R. & D.

Here is an example. At a shipyard where about 99 percent of the work is being done for the Navy, the company charged us over $500,000 for bid and proposal expenses. This was related to the development of a large, nuclear powered commercial submarine tanker to transport oil under the Arctic icecap.

This was strictly a commercial proposition. It had absolutely no military value. In fact the company could not have undertaken the project without the expertise acquired in the performance of Navy work. Yet the company took the position that the Navy would benefit from the work and should pay its design and engineering costs. The

company has taken its case to the Armed Services Board of Contract Appeals where a decision is pending.

What bothers me is this: Why should the Department of Defense subsidize commercial submarine developments when it is unable or unwilling to fund military submarine research and development projects?

PROMOTING A MODERN INDUSTRIAL TECHNOLOGY BASE

Large defense contractors argue that I.R. & D. is necessary to keep an up-to-date and modern industrial technology base for defense needs.

But the grant of large I.R. & D. subsidies to large defense contractors, smaller subsidies to smaller defense contractors, and no subsidies at all to firms without defense contracts does not broaden the industrial base. In fact it narrows it. The Defense Department's I.R. & D. payments help only those firms which already have defense contracts. Firms that desire to enter the defense market must find another source of financing.

The Department of Defense already makes a substantial contribution to maintaining a modern industrial technology base throughout American industry—without I.R. & D. From what I have seen, the flow of ideas and technology from Department of Defense funded major weapons systems contracts to nondefense areas far exceeds the ideas and technology the contractor brings to the job from nondefense work.

BENEFITS FROM I.R. & D.

For the past several years defense contractors and the Defense Department have been trying to collect examples of innovations under the I.R. & D. program. By now they have impressive lists showing that work performed under I.R. & D. was instrumental to this program, or led to the development of that piece of equipment.

I.R. & D. is frequently cited as a contribution to the success of laser development, the Huey helicopter, integrated circuits, and so on. But I could name hundreds of actual, not claimed improvements in nuclear plant technology which resulted from direct Navy or AEC funded research and development.

In case you are interested, I have made up a list of 50 of these which have nothing at all to do with the Department of Defense's I.R. & D. program.

I make that point as a practical proposition. I don't care how much the public relations people here tell you, because they are being paid to make a case. I am not paid to make any case for or against I.R. & D. I am telling you what actually happens.

Senator PROXMIRE. Could we have that list for the record, Admiral?

Admiral RICKOVER. Yes, sir.

Senator PROXMIRE. We will have that printed in full in the record at this point.

Senator MCINTYRE. Without objection, it is so ordered placed in the record.

[The document referred to follows:]

EXAMPLES OF DEVELOPMENTS FOR NAVY MAJOR NUCLEAR PROPULSION PLANTS USING DIRECT R. & D. FUNDING

1. Main coolant pumps.
2. Steam generators.
3. Special purpose reactor plant valves.
4. Specialized steam generator inspection equipment.
5. Pressurizers.
6. Pressurizer heaters.
7. Decontamination processes.
8. Steam generator cleaning processes.
9. Reactor shielding technology.
10. Nuclear propulsion plant design and arrangement.
11. Shock and vibration proof components.
12. Hot purification filters.
13. Control rod drive mechanisms.
14. Reactor vessels.
15. Closure heads.
16. Reactor plant electrical components.
17. Purification filters.
18. Ion exchangers.
19. Seal weld cutting equipment.
20. Electromagnetic Feedwater Filters.
21. Corrosion resistant materials.
22. Radiation resistant materials.
23. Reduced noise materials and equipment.
24. Long life core technology and materials.
25. Refueling techniques.
26. Condensers.
27. Turbine generator sets.
28. Improved welding and heat treatment techniques.
29. Propulsion motor for deep submergence research submarine.
30. Propulsion package for quiet running submarines.
31. Direct drive turbine.
32. Sealed neutron detectors.
33. Circuit breakers.
34. High temperature shielding materials.
35. Static variable frequency controllers.
36. Fuel handling containers.
37. Improved thermal analysis techniques.
38. Submarine propeller design.
39. Submersible electric motors.
40. Radioactive waste processing systems.
41. Valve standardization technology.
42. High strength low alloy steel forgings.
43. Reactor core installation equipment.
44. Reactor plant servicing equipment.
45. Improved structural design techniques.
46. Alternating current to direct current power supplies.
47. Reactor reactivity control systems.
48. Electric plant power distribution systems.
49. Radiation monitoring methods and equipment.
50. Nuclear fuel storage and preparation facilities.

Admiral RICKOVER. The issue is not whether discoveries have been made under I.R. & D., but whether the Defense Department can afford to pay $1 billion annually for contractors to spend as they see fit, in hopes that our defense will at some future unspecified date benefit directly or indirectly from such expenditures.

I.R. & D. AS A NORMAL BUSINESS EXPENSE

Defense contractors argue that I.R. & D. costs are as legitimate as rent, heat, light, maintenance, and the like. This is not a valid compari-

son. There is no incentive for a contractor to waste heat and light. However, increased I.R. & D. spending can enhance the company's profits and strengthen its market position, military and commercial. When major defense firms face declining sales, they can use I.R. & D. in any way they wish, and with no strings attached, to pay the salaries of engineers and other technical employees not needed on other work.

RIGHTS TO INVENTIONS, PATENTS, AND TECHNICAL DATA

Under the I.R. & D. program the Defense Department gives away all rights to inventions, patents, and technical data, even though the Government may pay for most of the work. If the DOD wants to use an invention financed under I.R. & D., the contractor may extract a royalty.

One contractor developed at Government expense and patented an automatic welding machine. This was then marketed to defense suppliers and to Government installations. As it turned out, the Government paid not only for developing the invention but also royalties for the right to use it on Government work.

In my view the Government should insist on rights to the technology it finances. If, as contended, the Government destroys a company's incentive to innovate by acquiring rights to patents, inventions, and technical data, why is it proper to have a double standard wherein companies do not grant rights to their employees and subcontractors for new concepts that are developed on the job?

Why shouldn't these subcontractors and employees have the same rights? That is a double standard. The contractor argument is just a public relations gimmick which is only successful with people who do not understand the way the companies actually operate.

DOD ADMINISTRATION OF I.R. & D.

In an attempt to establish some semblance of control over I.R. & D. expenditure, Congress has required the Defense Department to set, in advance, annual ceilings on the maximum amount of a contractor's I.R. & D. that the Department will reimburse. Congress also requires that I.R. & D. projects, to be allowed, must have a potential military relationship. But these controls are not effective.

When the Defense Department's annual share of a contractor's I.R. & D. exceeds $2 million, the Department negotiates an advance I.R. & D. ceiling agreement with the contractor. However, in these negotiations the Defense negotiators are in a weak bargaining position. Large contractors can hold out for a higher ceiling amount and usually get it.

Four years ago a large defense contractor refused to agree to an I.R. & D. ceiling that the contracting officer considered reasonable. The contractor insisted on a higher amount and in the Court of Claims challenged the Government's right to set the lower figure. The matter is still pending.

This is the same as a contractor coming to Congress and demanding that you appropriate a certain amount, and if you don't, taking Congress to court.

Although negotiations to establish I.R. & D. ceiling amounts are based on technical review of the I.R. & D. proposals, the process is largely brochuremanship. Defense personnel review the contractor's I.R. & D. submittals and briefings and comment on them. These evaluations, however, have little or no impact on how much I.R. & D. will be handed out.

Those who conduct the reviews for the Government have no incentive to challenge the projects or amounts. Unless Government reviewers can prove that a project has no potential military relationships, the cost of the project is allowed. Projects have been accepted such as development of sewage treatment systems for coin-operated laundries; energy studies for heating high rise buildings; and the development of home appliances. These were considered as having a potential military relationship.

I cannot envision a project that could not be defended as having a potential military relationship. What is to prevent a turbine manufacturer from studying fruit flies since fruit is eaten by the piccolo player of a military band? What if the contractor decides to develop a new blend of coffee—obviously this would have a potential relationship with the eating habits of the military. Under the current I.R. & D. program, the Government is committed to supporting any new venture a defense contractor decides to undertake.

Even if an I.R. & D. project were challenged as a result of technical review, determinations that it does not have a potential military relationship cannot be made without the prior approval of the Office of the Director of Defense Research and Engineering. Even if the challenge were sustained, this rarely would affect the amount of I.R. & D. the Defense Department pays. Any amount so disallowed is considered as included in the costs allocated to nondefense work.

As you can see, the technical reviews have not been effective. In the words of the Comptroller General, "Our studies have found that the PMR (potential military relationship) has had no effect on DOD's reimbursement of contractors' costs."

So far I have been discussing the situation where the Defense Department's annual share of a company's I.R. & D. is $2 million or or more. Where the Department pays less than $2 million, the ceiling is set as a percentage of the company's prior year I.R. & D. expenditures. Also there is then no requirement for technical review of the work to be performed—the costs are automatically accepted.

Thus while there may appear to be a degree of control over I.R. & D. as a result of past congressional directives, there is not. The safeguards are largely cosmetic.

IMPACT ON NATIONAL DEFENSE

The argument has been made that the Soviet Union is spending twice as much on research and development as the United States in an effort to close a technological gap that developed because of the superiority of the free enterprise system; that I.R. & D. helps finance the ingenuity and innovations which have contributed so much to the success of the free enterprise system; and that therefore continued Government support of I.R. & D. is essential. The impression is left that I.R. & D. helps us hold our lead in technology despite mounting expenditures by the Soviets.

To show how absurd this becomes, let me read from a company annual report I received last Saturday. I am quoting: "especially significant to a product development company is capitalism's proven ability to make people technologically innovative."

Next, "The free enterprise system is like democracy, often called 'the worst system of government—except for all the others that have been tried and failed.'" No better combination of productivity and liberty has been found.

The same companies that make these types of statements often claim they cannot exist if they do not get help, such as I.R. & D. subsidies, from the Government. So you have free enterprise subsidized by the Government. When they come here they want state capitalism. When they talk to their stockholders they want free enterprise. Take your choice.

It is dangerous to think that the United States can maintain indefinitely a technological lead over countries that are willing to devote substantially more resources to the task, regardless of their political or economic system. In my view, the fact that the Soviets are spending far more than we are for research and development is all the more reason to spend our limited funds in areas that are most likely to be profitable from a technological standpoint.

Elimination of Defense Department support for I.R. & D. would not mean the end of technological breakthroughs. Nor would it cause the United States to become a second-rate research and development country.

Prior to 1960 the Department of Defense had a firm policy limiting I.R. & D. The Atomic Energy Commission followed a policy of allowing independent research and development costs only when such costs were specifically provided in the contract, and only to the extent that such work benefited the basic contract work. When the Commission did participate in a contractor's independent research program, it obtained for the public the rights to technical data and inventions commensurate with the Government's investment. That policy did not impede the development of atomic energy. Neither do I believe that elimination of I.R. & D. would impede national defense.

Contractors do not have to accept contracts which they believe will not offer them a chance of making a fair profit. Defense lobbyists have used this threat of going out of business with many issues: Cost accounting standards, I.R. & D., progress payments, and so forth. No matter what it is, they bring up the very same arguments that everything the Government attempts to do that they don't want is Government interference.

When people come in and tell you they may get out of defense work, the witnesses should be asked if that really represents what the chairman of the board of their company thinks, or does it represent their public relations idea to scare Congress?

It would then be wise to get the senior official of the company to testify and ask him whether this public relations statement represents his view that if he does not get I.R. & D. he is going to get out of the defense business. I think you ought to have that on the record.

I would like to tell you that I am not completely unfamiliar with the I.R. & D. program. In 1959, I had discussions with Mr. McElroy who was Secretary of Defense when the present I.R. & D. system was

implemented. I advised him not to change the policy on I.R. & D. But because it was right after Sputnik, and everybody including myself thought we were falling behind the Soviets, it was felt we had to do something drastic. He told me at that time that this was a temporary measure. Like any temporary measure to spend Government money, it never is temporary. It always becomes permanent.

Once you get vested rights in various organizations, people find there are all kinds of reasons and justifications for continuing a Government subsidy. The argument is if you ever cut the money, the Republic will be in danger. You can be sure that this sort of representation, considering all the occasions it has been successfully used, will survive.

SUMMARY

Obviously, some beneficial ideas have resulted from independent research and development. However, we are faced with the need to make decisions in a climate of limited funds. A philanthropist might donate large sums to enable individuals or organizations to pursue their personal interests. But an ordinary citizen with limited income must conserve funds by spending his money where it will benefit him directly. Since philanthropy should not be in the Defense Department's charter, I believe it should confine its spending for research and development to specific projects where companies and individuals can be held accountable for expenditures and results.

In this way Congress could also properly exercise its oversight function over I.R. & D. expenditures—something the Congress is presently not doing. If it is considered that private research warrants public support on a basis other than military needs, such support should be authorized by Congress and administered on that basis, not hidden in the price of defense contracts.

The current I.R. & D. program does not provide benefits to the Government anywhere commensurate with the cost. It is a subsidy the Government can no longer afford. Nor is the Nation served by the further concentration of economic power in the hands of a few large defense contractors, which the present policy supports.

RECOMMENDATIONS

Here are my recommendations:

1. The present system of DOD payments for independent research and development and bid and proposal expenses should be eliminated.

2. The Department of Defense should allow costs of independent research and development projects only when such costs are specifically provided in the contract and then only to the extent such work benefits the contract work itself.

3. The Department should receive, in the name of the Government, patent and data rights commensurate with costs financed by the Government on independent research and development projects.

When NASA was being set up, I testified before several congressional committees regarding patents. Partly because of my testimony the NASA act provided for the Government's right to own patents, a right already given in the Atomic Energy Act of 1954. You can see, I do know a little bit about such things as patents.

4. In cases where company proposed research and development projects have sufficient benefit to warrant the cost, the Department should finance the work by direct contract, rather than through I.R. & D. Responsible Government officials would supervise the work, as they are supposed to for all work the Government undertakes.

5. If Federal subsidies of private independent research and development are necessary in other areas, such subsidies should be administered by the appropriate Government agency which has expertise in that area. Subsidization would then be above board and measurable by Congress. Appropriate controls could be established to preclude concentration of technology among a few favored industries; to provide adequate direction over the work; and to insure the Government-retained rights to work financed with public funds.

CONCLUSION

The present situation with respect to I.R. & D. is in effect taxation without representation. Congress has, in essence, delegated its rights and duties under the Constitution to Defense officials. There is little surveillance by the Defense Department or by Congress of these large expenditures. Appointed Defense officials are under no constraints as to the amount that can be approved.

Just think how popular you can become with contractors when you have $1 billion to give away, and with no strings attached. To put this into perspective, I remember from my high school days that the entire Federal budget in 1916 was about $700 million.

I contrast this easy way of spending money with the one I have to face when I ask for hard to get, relatively small sums for research and development from the very same people who approve the I.R. & D. And even when they agree, the request must still be justified and defended before the authorizing and appropriating committees of Congress.

The recipients of I.R. & D. largesse do not have these problems. They can simply initiate a program and charge the cost to Government contracts without justifying the expenditure to the Defense Department, to Congress, or to anyone else. Defense contractors contend that their reimbursement is subject to ceilings set by the Defense Department. But if they can persuade Defense officials to accept a higher ceiling, they can get it.

It is inevitable that favoritism may enter into such a practice. Yet no one could ever be proved guilty of wrongdoing because the amounts approved are left entirely to the judgment of those in charge.

I sometimes wonder what the ordinary citizen, who has to labor in making out his income tax, would think if he knew and understood this strange system of handing out Government funds. He might even wonder why he also is not given some of the free money, when it is so readily given to large defense contractors.

How do you suppose he would vote on this issue were he to have the opportunity?

Contractor representatives can make any statement they desire to you and not be held accountable. You should bear this in mind in evaluating their testimony.

Mr. Chairman, I deeply appreciate the opportunity to present my views on this subject to your two committees.

Senator McIntyre. Thank you for your testimony.

Admiral Rickover. I want to make another point about the competitive pressures that supposedly keep I.R. & D. costs down. About 88 percent of the defense contract dollars today are placed under other than truly price competitive situations. Design competition or the so-called competitive negotiated contracts are not really price competitive.

Further, it is generally the same contractors who do defense business year after year. It is about as hard for new defense contractors to enter the business as it is for new firms to enter the automobile industry. The investment is so large that many contractors practically become appendages of the Government, which the Government has to support. That is the consideration which led Congress to support Lockheed.

Senator McIntyre. Are you through? Was the Trident submarine design competitive?

Admiral Rickover. For the preliminary work on the Trident submarine design, we went to the two shipbuilding companies—Newport News and Electric Boat—that were qualified to do the design. The Navy later selected Electric Boat as the better source for the detailed design of the Trident submarine and gave them a cost-plus-fixed-fee contract.

Senator McIntyre. You have just described the competition for the design of the Trident?

Admiral Rickover. Yes, sir.

Senator McIntyre. Why should we spend up to the $1 billion annually for I. R. & D. when defense R. & D. is not funded? Are you saying that the DOD budget is sacrosanct?

Admiral Rickover. No, sir. I said the DOD's R. & D. budget is cut, but you don't cut the I. R. & D. program. You review a program over which you have responsibility and authority, and you question the defense officials, but you don't question them on how they spent I. R. & D. money at all.

This is the point I am making, sir.

Senator McIntyre. In your statement——

Admiral Rickover. I am not questioning your authority, sir. I may not agree with the cuts, but I don't have the responsibility to make the decision. That is your job. I am saying that direct R. & D. is one area where the responsible people say they need more money, and you cut them for your own reasons, sir.

But another area, I. R. & D., is not cut. Congress does not get into that area at all, sir.

Senator McIntyre. In the case you cite of the shipyard which tried to collect $500,000 from the Navy for bid and proposal on the commercial submarine tanker, isn't denial of this claim proof of the relevancy provisions of the law?

Admiral Rickover. No, sir. The technology for this tanker was derived nearly 100 percent from what they had developed on military submarines. The Navy was not interested in this submarine tanker. There were other companies trying to get into the transport of oil from the North Slope of Alaska to the lower 48 States. But this shipyard was

using Government money to give it a more favorable position in a competitive commercial market. There was absolutely no contribution or relevance to the Defense Department in that effort. Mr. Foster would like to comment, sir, if he may.

Mr. FOSTER. I would like to make one comment, sir. I am Mr. Foster, assistant to Admiral Rickover in fiscal matters. The basis on which the submarine tanker costs were disallowed was not military relevance. The incident occurred prior to the congressional mandate that defense funds go only for I.R. & D. projects with a potential military relationship. In this case, the test had to be one of the benefit to the Government. This was not a case of a cost being thrown out during the review for a potential military relationship but a case of auditors disallowing the cost on the basis of its not being of benefit to the Government.

Admiral RICKOVER. I would like to add to that. Only recently have I.R. & D. projects concerned with my program been referred to me. That was only done at my insistence. Previously, I was never even consulted about I.R. & D. projects on nuclear power, an area which I represent both for commercial and military purposes.

The Defense Department was reviewing and allowing I.R. & D. projects in the field for which I was responsible without even referring them to me.

Senator MCINTYRE. Admiral, all other Government witnesses support the need for the I.R. & D. program. This includes DOD, NASA, ERDA, Comptroller General, the Office of Procurement Policy. All other witnesses so far and all other witnesses' statements that we have read so far with the exception, I believe, of the next witness who we are going to get in here somehow, Mr. Long, all other witnesses in addition to industry agree that this is a program worth supporting.

You consider that the I.R. & D. program is ill founded and wasteful. Are all of these others misguided or wrong?

Admiral RICKOVER. No, sir. They are hired to tell you this.

Senator MCINTYRE. The DOD and NASA?

Admiral RICKOVER. Occasionally an individual will admit to error. But have you ever heard a bureaucracy admit that it has been in error? What do you expect them to say? Furthermore, many policymakers are sympathetic to the industry viewpoint. Look at what happens to some of the officials who have occupied high Defense Department positions after they left the Government.

For example, where did the last man in charge of research and development for the Defense Department go? It might interest you to find out where he went and what his company is asking for now. Just try that, sir. You may get some inkling as to the reason.

Senator MCINTRYE. Will you identify the major defense programs over which you have had charge?

Admiral RICKOVER. I had charge during World War II of the design, development, purchase, and installation of all of the electrical equipment in the Navy. That was a pretty big job at that time.

Since 1947 I have been responsible for developing nuclear power for naval application. Also I was responsible for the first civilian central station atomic power plant in this country.

I believe I have had quite a bit of experience with defense and other contractors. As I told you before, my work is 95 percent technical. If any of your witnesses wants to impugn my standing in this field, they may go ahead. But I know some of their companies have gained a great deal of business and learned a tremendous amount about nuclear power by having dealt with us in this field.

Senator McIntyre. Do you consider that that list of programs, defense programs, over which you have had charge, that that is a broad enough range to have provided you detailed knowledge and insight into defense industry across the board?

Admiral Rickover. I believe my experience is broad enough. It is very difficult to say how much experience is necessary, but I think you know from my testimony to your committee and to other committees of Congress that I have devoted my life trying to broaden myself. As a result, I am frequently asked by the Defense Department "What business is it of yours to testify on so many subjects?" The reason is I feel as if I were personally responsible for the United States. That is what motivates me. I have spent all of my life in working, studying and learning. I try to bring to bear whatever knowledge and ability I have acquired in all of my study and in all of my work on the problems that face me. I try to be philosophical in my approach.

I don't believe I am going to accomplish very much. But I must try and do my best.

Specifically on I.R. & D., though, I have seen the list of I.R. & D. projects for some of these contractors. There is nothing magical about the projects. In a few cases, it is perfectly obvious that an I.R. & D. project is totally commercial in nature. The problem comes when firms use brochuremanship to give a commercial project a military aura. I think that is the same sort of thing that Senator Proxmire is experiencing, sir.

He is caught up in reviewing the National Science Foundation projects, and he has been able to expose some items because the research titles were plainly descriptive. He is now going to find out that the projects may be named in a manner which will make it far more difficult for him to find out which ones are really useless. For example, love will be called companionship or empathy, something like that.

I would like to give you a message, Senator Proxmire, about love. Much money is being handed out for studies on love. I believe one of them was to study the love habits of aborigines. There is aboslutely no reason for doing that. I made a personal study of one group of aborigines and I would be happy to furnish this information for free. You might want to ask what that study was, sir.

Senator Proxmire. All right. What was that study?

Admiral Rickover. Before World War II, I was on duty in the Philippines. One of the areas I visited was in northern Luzon where aboriginal tribes were still living. In one village I noticed a large thatched hut, much larger than the others, with no openings. On looking more carefully, I found that there was an entrance in the bottom of the hut.

I crawled in and what did I find? I found about 10 couples. Each boy and girl was on a reed cot. These were trial marriages.

So if any U.S. Government agency is in need of a study of aboriginal trial marriages in the Philippines before World War II, I am somewhat of an expert observer. I promise you I will give this information for free to the agency and they will not have to give a grant of 50 to 100 thousand dollars of Government money to some deserving social scientist for a "learned" study with a big name that no one can understand.

Senator PROXMIRE. I never dreamed you were an expert on aboriginal sex. You are an unusual witness. I congratulate you. We need more whistle blowers, more people who are willing to stand up and take a position.

I am sure your contractors you have to deal with every day don't like it. It is no surprise to me that DOD and NASA and ERDA come up and tell us they like the program. Of course they do. I would like it, too. Who wouldn't?

Admiral RICKOVER. Why don't you become a contractor instead of a senator?

Senator PROXMIRE. That is a good question.

I am astonished to hear that you were not consulted on the I.R. & D. with respect to nuclear procurement until very recently.

Admiral RICKOVER. That is correct, sir.

Senator PROXMIRE. That is one of the more serious criticisms I have heard yet of this operation.

Admiral RICKOVER. You should not be surprised to hear that, Senator. Under the system we have, once a man is appointed to a job in the Defense Department, that inherently gives him the wisdom, the money and everything else to do his job.

Senator PROXMIRE. Admiral, I think we have heard witnesses who have indicated if not threats, they have indicated that if I.R. & D. were stopped, they might get out of the defense business. Or if Congress cut back on I.R. & D., or if we exercised control they thought was unwise. What is your recollection?

Admiral RICKOVER. That is merely a threat. As I said, I would get the senior official of that company here to testify and then ask him if he backs that statement. Get him on the stand and on the record. The other day you had the president of U.S. Steel up to testify, and that did some good, sir.

You might try that with anyone who makes threats like that. In my opinion it is a pure public relations attitude. The smartest people in this world do not go into public relations. They pick a field in which they can get something done. Public relations people use words, not deeds.

Senator PROXMIRE. One of the first questions Senator McIntyre asked and it is a very relevant question here is whether or not contractors would object to having the firms named and the amount of money they get with respect to I.R. & D. They objected very strenuously to that.

It has been defended before on the grounds that this is proprietary information, that is, if we should know that various firms got specific amounts, it might adversely affect their competitive position. Is there any wisdom in that?

Admiral RICKOVER. Senator Proxmire, when you are appropriating public money, who dares to tell you that it should not be known to

the public, to the taxpayer who must pay for it out of his earnings?

You would not levy taxes on your constituents and then make it impossible for them to find out what you are doing. That is sheer nonsense. If contractors feel that way, then they should not accept the money.

Senator PROXMIRE. One of the witnesses, Dr. DeLauer of TRW, and as I understand it John Foster, the former Secretary of Defense for Research and Development, is now an official of TRW.

Admiral RICKOVER. That is just a coincidence, sir.

Senator PROXMIRE. Isn't it obvious that under these circumstances, John Foster knows what firms get how much money and how much they got for I.R. & D?

Admiral RICKOVER. If he were going his job when he was in the Defense Department, he does know.

Senator PROXMIRE. That gives TRW an advantage. Isn't it also true that Mr. Shillito is working for a defense contractor and has that kind of knowledge?

Admiral RICKOVER. Yes, sir, I would think he might.

Senator PROXMIRE. Isn't David Packard the owner of a large firm that does considerable defense contracting? Doesn't he have that kind of knowledge?

Admiral RICKOVER. I would doubt that Mr. Packard does, because of the nature of his job in DOD. But you are raising a basic issue. Congress has been remiss in not having strong legislation which specifically prevents officials from easily moving back and forth from industry to the Defense Department.

Senator PROXMIRE. As far as I.R. & D. is concerned, the defense of not disclosing the firms that get it is that it would be disadvantageous. With all the admirals and generals going to defense contractors, it is clear to me that these big firms know who gets how much money.

Admiral RICKOVER. I agree, sir.

Senator PROXMIRE. The people kept in the dark are the public and the Congress. We can get the information on a classified basis, but not on a basis where we can use it.

Admiral RICKOVER. I believe the public should be aware of where the money is spent. I do not think any official should have the right to withhold this data from the public.

I do not know what is secret about the figures except perhaps to prevent an investigation into possible favoritism. I know of a number of officials who have been responsible for the expenditure of public funds who later worked for the companies they formerly dealt with. That comes back to your basic issue. As a minimum, I would prohibit that kind of movement for 10 years.

I think your problem is in the law. One problem is the basic issue of disclosure to the public. As I said earlier, I think it is only proper that any money given to anyone by the Government should be made a matter of public record.

The other issue is this: I believe drastic restrictions should be imposed so that anyone in Government who deals directly with contractors is forbidden to take a job with those firms for a large number of years. The current law is weak and because of this, considerable influence is being used by ex-Government employees as lobbyists or as officials of these contractors. If you want to do the proper and honorable thing, you should take steps to stop that, sir.

Senator PROXMIRE. On page 11 "in my view the fact that the Soviets are spending more than we are is all the more reason to spend our limited funds in areas which are most likely to be profitable."

We are concerned about the military threat of the Soviets. You argue that far from this being an argument in favor of continuing a look and see policy, it is an argument the other way that we should know when we put money into R. & D. that we are putting it into an area where we are going to get results.

Admiral RICKOVER. Yes, sir. But I go to a more basic principle than that. I think that whenever the Government spends money, someone should be responsible for how that money is spent. Today there is practically zero responsibility or accountability for how I.R. & D. money is spent. The military relevancy requirement is a farce. You are subsidizing these companies and decreasing competition in the United States, sir.

I would like to see more small companies get into defense business. That is true capitalism. The big companies actually want State capitalism and they are getting it. It is the little companies that are our true capitalists, sir.

It is probably no longer possible to have true capitalism for large companies. Therefore, there must be Government regulation to protect the public from abuse. The big companies don't want these Government regulations.

Senator PROXMIRE. We have a time problem. I want to ask just one final problem. You had many years of experience, have had or do have now with the Atomic Energy Commission. I think the statement you made on page 11 with respect to their experience where you follow the policy of allowing I.R. & D. costs only where such costs were specifically provided in the contract, and then you follow up by saying the rights to technical data and inventions commensurate with the Government's investment was also insisted on by the Federal Government and it did not handicap the development of the atomic energy program.

It seems to me this is a powerful argument in favor of pursuing that policy now.

Admiral RICKOVER. Yes, sir. The AEC policy did not hinder development of atomic energy. The companies which are predominant in this field were treated in exactly that way, sir.

Senator PROXMIRE. Thank you.

Admiral RICKOVER. I would like to say one other thing. Please do not think that I am trying to push a certain attitude. My attitude depends on what the circumstances are as I see them. I think I probably have acquired, if for no other reason than I am older, and have a broader view of these issues, as well as more experience than the public relations people who have testified here, sir.

They are good at public relations, but I think I am pretty good at technical matters. I approach everything from a technical standpoint. Everything I read or learn, whether it is science, engineering, philosophy, or history, or art, I try to apply to the work for which I am responsible, sir.

This is why I believe I have some measure of credibility with congressional committees; they know I am not doing anything to benefit anyone, but the Government.

[See page 753 for response by Admiral Rickover to comments by the Tri-Association.]

Senator McINTYRE. Thank you very much for your appearance here today. Thank you for your testimony.

We call as our next witness Professor Frederick Long accompanied by Dr. Judith Reppy. Please proceed, Dr. Long. We are pleased to have you with us today.

STATEMENT OF DR. FRANKLIN LONG AND DR. JUDITH REPPY, CORNELL UNIVERSITY, ITHACA, N.Y.

Dr. LONG. It is an honor to be present. Admiral Rickover is a pretty hard act to follow. It leads me to decide not to read my statement but instead to comment on some of the principal points in the interest of saving time and for a not trivial reason, namely that many of the positions that Admiral Rickover has taken are developed in our paper and it would be wrong to repeat them.

We have submitted to you our statement and many of the details are to be found there.

[See prepared statement, p. 714.]

I am going to start by turning immediately to some conclusions of our study. I should perhaps, first make the point that we have approached this as two scholars concerned about the effectiveness of the Nation's program of military research and development, and we have been asking ourselves, what is the contribution of the I.R. & D. element to this total program? Our investigation has led us to believe that Congress would be well advised to look either at alternatives to the I.R. & D. program or at modifications. Let me take up the possibility of modifications first.

Here, I am dealing with the summary points on about page 14 of our statement. We conclude that if Congress does wish to go ahead on an I.R. & D. program, if it decides the program is valuable to the DOD and should be retained, then there are a number of modifications which to us seem essential to insure program effectiveness and to reduce the level of controversy. The major ones are: better accountability, better evaluation, and assured relevancy. We don't see how the I.R. & D. program can continue to be justified unless the information available on it is greatly increased and unless Congress takes a more explicit and continued overview.

For each agreement on I.R. & D. with a major contractor, the following information should be publicly available: What is the company? What is the negotiated ceiling? What ls the character of the projects in the program? What is the potential military relevancy?

We list some arguments made against this position. We don't find they have much substance. We think that comparable changes are needed on technical evaluation of I.R. & D. programs. Procedures used by DOD for evaluation must be made sufficiently clear and explicit so that they can be explained and justified to Congress.

Of equal consequence we think is an evaluation of work after it is completed. How can DOD possibly know whether the I.R. & D. program is cost effective unless it evaluates in detail the completed effort and compares their cost effectiveness against its own budgeted R. & D. programs?

We conclude—and I guess where we are clearly giving our opinions—that there are alternatives to the I.R. & D. programs, alternatives which would probably be preferable.

We do agree with some of the essential objectives which the industry gives. We think it is appropriate that the industry be encouraged to search for innovations. We think that technical staffs do deserve stability and continuity. To the degree the companies are efficient and effective, we think they deserve economic stability and moderate profitability. We are prepared to believe that in some measure, the present I.R. & D. program contirbutes to these goals.

It is a much more profound question to conclude that the present I.R. & D. program is the best way to obtain these goals. We are inclined to think it is not. Our particular suggested alternative is that all of these desired goals can be met within the budgeted program of the Defense Department under the heading of R.D.T. & E. We see no reason why well designed R. & D. contracts can't handle these objectives and provide the accountability and the effectiveness which Congress and the Nation have a right to expect.

DOD has already established a thoroughly interesting and successful system for innovation and for expanding the technology namely the Advanced Projects Research Agency, which seems to us made to order to carry on the technically innovative kind of program which is being discussed.

The military contractors have argued that, in addition, they really need some program which would give them maximum flexibility and some choice of research priorities.

We think there is merit to this point. However, we think these goals too can be met within a framework of R.D.T. & E. contracts. We think in particular that a series of what are called "level-of-effort" R. & D. contracts designed to give the companies the desired flexibility and choice could be established and would be effective for exactly what we are talking about.

With all of these contracts one would of course need to insist on an ultimate evaluation of the results. We think this is a minimal requirement for any program which is supported by taxpayers' money. These then, represent the conclusions we have reached.

The next question is how did we get to them and that is the substance of the early part of our paper. One of the things we thought was important was to try to put this I.R. & D. program in context. This was well done by Admiral Rickover, but you might like a few data. The first slide Table 1 in our statement, gives information on the overall proposed budget for military related R. & D. in fiscal year 1976.

Senator PROXMIRE. This is table 1 in your statement?

Dr. LONG. Correct, sir. We have added the figure for space budget. R. & D. Dr. John Foster used to do that routinely and it seemed appropriate to us on this occasion.

These are immense numbers. Fifty-two percent of the Federal budget for R. & D. is in the defense area. It is almost 40 percent of the entire R. & D. program of the United States, public and private. It is a very large number, indeed.

Given this major budgeted program for military R. & D., which is ably looked after by Senator McIntyre's subcommittee, one can won-

der about the $1.1 billion for I.R. & D. We believe that it is probably unfair to make a comparison of this $1.1 billion for I.R. & D. with the total military R. & D. budget. It is probably more appropriate to make the comparison with those parts of the DOD budget for R.D.T. & E. which specifically concern themselves with building the technology base and with developing innovations, and we introduce slide 2, which is table 2 in our statement.

These categories are used by the DOD in discussing their R. & D. budget. It is the first two items, the ones labeled "Research and Exploratory Development," which relate particularly to the long term building up of basic competence, the technology base, the innovations.

It might be more proper to make the I.R. & D. comparison with those two items rather than with the total.

The next slide, table 3, develops this comparison a little more fully for 1974. We give separately the I.R. & D. and B. & P. payments to major contractors. We have the usual problem of knowing the size of the total program, since only data for the major contractors are available. Using an estimate that the listed numbers are 80 percent of total payments, we conclude that the overall total is probably a little over $1 billion.

The bottom part of the table lists the R.D.T. & E. expenditures for research and exploratory development for fiscal year 1974. We have broken it down into three parts: inhouse expenditures, industrial expenditures, and expenditures in universities, FCRC's and so forth. Even for the major contractors only, the payments for I.R. & D. are comparable to the budgeted payments to industry shown in the lower part of the slide. In other words, if I.R. & D. were in fact contributing principally to the development of the technology base of the Defense Department, one could say that the program is large enough to be important so that it ought to be looked at with a good deal of care.

When we turned to the question of the utility of the I.R. & D. program, to the evaluation done on it, to the products from it, we found we were hampered by a tremendous lack of information.

On pages 5 and 6 of our statement, we list the items that we simply could not get adequate information on. First, we don't know the total expenditures. We know the expenditures for major contractors, but we don't know beyond that. We don't know all the companies that get the I.R. & D. and B. & P. funds and we do not know the amounts they get.

We did get for 1 year, a ranked list of the major contractors which received funds from the DOD for I.R. & D., but not the amounts of the payments. The last column in slide 4 (table 4) shows, for 1973, the position on the ranked I.R. & D. list of the 12 largest prime contractors for DOD, Lockheed, and so on. The middle column in the slide shows the ranking for these same companies on R.D.T. & E. contracts. Not surprisingly, there is a great deal of similarity in the rank order of these three lists. To a first approximation, the companies with the large prime contracts are the companies that get the large R.D.T. & E. contracts, and they are also the ones that get the large I.R. & D. payments.

United Aircraft, though it is 8th in rank for prime contracts and 11th for R.D.T. & E., is first for I.R. & D. payments. Why is an interesting question. We don't have the answer.

Second, we have been unable to obtain any public description on a comprehensive basis of the character of the I.R. & D. programs and of the technical work done under B. & P. Interesting as the examples given by industry are, one wants a more comprehensive analysis than is afforded by occasional examples of this piece of I.R. & D. on this project.

We found exceedingly difficult to make a judgment on the adequacy of the evaluations by the military of the individually proposed I.R. & D. programs. It is clear there is an evaluation. It is principally a prior evaluation. It is part of the negotiation that leads to the agreements for a coming year. However, we don't see very much coupling between these evaluations and the size of the ultimate negotiated ceiling. Sound management would suggest there ought to be such a coupling.

Finally, as I mentioned earlier, we have almost no information on after-the-fact evaluations. What does DOD really get out of some of the I.R. & D. expenditures which were done 1 year ago, 3 years ago, 5 years ago? One would think such after-the-fact evaluations would give the real data on the effectiveness of the innovative aspects of the I.R. & D. program, the broadening of the technology base and so on.

Because of these uncertainties we have been led to discuss in more detail some of the broader elements of the program, focusing on some of the arguments made by the industrial groups, made for example with great vigor this morning.

There are such claims as fostering independence, expanding the technical base, fostering competition, and contributing to the stability of the industry. First, we are pretty skeptical to the degree to which this program fosters independence. This I.R. & D. element, even if you add B. & P. to it, is only some 10 percent of the budgeted R. & D. program. The degree of independence implied by 10 percent is rather modest. In addition something like 60 percent of that I.R. & D.-B. & P. effort is paid by DOD and NASA. If one recalls the old proberb that "He who pays the piper calls the tune" one can be skeptical about the independence in that part of the I.R. & D. programs which is funded by DOD. It is only roughly 4 percent of the industry's total military R. & D. effort which represents anything truly independent.

With respect to the fostering of competition, I think I should simply associate myself with the points made by Admiral Rickover. There is no question that I.R. & D. is of utility to an individual company in enhancing its position vis-a-vis some of the other companies in the same military contracting business.

Does it foster competition in a real sense? Is it a mechanism which helps to bring new companies with new ideas, new directions, into the military contracting business? We conclude on the contrary, that it probably works in the opposite direction. Table 4 is really an illustration of that fact. The companies which get the large prime contracts get the large R.D.T. & E. contracts and finally they get the large I.R. & D. payments. This program works to maintain the current group of military contractors, not to enhance the entry of other groups.

Senators McIntyre and Proxmire, I should close. I know you are running late and you have other people to talk with. Let me say again it was an immense pleasure to be able to come here. We intend to

continue our studies of I.R. & D. We are exceedingly pleased that the two of you have held this hearing and we hope it is the first of many.

Senator McIntyre. Undoubtedly for all witnesses appearing before us today, we may submit to them other questions for the record. That is particularly true of the panel, the Tri-Association Ad Hoc Committee.

It will also be true of you, Professor.

[See p. 721.]

You state that the categories "Research" and "Exploratory Development" support the defense technology base and therefore are most relevant to I.R. & D. Isn't that an oversimplification considering that Dr. Currie testified last week that advanced development and engineering development are also relevant to I.R. & D.?

Dr. Long. There is one argument that has been made in the literature that a principal goal of I.R. & D. is to foster innovation and to build the technology base. I suppose one would not apply that same statement to B. & P. which is closely coupled to getting contracts.

One must also admit, however, that the notion that I.R. & D. is at present devoted to these long-term activities is not supported by other data. There was a DOD survey which implied that something like 40 percent of I.R. & D. efforts led to contracts. That does not sound like a very long range program, I must say. I do admit there is some conflicting evidence.

Senator McIntyre. Do you consider that the inability to obtain specific detailed information is necessarily a criticism of the system without regard to the economics, feasibility or necessity for obtaining such details?

Dr. Long. I simply don't see how Congress can make an adequate judgment on this program unless it has adequate details. If there were no alternatives whatsoever to the program, one might say the end objectives are so critical that Congress will forgo details, but I don't think that is true.

There are alternatives, and I don't see how one can look at the total situation without better information.

Senator McIntyre. You say it is not clear that the present prior evaluation procedures for proposed I.R. & D. programs are adequate—or that the results have much impact on the size and quality of the I.R. & D. program. What is the basis for your statement?

Dr. Long. Dr. Reppy?

Dr. Reppy. I have had interviews in both industry and DOD with respect to this program and in particular the technical evaluation procedure and how it feeds into the negotiation process.

If you look at the form used for evaluation, you will see that, although it rates each project by such criteria as suitability of the objective, the approach, and the resources; how relevant it is, and so on, in fact this involves just a checking off of boxes. This information is further summarized and condensed into a single overall score for the whole program which is forwarded to the negotiator.

Now the negotiator is not bound by that technical evaluation. This is the basis of our concern about whether or not the evaluation really has an effect on the negotiated ceiling. They certainly look at it, but they also take into consideration other economic factors. It is our feeling that if the purpose of this program is to enhance the technology

base of the defense industry, there should be a good deal more stress placed on the technical evaluation.

Senator McINTYRE. Did you have an opportunity to examine the procedures in detail and measure them against the results of the evaluation?

Dr. REPPY. This information, as you can imagine,—is proprietary.

Senator McINTYRE. Do you know what occurs during specific evaluations?

Dr. REPPY. My understanding is that these project descriptions are circulated through the service laboratories of the DOD, and that they percolate down to the persons who have been designated as the appropriate evaluators for each particular project. The evaluators look at the project descriptions and every 3 years there is an additional on-site review of some portion of each company's projects.

There is a distinction between the way the Air Force and the Navy link the technical evaluation to the advance negotiations. The Air Force has introduced a procedure whereby a change in a company's technical score has an automatic affect on the negotiated ceiling. But the Navy does not do that. I am not familiar with the Army's procedures on this point.

Senator McINTYRE. I think, Professor, this is your question. You quote Secretary McNamara as evidence of DOD inability to know what it is getting out of I.R. & D. Did you take into account the effect that Public Law 91–441 was enacted 4 years later and was specifically designed to inform Congress?

Dr. LONG. There have been improvements in the way in which the program is run and in the character of the information available. I have not seen the evidence that the evaluation is of sufficient depth so that one can feel that Secretary McNamara's statement is no longer applicable. On the whole I would think it is still applicable.

Senator McINTYRE. Why do you consider industry's share of I.R. & D. cost very small? Is $450 million in 1973 and $455 million in 1974 very small?

Dr. LONG. These numbers are the portion of I.R. & D. costs accepted by DOD but allocated to other customers including NASA. If you talk independence, you should talk only about the money put in by the companies themselves and not that recovered automatically under their negotiated ceilings. That is the part they have complete control over. We are talking, however, about a large industry, an industry whose total defense contracts, materiel plus R.D.T. & E. are on the order of $30 billion a year.

It is a big industry.

Senator McINTYRE. You say that the evidence suggests most I.R. & D. funds are spent on short run development projects aimed at winning new contracts. What evidence do you have to support this?

Dr. LONG. I thought I was less definite than that. The fact is we are inadequately informed on the details. Our studies would benefit by more details.

We feel that Congress, too, would benefit. I did mention that there seems to be a genuine conflict between evidence that there is a good deal of shortrun work and evidence that the program is thought of as supporting innovation and the technology base.

This is an area of uncertainty. We would be delighted to have the information to resolve it.

Senator McINTYRE. Mr. Fine?

Mr. FINE. Professor Long, you indicated in your earlier comments that you had been advised that these efforts led to contracts. Now the information you were given, did it indicate when the contracts were let so you would have a better base for establishing the time relationships?

Dr. REPPY. That information came from a DOD-sponsored survey. It is a 1974 study which you probably have. There was no statement about the time lags. On the other hand if you look at the charts submitted by the industry in the Tri-Association volume of technical papers, you will notice that they give dates for contracts related to I.R. & D. So you can get a sense there that the I.R. & D. projects lead rather quickly to an R.D.T. & E. contracts.

Mr. FINE. Do those indicate when the company intiated its individual research which led to the contracts ultimately?

Dr. REPPY. The industry documents do, but the Defense Department survey does not.

Senator McINTYRE. Senator Proxmire?

Senator PROXMIRE. Dr. Long, Dr. Reppy, we are honored to have you. You are not just scholars. You are much too modest. I ask unanimous consent to have placed in the record a 2½ page listing of Dr. Long's achievements, including serving as a member of the Science Advisory Board, Department of the Air Force, Chairman of the Chemistry Advisory Committee of the Air Force, Office of Scientific Research, Scientific Advisory Board, Department of Defense, Assistant Director for Science and Technology, U.S. Arms Control and Disarmament Agency, and so forth.

[The information follows:]

FRANKLIN A. LONG

Addresses: 632 Clark Hall, Cornell University, Ithaca, N.Y. 14853. 429 Warren Road, Ithaca, N.Y. 14850.

Present Position: Henry R. Luce, Professor of Science and Society; Professor of Chemistry.

Born: July 27, 1910, Great Falls, Mont.

Education: B.A., M.A., University of Montana, 1932; Ph. D. in Chemistry, University of California, Berkeley, 1935.

Marital Status: Married; two children.

BACKGROUND: NONGOVERNMENT

1933–35, Fellow, Department of Chemistry, University of California, Berkeley; 1935–36, Instructor, Chemistry, University of California, Berkeley; 1936–37, Instructor, Chemistry, University of Chicago; 1937, Professor, Chemistry, Cornell University; 1942–45, Research Supervisor, Explosives Research Laboratory of NDRC, Pittsburgh, Pa.; 1946, Visiting Chemist and Consultant, Brookhaven National Laboratories, Upton, Long Island, N.Y.

1947–62, 1964–74, Member, Board of Trustees, Associated Universities, Inc., New York; 1975, Honorary Board of Trustees Member, AUI; 1950–60, Chairman, Department of Chemistry, Cornell University; 1956–57, Faculty Trustee of Cornell University; 1960–66, Member of the Committee on Chemistry and Chemical Technology of the National Research Council; Chairman, 1965–67; 1961–68, Member of the Editorial Board of the Journal of Physical Chemistry; 1962, Member of the National Academy of Sciences; 1972, Chairman of the Korean Advisory Committee; 1963–69, Vice-President for Research and Advanced

Studies, Cornell University; 1963, Member, American Association for the Advancement of Science; 1964, Member, Board of Directors, *Bulletin of Atomic Scientists.*

1964, Member, Council on Foreign Relations; 1965, Member, American Academy of Arts and Sciences, Boston, MA.; 1965, Member, Board of Directors, Inmont Corp.; 1967, Member, past Chairman, Committee on Chemistry and Public Affairs, American Chemical Society; 1967–71, Member, International Continuing Committee, Pugwash Movement; 1969–73, Director, Program on Science, Technology and Society, Cornell University; 1969, Member, Board of Directors, Exxon Corp.; 1969, Trustee, Alfred P. Sloan Foundation; 1970, Guggenheim Fellow, Max Planck Institute for Physical Chemistry, Goettingen, Germany.

1971, Chairman of the Executive Committee, Program on Policies for Science and Technology in Developing Nations, Cornell University; 1973–74, Co-chairman, American Academy of Arts and Sciences study on "New Directions in Arms Control"; 1974, Member, ad hoc Committee on Science and Technology for Government of the National Academy of Sciences; 1974, Co-chairman, American Pugwash Committee.

GOVERNMENT

1941–45, Consultant, National Defense Research Committee, Office of Scientific Research and Development, Washington, D.C.; 1953–59, Consultant, Ballistics Research Laboratory, Department of the Army, Aberdeen, Md.; 1956–60, Member, Science Advisory Board, Department of the Air Force, Washington, D.C.; 1959–63, Chairman of the Chemistry Advisory Committee of the Air Force Office of Scientific Research.

1959–61, Consultant, Scientific Advisory Board, Department of Defense, Washington, D.C.; 1961–66, Member, President's Science Advisory Committee, Washington, D.C.; 1962–63, Assistant Director for Science and Technology, U.S. Arms Control and Disarmament Agency, Washington, D.C.; 1963–73, Consultant to the U.S. Arms Control and Disarmament Agency, Washington, D.C.; 1970, Consultant, U.S. Agency for International Development; 1971, Director, Arms Control Association.

1972–74, Member, Advisory Committee for Planning and Institutional Affairs, National Science Foundation; Chairman, 1973–74; 1974, Member, U.S.-India Commission for Educational and Cultural Affairs.

Author: Contributed numerous articles on chemistry, science and public affairs and arms control and disarmament to books, journals, encyclopedias and reference works.

Senator PROXMIRE. You are distinguished as a consultant and adviser on defense matters for some time. I think you are very, very well qualified. Now you suggested an interesting alternative. We may not be able to give it much consideration at this time, but I think it is fascinating.

It is the Advance Projects Research Agency. Did you have the notion that that would take over the functions of I.R. & D.? If so, would it be a billion-dollar operation or significantly on that order?

Dr. LONG. I was proposing two new program elements to be located within the broad program of the Office of Defense Research and Engineering under its Director to respond to the desire for innovation and for building up the technology base, and to the desire of industry for some independence and flexibility.

As to the former, I suggested that the Advance Research Projects Agency had been in the business of innovation and supporting of programs over relatively long periods. It seems very reasonable to put those programs which focus on building the technology base and working for innovation in ARPA.

The second suggestion was that to give the companies some flexibility and choice in what they do, that we could introduce "level-of-effort" contracts.

Senator PROXMIRE. I was very impressed by your table that showed a comparison of I.R. & D. with the research and development phases of R.D.T. & E. The overall figures were close when you broke it down, you pointed out that industry rather than in-house and universities got $480 million of the R.D.T. & E. money in these categories compared to the far greater amount of that it gets in I.R. & D./B. & P. funds. The fund over which we have control is relatively small.

As I understand it, your remarks with respect to Secretary McNamara's notion seem to me to stand up just as well today when you recognize what they do is they evaluate the brochures and proposals but they don't evaluate the results.

If they do, they certainly keep it a mystery. Is that right or wrong?

Dr. LONG. I realized when I listened to Admiral Rickover that Dr. Reppy and I can't help but be looked upon by you as relatively mild witnesses. We did not use strong statements like "the program is a waste." Indeed, I am prepared to believe that there have been benefits from the program.

I am also prepared to believe that the industry is right in thinking that it ought to have some flexibility and some choice. The point of the Secretary's statement was that he was willing to believe there were benefits from the program. He found it very much more difficult to decide whether the benefits were equal to the cost, that is, whether it was a cost effective program. That seems to be still a reasonable position.

Senator PROXMIRE. You tell us there is still no reason why we can't ask that question. We should be able to make some assessment of this program, at least as time goes on, is that correct?

Dr. LONG. I believe you can and I deeply hope you will.

Senator PROXMIRE. You indicated on page 5 that you can't find out the amount that we spend on I.R. & D. total amount of overall. You have been able to get access to undocumented statements. Do you see any reason at all for keeping the public in the dark on this?

Dr. LONG. Frankly I see no reason whatsoever that the amount of total funding is not available.

Senator PROXMIRE. The total number would not affect the proprietary interest to any firm?

Dr. LONG. No.

Senator PROXMIRE. Would it disclose anything to any potential enemy?

Dr. LONG. No.

Senator PROXMIRE. As far as the companies that get I.R. & D., is there any reason you can see any justification or any reason why the companies that receive these funds should not be identified?

Dr. LONG. There is a conflict here. One understands why companies involved in these programs would be happier if only minimal information were available on what was going on and what was the level of expenditure. I have some sympathy with that.

Senator PROXMIRE. What sympathy do you have with it? Why shouldn't we know if it is our money, where it is going?

Dr. LONG. If it were really done by private enterprise, for example, in the way that DuPont handles its R. & D. expenditure for chemicals, I would be in sympathy for wishing to maintain some privacy. I am not so sure I would have the same feeling if I were a stockholder. But the

real point here is that this is Government money. It seems to me whatever the case might be for a different kind of industry or a different kind of arrangement for these payments, there is no reason why the information should not be made available for the current program.

Senator PROXMIRE. You say you have no evidence that Congress either has the information or after the fact evaluation by DOD. You don't understand how one can evaluate this program. Indeed I don't see how either. I don't see how we can justify spending $1 billion a year. I am responsible as chairman of a subcommittee that handles a space budget.

NASA has $80 to $90 million a year in here. Even though I am chairman it was never called to the attention of our subcommittee.

This is something that I would agree wholeheartedly to and unless you have something you would like to add, I don't see how we can justify this.

Dr. LONG. Congress can have in executive session some of this information which we have not been able to get.

Senator PROXMIRE. We can get some breakdown.

Dr. LONG. This should be of some help to Congress. But I must say I do strongly feel that the information ought to be more widely available.

Senator PROXMIRE. You say the I.R. & D. system not only discriminates against the small firm but it prevents entry and in that way inhibits competition and narrows the base of industry that is able to compete. Then on page 11, you say—you talk about the depth of the evaluation and confidence in the evaluators. The strong case is that the principal ceiling level for I.R. & D. for any year is the amount the company received in previous years.

That is about as appalling a situation, if that is the case—not the basis of the merit of the research team or the quality of the project they may be involved in or the need the Government or the military has for this particular thing but how much they got the year before.

Is this one of these things where you just don't have the data to make a proper conclusion or is it an assertion you are making with considerable confidence?

Dr. REPPY. There are two points to be made. There is, of course, great stability in this industry. It is not surprising that year after year you see the same major companies on the list of major prime contractors. In that respect the I.R. & D. payments follow the same pattern.

Secondly, in the negotiation, there is a tendency to start off with what the company got the year before and to go around that point. The impression I received through the interviews I have had, both in industry and DOD, is that the technical evaluation is not heavily weighted. The sales base of the company and the historical size of its program will be the most important determinants in its ceiling negotiations.

Senator PROXMIRE. My time is about up. Let me finally ask one other question. As I understand it, you indicated that in your view most of I.R. & D. is short rather than long term. I think that the GAO study confirmed that.

That study pointed out that the four firms they examined, that one firm had 11 percent of their funds in new concepts, another had 1 percent, and two firms had none at all.

The Air Force had a study and found that only 5 percent went for basic research. There are other long term research projects, certainly. But I think that that finding would tend to confirm your conclusion that I.R. & D. is not an effective program at the present time for a long term new concepts or basic research.

Thank you, Mr. Chairman.

Senator McIntyre. Professor, you say a reasonable question concerns the evaluation of the results of prior year programs. How cost effective is it? Do you know if there is a practical way to determine this?

Dr. Long. Sooner or later, it seems to me that people who run programs and spend money always end up being forced to do some evaluation. They have to say that the results of this company were or were not better than that company, or that this program of response to a military need is more effective than another.

That is a routine requirement. It seems to me it is a very reasonable thing to expect.

Senator McIntyre. Mr. Fine and I spent long hours on the I.R. & D. end of it with the military. I am a critic of some of their work but I think historically if you take a look at just who is the world leader in I.R. & D. and all that goes with it, you will find that the Russians are playing catch up now. So while we are criticizing, and I think this program needs to be examined carefully, I think we must not lose sight of the fact that out there in those industries you are pointing to, there are some of the finest brains that exist in this country that keep us ahead.

We are the envy of the world.

How would you determine the content and cost of your suggested level-of-effort research contract program and how to distribute it in industry not to mention to justify it to the Congress and budget and administer it?

Dr. Long. In the first place, if you went that route, the program would be quite completely under congressional control. It would come directly to your committee. It could be looked at in terms of character, size, budget. I should think this would answer many of these areas of uncertainty and controversy. It is a clean and straightforward way to handle a program like this.

Senator Proxmire. I share a lot of Senator McIntyre's views. I must say, though, that if the Russians and other countries are catch ing up so rapidly, there must be something wrong with the way we are doing it now.

Senator McIntyre. They are not catching up.

Senator Proxmire. If they are not catching up a lot of the charts and things we have been seeing are telling something that does not make sense.

At any rate, it appears to me that we do have a program here that is not getting results in the long term area, as I think you have well documented. For that reason, it is proper for us to look at the options.

Dr. Long. If I may make a brief statement on the Soviet Union, I am a frequent visitor there. I watch their R. & D. programs with a great deal of interest. Personally I have a great deal more admiration for U.S. programs than this particular discussion might have implied.

Second, I give a somewhat lower assessment to Soviet capabilities in R. & D. than some of the comments of others have implied. I

believe very strongly in the competence and capability of U.S. industry in this regard.

Senator McINTYRE. I want to thank you, Professor, and Dr. Reppy for being here and for your fine testimony.

[The information follows:]

PREPARED STATEMENT OF F. A. LONG AND JUDITH REPPY

Mr. Chairman, Committee Members: I am Professor F. A. Long of Cornell University, and with me is my colleague Dr. Judith Reppy. The two of us have been studying the IR&D Program of the Defense Department for the past year, and we are consequently most grateful for the opportunity to attend these hearings and to participate. We look forward to learning all we can, and we especially appreciate the opportunity you have given us to raise some of the questions which have occurred to us during the course of our work.

INTRODUCTION

The IR&D/B&P Program allows defense contractors to recover certain research and development expenditures as overhead charges to contracts which they have with federal agencies, principally, of course, with DOD. Although IR&D and B&P are formally different, there is enough similarity between them and enough fungibility that most of the discussants in these hearings have lumped them together, and we shall do the same.

The IR&D/B&P Program is a large one by almost any standard. It has amounted to something over one billion dollars a year for each of the last few years, if recognition is given to the unreported payments to smaller companies. Even as a percent of defense sales it is pretty substantial, averaging out to something like 3½ to 4 percent.

This program is strongly supported by the DOD which supplies the funds, and by the military contractors which receive them. Among the advantages claimed for the program are: (a) it permits the military contractors to broaden their technical base, and hence to do a more effective job at contracting; (b) it supplies continuity to the efforts of the contractors in the areas of research and development; (c) it gives to the DOD an alternative source of innovation. In Dr. Foster's dramatic language, it permits utilization by DOD of thousansd of technical brains outside of DOD itself. It is also claimed that the program contributes to competition in the defense industry and to its economic stability. These are substantial advantages, if realized, and hence the program needs thoughtful consideration. At the same time there are some very ovbious difficulties with the program, the chief ones bring lack of program accountability, questions of program management, and absence of information about program details. We shall turn to these several points shortly, but we would like first to put the program in context.

THE OVERALL PROGRAM OF MILITARY R&D

Large as the IR&D Program is, it is still only a modest part of an overall program of federally supported research and development directed toward military problems. Even without including the IR&D funds, the total federal budget for military R&D is uniquely large by comparison to that for any other federal agency, and it is also uniquely large as compared to that for any U.S. industrial group. Total obligations for the Defense Department this year will approximate 100 billion dollars and NASA will spend perhaps another 3.5 billion. Budgeted funds for R&D for these agencies are over fourteen billion dollars: details are given in Table 1 below. In including the budgeted space R&D in this total, we follow the practice used by Dr. John Foster during the days he headed ODDRE.

The totals in this table are immense. They represent roughly two-thirds of the total R&D expenditures by the federal government, and over 40 percent of all R&D expenditures for the entire United States, public and private.

For DOD in particular, expenditures on R&D account for over 10 percent of its total budget. They are very much higher as a percent of the procurement portion of the budget and, indeed, it appears that almost 25 percent of the total funds spent in industry is for RDT&E. By comparison to this large budgeted program of defense-related R&D, the one billion dollar IR&D/B&P program appears relatively modest.

However, it is probably not quite proper to compare IR&D expenditures by DOD to the total RDT&E budget, since the usual argument is that IR&D is most relevant to the support of the defense technology base. To the extent one accepts this, one should compare IR&D funds to the portion of the RDT&E budget which relates particularly to long range activities. Table 2 gives the DOD's allocation of funds by category in its FY 1974 RDT&E budget. It is the first two categories, "Research" and "Exploratory Development," which support the defense technology base.

In Table 3 we compare spending in these two categories with IR&D/B&P spending. The estimated total figure of $100 million for IR&D/B&P spending makes an allowance for payments to smaller contractors not included in the published data on IR&D/B&P. From this table we can see the importance of the IR&D contribution; IR&D payments to major contractors alone are nearly equal to the contracts let to industry in the categories of Research and Exploratory Development. We conclude that IR&D expenditures, *if they are indeed for long range efforts*, represent a very significant addition to DOD's efforts to obtain technical innovation and to maintain the technical base of the industry. In this sense, the IR&D/B&P expenditures are potentially an important element in the overall program of military R&D.

THE UNCERTAINTIES

Given the substantial size and apparent significance of the IR&D Program, one is immediately led to ask how does DOD benefit from it? It is here that investigators like Dr. Reppy and myself encounter real trouble. These expenditures are of taxpayers' money, yet the details of the expenditures and of the products from them are remarkably difficult to discover.

We are by no means simply negative about IR&D. We are prepared to believe that there are important benefits from the program to the military contractors as well as to the Defense Department and NASA. However, as investigators, we do feel the need to see and analyze the facts. Let me tell you specifically the kinds of difficulties we have in getting full data:

1. *We do not know the total expenditures for IR&D/B&P.* We can find out, for the year 1974 for example, that the total in these categories for "major defense contractors" was $808 million. We can find undocumented statements implying that this represents something between 75–85% of the total. What we would like, however, are firm figures on the total expenditures, stated for the two categories, IR&D and B&P.

2. *We do not know what companies get IR&D/B&P funds and we do not know the amounts they get.* We have a small and partial set of data of this sort and will present it later, but it is only for one year, and in having this information, we may well be unique.

3. *We have been unable to obtain any public description on a comprehensive basis of the character of the IR&D Program and of the technical work done under B&P.*

4. *We find it difficult to make a sound judgment on the adequacy of the evaluation by the military of the individually proposed IR&D programs.* It is not clear that the present prior evaluation procedures are of adequate depth or that the results have much impact on the size and quality of the IR&D program.

5. *We have obtained almost no solid information on after-the-fact evaluations by DOD, i.e. analyses on what benefits have actually resulted from the IR&D expenditures.* In the absence of more specific information than we yet have, it is difficult for us to make a firm evaluation of the value of the IR&D Program. Since we have no evidence that Congress, either, has this information, we find it equally difficult to see how Congress can make an adequate evaluation. Indeed, DOD itself may not really know what it is getting for this R&D program. The testimony by then Secretary McNamara in 1966 hearings before the House Appropriations Committee still seems relevant. He said:

"The defense contractors maintain that we benefit very substantially from these expenditures. I think we obtain some benefits from them. Whether the benefits we obtain are equal to the cost is very, very difficult to prove one way or the other."

IR&D AND THE DEFENSE INDUSTRY

The outside analyst is left to try and evaluate the program on the basis of an understanding of the defense market in general, and of the procedures governing the IR&D program in particular. The peculiar features of the defense market

are well known. Except for the large, but U.S. supervised, sales to foreign governments, the U.S. government is the single customer. The market is characterized by a high demand for innovation and a correspondingly high rate of technological obsolescence. The risks usually associated with rapid technological change, however, have been largely assumed by the government through its direct funding of defense R&D and its reliance on negotiated contracts in its dealings with its contractors. Less than 10 percent of the prime contracts awarded by the DOD in 1974 were let through formal advertising and bid procedures. For the remaining contracts, price was negotiated on the basis of contractor costs, including the costs of IR&D/B&P; i.e., for these contracts the government's share of IR&D costs (up to the negotiated ceilings in the case of major contractors) automatically became part of the contract price. In other words, a defense firm's IR&D program generates a substantial fraction of the funds needed to cover its costs, irrespective of the program's technical success or failure.

FOSTERING INDEPENDENCE

The companies which receive IR&D payments give great stress to the word "independent," arguing that these payments are essential to preserve the independence which goes with the private enterprise character of the companies. It is difficult, however, to take this argument very seriously. Recognizing that "Who pays the piper, calls the tune," we can ask how much of their own funds, not recovered from DOD or NASA, the major contractors allocate in their government divisions for their inhouse research effort. The answer is that the amounts are very small. On the average, over the past five years the major defense firms have recovered 50 percent or more of their IR&D/B&P costs from DOD and another 5–10 percent from NASA. The share contributed from the company's resources will be on the average only 40 percent of the IR&D costs incurred. When one considers that the negotiated IR&D programs of the major contractors are only about 15 percent of the budgeted DOD funds spent in industry for R&D, it is clear that only about 6 percent of the total military R&D done by these contractors can be thought of as truly independent.

In contrast, a nondefense firm which decided to allocate funds to an inhouse R&D program is reducing its profits in the short run by the full amount of its R&D costs. Such a firm does not normally have large outside contracts for R&D so the total cost of its programs for technological advance is borne by the company itself.

The risk which the defense contractor *does* face in his IR&D program is the danger that he may choose poorly in putting together his program, that the projects may not succeed technically or may not be of interest to his customer. This risk is minimized, however, by the close contacts maintained between contractors and DOD personnel, which provide a two-way flow of information on DOD needs and industry capability. The effectiveness of this network is apparent in a 1972 DOD survey of 30 major IR&D contractors. The contractors stated that, on an average, 40 to 50 percent of their IR&D projects resulted in DOD contracts. This is a large proportion compared to the R&D experience of nondefense firms, and it suggests that the risks associated with the defense industry are not being borne by the contractor.

CONTRIBUTING TO THE TECHNOLOGY BASE

The concentration of the effort of IR&D projects toward the development end of the R&D spectrum has been noted by many observers. It is reflected in an Air Force survey of a sample of their major IR&D contractors in which only 5 percent of the IR&D projects were identified as basic research and 30 percent as applied research. These are presumably the categories which contribute to the technology base as defined by DOD, yet they apparently constitute little over a third of the IR&D Program and, of course, a much smaller proportion of the total IR&D/B&P effort. The evidence suggests that most of the IR&D funds are spent, not on contributions to the technology base, but on short run development projects aimed at winning new contracts. The high rate of success in converting IR&D projects to DOD contracts reported in the DOD survey is evidence that the companies rightly see new business as their most important reason for doing IR&D. The rhetoric which describes the IR&D Program as "a major source of innovative contributions" may be inappropriate.

FOSTERING COMPETITION

The IR&D Program, it is claimed, fosters competition in the industry. It is true that the program provides funds which allow the defense companies to pursue their technological rivalry; however, it does not contribute to competition in a larger sense. As long as IR&D costs are recovered only through existing contracts, the program will tend to preserve the status quo, inhibiting both exit and entry in the industry. With some difficulty we have been able to obtain for 1973 a list of the major defense contractors ranked by size of their IR&D payments from DOD, and we give some of the data in Table 4. The table compares this ranking for twelve major companies with their rankings according to the magnitude of their prime contracts and of their RDT&E contracts. The rankings for contracts refer to fiscal year 1973, whereas the ranking for IR&D payments are for the calendar year; data for RDT& E contracts have been adjusted to include contracts awarded to company subsidiaries. Finally, the volume of IR&D payments leading to the ranking listed includes payments on subcontracts as well as prime contracts.

As Table 4 demonstrates, there is extensive overlap among the top dozen prime contractors, RDT&E contractors, and IR&D contractors. We, of course, *do not know* the dollar amounts recovered from DOD by companies for their IR&D programs, but we do know that the twelve companies in aggregate received 36 percent of total prime contracts of $10,000 or more for the year, and 56 percent of total RDT&E contracts. Hence, we may estimate that they received about 50 percent of the reported IR&D/D&P payments. In any case, it is certain that the large prime contractors, with their large RDT&E contracts and well developed technological capability, also receive the lion's share of the IR&D funds. The non-defense company, no matter how excellent its ideas or scientific resources, cannot recoup its R&D costs from the government. To the extent that IR&D is an important entry point to new defense contracts, the program discriminates against potential new suppliers in favor of established sources, and in this sense diminishes both the potential defense technology base and competition in the industry.

EVALUATION BY DOD

The value of the IR&D Program to the Defense Department depends largely on the technical quality of the work done and its relevance to DOD needs. DOD relies on its procedures for technical evaluation to monitor quality and relevance of individual IR&D projects. We have had difficulty, here, as in other areas, in forming a judgement on the adequacy of DOD's technical evaluation procedures; the procedures can be described, but the results of their application are less certain.

Technical evaluation of the proposed IR&D programs of a military contractor is done by circulating the technical write up for each proposed IR&D project among DOD inhouse laboratories, where it is checked for relevance and given a technical rating. These ratings are then aggregated to an overall score, which is forwarded to the service negotiators who negotiate a ceiling agreement for the IR&D program with the company's representatives. We see two problems with this system. One is the question of the depth of the evaluation and competence of the evaluators, a point already raised by GAO in its report. Secondly, there is relatively little sensitivity in the final negotiated ceilings to the details of the evaluations. Indeed, the strong indication is that the principal determinant of the ceiling level for IR&D for any year is the amount which the company received in the previous year. The Air Force has made a beginning in adjusting ceilings for IR&D expenditures to changes in contractors' technical scores, but even the Air Force procedures provide for only a marginal role for the technical rating in determining a company's ceiling, while the Navy has eschewed any explicit link at all. Yet good management demands that program size should be determined by quality and relevance.

We have even less evidence of thorough evaluation of the results of prior year programs of IR&D. What were the accomplishments of the individual programs? What specific relevance to DOD? How cost effective compared to direct contracting for R&D? These are reasonable questions. Does DOD have the answers?

CONTRIBUTIONS TO STABILITY IN THE DEFENSE INDUSTRY

The evidence for the technical benefits from the IR&D Program is, as we have indicated, incomplete and contradictory. One is forced to conclude that the only goal which the IR&D Program meets unambiguously is its role in increasing the

economic stability of the industry. There is a legitimate need for continuity in any R&D activity, and the IR&D Program helps to supply this continuity for the defense industry. Proponents of the program go further, however, and claim that the IR&D Program is a vehicle for diversification by which industry can reduce its dependence on the DOD for economic survival. This raises the controversial issue of agency relevancy for IR&D projects, an issue which explicitly pits the military contractors' "independence" against the need for accountability in government spending. We believe that the question must be decided in favor of the principle of accountability: public money appropriated for the defense budget should be spent for defense purposes. Removing the relevancy test or, what amounts to the same thing, broadening it to ask only for government-wide relevance, would permit IR&D funds to be spent on nondefense purposes and would constitute an unfair subsidy to defense companies over nondefense firms in commercial markets.

Even with the relevancy requirement, the IR&D Program is an important factor in the economic stability of the industry. The companies note that the IR&D payments constitute "only" 3 to 4 percent of their sales to DOD and NASA. However, when one recalls that funds for inhouse R&D in a *non*defense firm come out of profit, it is clear that IR&D payments are an implicit addition to the profits of the defense firms. Since, further, a substantial portion of the facilities which these military contractors use have been supplied by the government, the rate of return on their invested capital is much more favorable to the companies than the rate of return on sales. In this context 3 to 4 percent on sales is a substantial contribution to the economic health of the firm.

In spite of these reservations, we believe that any changes made in the IR&D Program should be done with full consideration for financial stability and industrial efficiency. For good or for bad, the major military contractors have grown used to the current procedures and will find change awkward and painful, even if, in the long run, changes would benefit both them and the country. With this in mind, we now turn to possible new directions.

MODIFICATIONS IN THE IR&D/B&P PROGRAM

If Congress concludes that an IR&D Program in some form is valuable to DOD and NASA, and should be retained, then there are a number of modifications which seem essential to insure program effectiveness and to reduce the level of controversy which currently surrounds the program. Three changes are needed: better accountability; better evaluation; and assured relevance.

We do not see how the IR&D Program can continue to be justified unless the information available on it is greatly increased and unless Congress undertakes a more explicit and continued overview. We are astounded that so little information is currently released on the program. For each advance agreement on IR&D with a major contractor the following information should be publicly available: what is the company; what is the negotiated ceiling; what is the character of the projects within the program; what, in detail, is the potential military relevance? Companies and DOD will argue that the information is proprietary and that the research involves classified information. Neither of these arguments has substance. If the companies wish to do truly proprietary work, let them use their own funds. In any case, ample information can be disclosed as to the character of research without unduly revealing individual company approaches. The concern on security classification is equally unreal. For years DOD has presented unclassified descriptions of classified contracts awarded by DDR&E.

Surely the same can be done for projects to be done with IR&D funds from DOD.

Comparable changes are needed on technical evaluation. Procedures used by DOD for evaluation must be made sufficiently clear and explicit so that they can be explained and justified to Congress. Congress must be able to understand the reasons for supporting a given IR&D project and must be assured that the degree of DOD support is related to the project's quality and relevance. Of equal consequence is an evaluation of the work after it is completed. How can DOD possibly know whether the IR&D Program is cost-effective unless it evaluates in detail the completed efforts and compares their cost effectiveness against its own budgeted R&D programs?

ALTERNATIVES TO THE IR&D PROGRAM

Many of the objectives which DOD and the military contractors advance in arguing for the IR&D Program are entirely sensible. The companies involved

should be encouraged to search for innovation. Their technical staffs deserve stability and continuity. To the degree that they are effective and efficient, the companies deserve economic stability and moderate profitability. And no doubt the present IR&D/B&P Program contributes in some measure to these objectives. It is a different and more profound question, however, whether the IR&D Program is the best way to achieve these objectives. There are obvious alternatives, and Congress should insist that DOD explore these alternatives and should itself be prepared to analyze them.

Questions of economic stability and profitability are beyond the scope of these hearings. We shall, therefore, restrict our comments to alternatives for innovation, for maintaining the technological base, and for contributing to continuity for scientific personnel. We believe that these goals can be addressed directly within the budgeted program of the Defense Department under the heading of RDT&E. We see no reason why all of these objectives cannot appropriately be handled by well-designed R&D contracts which can, at the same time, produce the accountability and explicit examination of effectiveness which Congress and the nation have a right to expect.

In some ways, the needed institutional changes have already been developed by DOD and proven successful. We refer to the innovative and long range programs started some years ago under the rubric of Advanced Projects Research, and supervised by ARPA. It would seem a modest task indeed to modify the current ARPA program to respond more fully to some of the objectives we have just mentioned, and the fact that there is a structure in place should make these modifications of the ARPA program all the simpler.

One could still argue that the military contractors need programs which allow them maximum flexibility and independent choice of research priorities. They have a case. However, to satisfy their objectives one need not go to an IR&D program. The obvious alternative would be to establish within DDR&E a series of "level of effort" research contracts designed to give companies the desired flexibility and choice. One would, of course, need to insist on an ultimate evaluation of the results, but surely this is a minimal requirement for any program which is supported by taxpayers' money.

There are still other available alternatives which would address the concerns we have expressed here. If enhancing contractor independence is given highest importance, then it might be desirable to dismantle the present IR&D Program and replace it with a higher profit rate on defense contracts. This would come closest to stimulating the situation in nondefense industries and would provide complete freedom to the defense contractor to allocate his company's resources according to its own priorities. And no doubt, still other alternatives to the present program should be considered.

SUMMARY

To sum up our comments, we subscribe to many of the goals and objectives which the military contractors and DOD believe are served by the IR&D/B&P Program. However, we have grave doubts whether, in its current form, the roughly one billion dollars in this program is well spent. One key deficiency is the lack of accountability, and we think at the minimum Congress should insist on modification here. Taxpayer support for the IR&D Program should be justified on the basis of demonstrable benefits of the program, benefits commensurate with the very substantial amounts of money involved. We are not persuaded that the evaluation either before the programs are established, or after the work has been done are adequate to assure that the programs are effective and that the work done does indeed have military relevance, an element which we think essential. Finally, we doubt whether the current program does, in fact, leave the companies with very much independence and therefore, we remain uncertain whether the major objective of fostering innovation is, in fact, being realized.

There are at least two ways in which some of the deficiencies could be corrected. One is basic modification of the IR&D Program itself. An alternative procedure which, in the long run we think preferable, would be to replace the IR&D Program by appropriate budgeted "level of effort" and exploratory R&D projects within the RDT&E programs of DOD.

TABLE 1.—ESTIMATED FISCAL YEAR 1976 FEDERAL OBLIGATIONS FOR DEFENSE-RELATED R. & D.[1]

	Amount (billions)	Percent of Federal R. & D.
National defense budget:		
R.D.T. & E. of DOD	$10.19	
R. & D. for atomic weapons (ERDA)	.74	
Pay for military assigned to R. & D	.43	
Subtotal	11.36	52
Space budget: R. & D	2.90	13
Total, military and space	14.26	65

[1] Not included, approximately $1,100,000,000 for I.R. & D./B. & P.

Source: NSF.

TABLE 2.—*R.D.T. & E. budget by category Fiscal Year 1974*

	Millions
Research	$308
Exploratory development	1,095
Advanced development	1,475
Engineering development	2,562
Management and support	1,130
Operational systems development	1,763
Total	8,333

Source: DOD.

TABLE 3.—*I.R. & D./B. & B. funds compared to DOD budgeted expenditure for the technology base, 1974*

	Millions
I.R. & D., B. & P. payments:[1]	
I.R. & D., major contractors	$457
B. & P., major contractors	351
Total	808
Estimated total I.R. & D./B. & P. payments—all contractors[3]	1,010
Expenditures from R.D.T. & E. budget for research and exploratory development:[2]	
Spent inhouse	683
Spent in industry	482
Other (universities, FCRC's)	238
Total	1,403

[1] Calendar year 1974.
[2] Fiscal year 1974.
[3] Total I.R. & D./B. & P. payments to all contractors estimated by taking reported payments to be 80 percent of true total.

Source: DOD.

Table 4.—TOP 12 PRIME CONTRACTORS FOR DOD WITH THEIR RANK AS R. & D. CONTRACTORS AND RECEIVERS I.R. & D. PAYMENTS, 1973

Company	Rank on lists for—		
	Prime contracts [1]	R.D.T. & E. Contracts [1]	I.R. & D. payments [2]
Lockheed	1	2	7
General Electric	2	6	2
Boeing	3	4	3
McDonnell Douglas	4	1	8
Grumman	5	5	17
A.T. & T. (Western Electric)	6	7	34
Textron	7	34	12
United Aircraft	8	11	1
General Dynamics	9	8	19
Rockwell International	10	3	5
Raytheon	11	9	4
Hughes Aircraft	12	10	6

[1] Fiscal year.
[2] Calendar year.

Source: DOD.

Prepared Questions From Senator McIntyre With Responses by Professor Long and Dr. Reppy

Question. Professor Long, have you had any significant experience in industry or in the Defense Department which could provide a basis for practical understanding of this program?

Answer. I have not held any full-time appointment either in the military procurement industry or in DoD. I have, however, served extensively on advisory committees for DoD as my Vita shows. As a member of the President's Science Advisory Committee, between 1961 and 1967, I gave extensive consideration to military procurement problems and new weapons systems.

Question. The footnote on Table 1, showing Defense related obligations for FY 1976, indicates that the $14.26 billion for Military and Space does not include about $1.1 billion for IR&D and B&P. Are you aware that a significant part of this $1.1 billion in fact is paid from the $14.26 billion?

Answer. Yes. We are aware that companies which do contract RDT&E work for DoD obtain funds for IR&D and B&P as part of the overhead on these research contracts. For any company or profit center the fraction of its total IR&D payments which comes from RDT&E funds will correspond to the proportion of RDT&E contracts in its total business. Overall, this fraction is relatively modest, on the order of 25 per cent.

Question. You state that the totals in Table 1 are immense. Does this imply a criticism? Are you saying that we do not have to develop major sophisticated and costly weapons like a Trident submarine for our future national security even though it will cost about $3.4 billion just for development?

Answer. In calling the proposed FY 1976 total for defense and space related R&D of over 14 billion dollars immense, we are simply making an obvious comment. It seems to us obvious that such a large fraction of our total R&D must be considered very carefully in terms of national objectives. You also ask for our comment about the $3.4 billion which has been allocated for development of the Trident submarine. This was, of course, not part of our basic discussion, but we are glad to note that this figure also seems immense for just the R&D effort on just a single weapons system.

Question. In speaking of IR&D expenditures, you use the phrase "if they are indeed for long range efforts". Do you have reason to believe otherwise?

Answer. Yes. In our statement we refer to the evidence provided by the Air Force survey and the separate DoD survey that a substantial fraction of IR&D efforts are not for long-range efforts, but are for relatively short-range development, oriented toward obtaining new contracts.

Question. You say you do not know the total expenditures for IR&D and B&P. Have you attempted on a sampling basis to investigate with a variety of contractors why it is so difficult to obtain, and what would be required in terms of manhours and cost to obtain such information for all contractors, large and small?

Answer: We have not attempted to obtain data on total costs of the IR&D program ourselves. The obvious and reasonable source of such information would be the agencies which fund the program, principally DoD. It would seem perfectly feasible for the DoD to obtain such information from the smaller contractors, either directly via a questionnaire or by conducting an audit of IR&D costs for a random stratified sample of the smaller companies. A well-designed sample survey could generate an accurate estimate of the total size of the program at a reasonable cost.

Question. You state that you have been unable to obtain any public description on a comprehensive basis of the character of the IR&D program and of the technical work done under B&P. Would you reconsider your conclusion and comment for the record after you have reviewed all of the testimony and inserts for the record which will be published as the result of these hearings?

Answer. The material included in the hearing record includes several examples of successful IR&D projects. It does not, however, constitute the *comprehensive* record which is needed to evaluate properly the IR&D program. For example, it is not possible on the basis of selected examples to judge whether the bulk of IR&D projects have been directed to long-range technical efforts or whether, as the Air Force survey suggests, they have been concentrated in short-run development projects.

Question. You state that "a defense firm's IR&D program generates a substantial fraction of the funds needed to cover its costs, irrespective of the program's technical success or failure." Is it any different for much of the overall Research and Development program?

Answer. No. But of course the character of the RDT&E program is quite different from the IR&D program with respect to funding and public accountability.

Question. When you say that a nondefense firm bears the total cost of its R&D program by itself, are you saying that none of these costs are recovered in the sale of its developed products?

Answer. No. Our point is that in a non-defense firm the cost of R&D programs is not covered automatically but represents a reduction in the firm's net earnings in the short run.

Question. How can you say that risks associated with defense industry are not borne by the contractor when defense industry spends some $450 million annually for defense IR&D which is not paid by the Government?

Answer. We accept the implication of your question; our statement on this is unduly strong. An appropriate modification of our words on this would be "It suggests the risks associated with the defense industry are not being (principally) borne by the contractor," where the word in brackets should be added.

Question. Regarding your conclusion the IR&D does not contribute to competition in a larger sense, why do you say that "as long as IR&D costs are recovered only through existing contracts, the program will tend to preserve the status quo, inhibiting both exit and entry in the industry"?

Answer. The section of our statement entitled "Fostering Competition" is designed to answer just this question. The essential point is that IR&D payments go principally to the largest military contractors and go only in negligible amounts to new companies that might contribute to "competition in a larger sense". DOD itself argues that the program holds existing defense firms in the industry; we would add that it tends to exclude new entrants.

Question. Would you say that because there are only four major car manufacturers in the United States there is no real competition in that industry? Isn't this analagous to the twelve major Defense contractors who have the physical, financial and manpower resources needed to produce the highly complex, sophisticated and costly weapon systems that consume most of our Defense procurement dollars?

Answer. We are not experts in the automobile manufacturing industry but we can make two obvious points. Many people have argued that there is no real competition in the U.S. automobile industry; many others have pointed out that the principal source of competition has been imported automobiles which now account for 20 per cent of total sales in the U.S. Comparable competition from imported military equipment does not exist in the U.S. as far as we know.

Question. You say the IR&D program diminishes both the potential defense technology base and competition in the industry. Are you saying that these are not adequate to our national needs? Are you aware that our present defense industry cannot now be supported by the Government without stretching our production lines for many major weapon systems to the point where they are entirely uneconomical and costing the Government additional hundreds of millions, if not billions, of dollars?

Answer. The Joint Sub-Committee hearings in which we participated and our statement to these hearings did not address the adequacy of either the defense technology basis or the degree of competition on the industry. As to the second part of this question, this again is beyond our analysis, but the obvious response is that if production lines are "entirely uneconomical" they should be dropped. This involves a judgement as to whether it is costlier to maintain redundant capacity or to deal with single sources.

Question. You say a reasonable question concerning the evaluation of the results of prior year programs is "How cost effective is it compared to direct contracting?" Do you know if there is a practical way to determine this?

Answer. Normal private enterprise companies must face this question all the time, i.e. how effective is one way of getting new technology as compared to another. We see no reason why this would be more difficult for DOD than for these companies.

Question. Why do you say that the evidence of technical benefits from the IR&D program is incomplete and contradictory?

Answer. It is incomplete in the sense that full information on the programs is not available; it is contradictory in the sense that serious analysts of the program, including the GAO, differ considerably from the strongly supportive analysis of the military contractors.

Question. You say that three changes are needed in the IR&D program, better accountability, better evaluation, and assured relevance. Since all three are being treated in depth as the result of these hearings, would you provide any new ideas for the record after you have reviewed all of the testimony?

Answer. A review of the prepared statements presented at these hearings make it clear that Congress is being presented with two quite different views of the IR&D program. As outside observers we do not find the picture of the program painted by DOD and the industry very persuasive, especially with respect to the degree of real competition present in defense procurement. Therefore, we think that Congressional oversight of the IR&D program should be strengthened. On accountability, we believe that information on contractors' identity, on the size of their programs, and on the type of work undertaken should be available to the Congress and to the public whose dollars after all support the program. On technical evaluation, we stress the need for better after-the-event evaulation. The contractors should have the choice of which technical directions to pursue, but their performance should be analyzed and should directly affect the size of DOD's contribution to their programs in the future. On relevance, we continue to believe that the funds voted by Congress for the Defense Department budget should be expended only for military purposes.

Question. You say that ample information can be disclosed as to the character of research underlying advance agreements without unduly revealing individual company approaches. What basis do you have for such a generalized statement

Answer. This statement is based (a) on the kinds of public information currently made available on DOD contracts for R&D with various companies and (b) on the reports by nonmilitary private industry to their stockholders and to the public in which they give details of their R&D programs without revealing proprietary information.

TESTIMONY OF TRI-ASSOCIATION AD HOC COMMITTEE—Continued

Senator McINTYRE. Members of the Tri-Association, would you prefer that I call you back to continue with your questioning or should we recess now until about 2 o'clock and than restart at that time?

Mr. MURRIN. It is really your preference, Mr. Chairman. Some of us have another demand on our time but we bow to your judgment on this matter.

Senator McINTYRE. I think then if it is agreeable we will bring you all up here and let's have a few more questions and answers for the record.

After that we will come back at—I will announce a time—with the final witnesses, Mr. Witt, Federick Dietrich, and Dave Soergel.

You strongly recommend that there be no constraint on recovery of I.R. & D. costs except reasonableness and allocability. Under this approach how could the Government theoretically prevent industry from doubling its I.R. & D. expenditures with the Government having no alternative except to pay for the increase at the expense of other R.D.T. & E. work?

Dr. DELAUER. If you understand the negotiations process that goes into establishing the indirect costs within any particular plant, there is an overhead negotiation that goes on with the inplant representatives of the Government.

They talk about the reasonableness of what they think will be allowable; for instance, in space occupancy. If you have too much of that, they won't allow that. Since you have to get advance agreements on your overhead bidding rates—including your G. & A.—you have to talk about what you are going to put in there for bidding and proposal, and for I.R. & D. Since there may not be a formal situation where you have I.R. & D./B. & P. advance agreements like there is now, the inferred approach where you have to stay within the cost competitiveness of your business would provide a check and balance on the reasonableness of whether you have your I.R. & D. large, small, or at a reasonable amount, I think there are economics just in the way that you establish the base for your next year's cost.

Remember, gentlemen, you have to have advance overhead agreements for the 3 years, so you have to make estimates of what it will be well in advance.

Senator McINTYRE. I notice you state that companies who sell to the Government are being denied of full recovery of I.R. & D. and B. & P., and that these companies are actually subsidizing the U.S. Government. Aren't such companies actually in a privileged position because of the following reasons?

(*a*) They receive advance and progress payments approaching 80 to 90 percent of the contract value and thereby save the interest they would have to pay if they were forced to borrow these funds from lending institutions.

(*b*) They do not have to invest in some facilities and equipment which the Government sometimes furnishes.

(*c*) They are allowed to retain patent rights to inventions paid for in substantial part by the Government.

Dr. DELAUER. The first one has to do with——

Senator McINTYRE. The first one was on severance and——

Dr. DELAUER. Very seldom do you get 90 percent. Eighty percent is pretty good. We would like to have it higher. When the overall gross margin on business before taxes is 4½, maybe 4 percent, and you have to pay 10 percent for the money, you are eating into it pretty fast.

In fact, you asked a question earlier, or Senator Proxmire did, in regard to why there was discontinuity between the United States and the other free world investments in R. & D., and I did not get a chance to answer it then. I think it goes back to your point which you have been working on in the whole question of capital formation and the ability of profit margins being large enough to be able to increase the investment for increased productivity which comes out of the research end.

My answer to that would be take a good look at the profit margins in this business to see whether or not you can replace the capital. To answer your question, the second part of your question, which had to do with the facilities and equipment furnished by the Government, the Cost Accounting Standards Board recently put out a standard which tends to change the depreciation schedule on our plant and equipment that does not let us recover the cost as fast as it did in the past.

You have already taken that away from us.

Senator McINTYRE. How about the patent rights?

Dr. DELAUER. The Government has Government rights to patents under its contracts. If you do a reasonable job of negotiation ahead of time from the Government side, you can arrange for data rights.

On any R. & D. contract, such as Admiral Rickover was talking about, the full Government R. & D. programs that are contracted for, they have the patent rights. It is the commercial patent rights that we always have a fight about, not the Government patent rights.

If you look at the fine print, you will find what we are talking about is the commercial patent rights. I don't think you are giving us too much in that direction.

Senator McINTYRE. You also state that if each agency determines whether or not all or part of I. R. & D. and B. & P. bears a relationship to that agency's interest, it would be an accounting nightmare. Hasn't this been done without much difficulty in DOD?

Dr. DELAUER. I read the list of things we got turned down. What we have to do now is be sure that when we do work for ERDA that we separate the I.R. & D. effort in such a way that ERDA can administer it, NASA can administer it, DOT can administer it, HEW can administer it, and so forth, and as a consequence we have to take all those administrative steps to be sure that at least the pieces of that are all approved by those particular agencies if we are doing work in their areas with contracts that bear the cost of the overhead.

The AEC in the past just arbitrarily said we will not accept much if any of the I.R. & D. and B. & P. costs. Therefore, when you burdened their contract, you had to take close to 9 or 10 percent off because that is what the disallowance represented. That turned out to be greater than the profit margins, and so we finally had to turn down their contracts.

Senator McINTYRE. The analogy that you draw between a man who buys a TV set and the Government insofar as the man obtaining license rights, is not valid for a number of reasons. Does a TV buyer provide advance and progress periods during the period of production?

Dr. DELAUER. Yes. Let me give you an example of a commercial product which I am responsible for. It is a deep-well pump. It pumps at a high volume rate out of deep wells where you can't use pressure. The pump is suspended on a cable, and it is a very tricky thing.

We spent quite a bit of R. & D. both on the cable—as a matter of fact, R. & D. work we are doing on that cable is a direct charge from one division, the Government division, because those guys are pretty good in rubber chemistry and electrical stuff.

We have to charge from that division to the pump company which is a separate operation completely out of the Government business. The pump company pays the actual overhead, the full G. & A. Thus, they pay the part of the independent research element of the cost that the TRW Systems Group is doing.

We put that in the cost elements of the pump company which we put into the price on the pump which we sell to the Russians. So the Russians are paying their share of the independent research and development. That is the way cost principles are worked.

That is the way you put the cost out. It is standard. It is not magic. If you have the cost of doing business, you either recover it or you don't. If you don't recover enough of it, you are out of business because you don't make a profit.

Senator PROXMIRE. In view of the late hour, I have some questions which I will submit for the record. I would just say in response to that last statement that I understood Senator McIntyre's question to be, does the TV buyer pay in advance, in effect, with an interest-free loan for the research that goes into developing that TV?

Obviously there is no way on the face of the Earth that he can. The research is all finished. The TV is developed. The TV is produced. The TV is put in inventory and then the consumer buys it. To say that you recover in the price for the research is an entirely different question than whether or not it was given in advance where, under certain circumstances the Government is taking risks.

Dr. DELAUER. The same thing happens with a TV.

Senator PROXMIRE. Suppose you can't sell the TV?

Dr. DELAUER. Then they are in trouble.

Senator PROXMIRE. You are not in trouble with I.R. & D., because you have got the money from the Government.

Dr. DELAUER. Only if I get the next job—contract—do I get that recovery.

If I go out of business, all the money that I have spent this year in I.R. & D. is not recovered. If my contract disappears next year and I don't recover the overhead expenses on that labor base, if I only recover half, that is all I get.

Senator PROXMIRE. There is a difference because I don't get an advance when it is commercial. As far as bids and proposals is concerned, how about that? That is $350 million.

Dr. DELAUER. When you see Philco or Zenith advertising that TV for this year, it is in the price of that TV, or the next TV, the cost of their advertising program. You are paying Zenith in their present prices their R. & D.

Senator PROXMIRE. You don't have to make any sales at all to get R. & D.

Dr. DELAUER. No, that is incorrect, sir. The only way you can get reimbursed as an overhead item is on your direct contract costs. If you don't turn out any direct labor you don't get anything back for overhead.

Senator PROXMIRE. You get reimbursed for a bid and proposal that is unsuccessful?

Dr. DELAUER. Yes, sir, but you have to have a contract.

Senator PROXMIRE. In the commercial areas where you advertise an item and the advertising doesn't work, you are out of luck.

Dr. DELAUER. Same thing. You have to put such costs as overhead on the cost of your current product. This is the part that——

Senator PROXMIRE. If you get a sole source contract, that is not the same thing.

Dr. DELAUER. We don't have very much sole source contracts.

Senator PROXMIRE. Sixty percent of contract awards are sole source.

Dr. DELAUER. That may be true but I am not one of the lucky ones. Let's just take the case of the bidding and proposal cost of this poor old shipyard guy. If he had gotten this job and his labor base had gone up by a factor of two, Admiral Rickover's contract labor would only have been charged half as much overhead.

The fact that he got that additional labor base, if he had won the contract, the fact that it would share the expenses of the general manager, whoever, would have reduced the amount of money that Rickover would have had to pay on his contracts.

The base was so much bigger. The indirect costs were a dollar amount and you double the base and therefore each contract took half what it did before he got that additional business.

This whole question of whether or not there is benefit to the Government on bidding for commercial business is a very explicit thing and can be resolved and can be examined. The benefits can be very direct.

Senator PROXMIRE. If I am building a private building and I have 3 or 4 people competing for the opportunity to build it, unless I have a very peculiar contract as far as I am concerned I am not going to pay the people who are unsuccessful a nickel who bid.

Dr. DELAUER. No question about that, but the price you pay the guy that won the contract includes his bidding costs, and the guy that gives the next contract to the loser also helps pay his bidding costs. Today's customers pay through process—the R. & D. and B. & P. homework for tomorrow's customers.

Senator PROXMIRE. It may well be that that comes out of profit.

Mr. MURRIN. Otherwise the loser soon goes out of business.

Senator PROXMIRE. No, he just makes a little less money. Some of them do go out of business.

Dr. DELAUER. Do you really want us to go out of business?

Senator PROXMIRE. Not necessarily. [Laughter.]

Senator PROXMIRE. I think you fellows are competent.

Dr. DELAUER. Admiral Rickover accuses us of being public relations guys. We run profit centers. It is our job to make these things work. We are not here for public relations. I guarantee you—and I can speak for my chairman—that we will go out of business if we can't make a profit.

Senator PROXMIRE. All I want as a U.S. Senator is to get the information and to know where in the dickens the money that is appropriated under my responsibility goes. I want to be in a position to know. You fellows are saying if you tell us that you lose your flexibility.

Mr. MURRIN. We believe you now have exactly the information you need.

Senator PROXMIRE. We can't be effective with it. You have tied us in a knot. It is proprietary information or classified information that is not able to be used.

Mr. POWNALL. Senators Proxmire and McIntyre, let me emphasize some of the things said in the last few minutes. We talk about competition in this industry and I would like to make a point here. In all of commercial business that Martin Marietta does, there is no element of the company where we face anything like the kind of competition that we have in this industry.

It is absolutely unbelievably difficult. It is thoroughly competitive time after time after time. The 60 or 80 percent that is without competition is generally speaking followup to the major awards that were won under very competitive conditions. In point of fact we are highly competitive. Second, with respect to relevancy, if the I.R. & D. that we do is not relevant, then there is a fairly short period of time after which it is all over, and we can no longer compete.

We don't have to be forced to have I.R. & D. to be relevant. It has to be relevant or we are out of business. It is as simple as that.

It is a very straightforward proposition, and I.R. & D. is managed down to the last dollar. It is managed to a lower level than any other piece of the business we conduct. It is essential that we manage I.R. & D. as well as it is humanly possible to do it, and we do.

I think I.R. & D. is one of the best investments that the Department of Defense can make.

Senator MCINTYRE. Mr. Murrin, you state that the significant reduction in DOD's share of contract to I.R. & D. cost and 51 percent in 1969 to 40 percent in 1974 may result in disastrous consequences for the future.

How do you explain why in actual dollars industries' spending which was not repaid by the Government increased from $173 million in 1971 to $248 million in 1972 to $81 million in 1973?

Doesn't this prove that competition and future profits are the predominant influence for industry I.R. & D. spending and not Government repayments?

Mr. MURRIN. Senator, we frankly anticipated that question and had some second thoughts about the statement after having put it in the record. For example, we speculated over what specifically were the reasons for the reductions in recovery. To our knowledge there have been no rigorous determinations on that. It might be constraints on available funds or more rigorous application of the relevancy tests, for example.

But, nevertheless the trend clearly is downward. The thrust of the comment was to raise concern over that downward trend.

To answer your question, I think you have to look at the overall profits of the defense industry and in the case of my own presentation, look at our performance in the last several years at Westinghouse in this regard and notwithstanding the data that you cited, it is abundantly clear that in trying to reconcile a modest and in one case

negative profit performance in 1967 with that worrisome trend toward reduced recovery, it raises the very question that we put in the record.

The main purpose of it being there and the point that we wanted to get across is this.

Senator McIntyre. Any severe reduction in I.R. & D. probably would force your company, Westinghouse, out of the defense business. What do you consider to be a severe reduction?

Mr. Murrin. What I had in mind in making that statement, Mr. Chairman, was the reference that Senator Proxmire earlier made to the possibility of a 50-percent reduction in I.R. & D. and B. & P.

Let me say at the outset that, as Dr. DeLauer has stated, I don't characterize myself as a PR type and I think I can come here on behalf of our corporation and meaningfully communicate to you what our top management's posture really is.

I have in front of me the annual reports published by Westinghouse for 1972 and 1973. Also I have our prospectus for 1971. I brought these along because they are available to the public and provide data which show the sales and income before and after taxes for our Westinghouse defense business in the years 1967 through 1973.

We know of course the amount of money that we recovered for I.R. & D. and B. & P. in that same time frame. If we simply go through the arithmetic of allowing only 50 percent recovery of the moneys that we did affect in those years, we end up with an after tax profitability level that averages, over this period, less than 1 percent.

In my judgment, the continuation of such a level of after tax profitability would preclude us from being a viable free enterprise undertaking.

Though we could not examine with equal rigor the data available for the industry as a totality, if one applies the same sort of analysis there, I am confident that you get after tax profitability levels in the range of 1 to 2 percent and you get a return on investment or return on equity levels which are very small when compared to the rest of American industry.

Speaking for myself, that raises grave concerns about the future of the entire industry if it were to suffer that sort of depressed profitability and return on investment.

Senator McIntyre. You heard Professor Long and Dr. Reppy and you also heard Admiral Rickover. Would you like to just comment briefly, each of you, on the testimony as you heard it?

Mr. Murrin. I would like to comment briefly. Let me first say, as you know, Mr. Chairman, we did not get to see the admiral's statement until immediately before his presence here. Though we followed what he said, we have not had a chance to ponder fully the implications of what he said. Similarly in the case of the two distinguished academicians, we did not see at all yet any written presentation by them.

We in Westinghouse particularly know and value the great contributions the admiral has made to the national security effort. We have worked with him for decades. We are fairly familiar with his position on the matter at hand. Speaking for our corporation, we found no surprises in his statement. We find nothing that shatters or threatens the position we have earlier taken.

If you would like, we would be happy for the record to submit in writing our commentary on the admiral's presentation.

To say something else, I think he speaks frankly from a rather unique situation; that is a single technology and an extraordinarily singular type of management that he has affected for several decades in that particular field.

I think the question you posed which implied concern as to whether or not some of his views and findings are equally relevant across the broad spectrum of DOD R. & D. and I.R. & D. undertakings is essential to the overall question at hand.

The views of the two academicians were obviously interesting and sophisticated. In all candor, I have to say that for obvious reasons, they were not as in depth in some aspects as we would like them to ideally be.

If we may have their written statements and if you would invite our commentary on them, we would be happy to do that.

Mr. POWNALL. With respect to the competition, I would add the fact that surveillance is a major part of our I.R. & D. program. This is made apparent by the kind of reviews that we have with the DOD on a regular basis.

The admiral in his recommendations suggested something that nearly parallels the acceptance of I.R. & D./B. & P. costs traditionally associted with the AEC program. In several instances that I know of, companies found this policy so unpalatable as to disappear from that piece of business long before now.

Beyond that I happen to believe with Mr. Murrin that the admiral's view is limited by the program he has been associated with for a good number of years, and which is fairly narrow. I would also enter the disclaimer that Madison Avenue persuades me to do nothing.

Dr. DELAUER. The comments made by the people from Cornell with regard to evaluation of I.R. & D. programs, believe me, we take it a lot more seriously than they gave any credence to whatsoever.

We get evaluated. The evaluation is on a point system, subjective. It is not based on any preset criteria. The ceiling in the advance agreement is based on a specified technical rating. If the subsequent technical evaluation rating is just 5 percent less, the ceiling is lowered. Anything expended above that ceiling comes out of profit.

We take that evaluation very, very seriously. Nobody else ever seems to consider that to be worthwhile. We think it is very important when you might lose $1 million. We think the evaluation exists. It may not satisfy everybody but as far as I am concerned it sure satisfies us. We have got to pass that examination once a year.

Otherwise it comes right off the top. There is a process. Maybe it could be improved but I take issue with the Cornell study that says it is an ineffective review process.

Senator MCINTYRE. I will ask you to comment on the Admiral's testimony. It does not have to be in depth and by the same token we will give the professor and the admiral the right to comment on your comments if they wish.

Senator Barry Goldwater sent some questions here that we will be sending over to you.

Your answers to the questions and all of your comments will, of course, be included in the record, and we will appreciate receiving them.

[The information follows:]

AEROSPACE INDUSTRIES ASSOCIATION;
ELECTRONIC INDUSTRIES ASSOCIATION;
NATIONAL SECURITY INDUSTRIAL ASSOCIATION,
Washington, D.C., October 28, 1975.

DEAR SENATOR MCINTYRE: On behalf of the Aerospace Industries Association, the Electronic Industries Association and the National Security Industrial Association, and their member companies, I wish to thank you for your courtesy in offering the Tri-Association Ad Hoc Committee on Independent Research and Development and Bid and Proposal efforts the opportunity to make comments on testimony, and also to respond to questions that could not be covered during recent Senate hearings. The comments concern testimony on September 29, 1975 by Admiral Hyman G. Rickover and Professor Franklin Long before the Senate Armed Services Research and Development Subcommittee and the Subcommittee of the Joint Economic Committee, respectively chaired by you and Senator Proxmire. The answers are supplied to questions that could not be raised during the Hearings due to time constraints.

Enclosed are the following papers:

A. Comments on statement by Admiral Rickover.

B. Comments on statement by Professor Long.

C. Answers to questions for the undersigned, President, Public Systems Co., Westinghouse Electric Corporation.

D. An answer to question for Mr. Thomas G. Pownall, President, Martin Marietta Aerospace.

E. Answers to questions for Dr. Richard D. DeLauer, Executive Vice President, TRW Inc.

F. Answers to questions which were submitted by Senator Barry Goldwater.

We appreciate the opportunity afforded by you to amplify and clear the record on this subject which is so vital to our Nation's continued technological supremacy. As we understand it, the rebuttals and answers in the attachments hereto will be included in the record of the proceedings.

If we can furnish additional information on the function, operation and benefits on IR&D/B&P, please do not hesitate to call upon us.

Very truly yours,

THOMAS J. MURRIN,
Chairman, Tri-Association,
Ad Hoc Committee on IR & D/B & P.

A. COMMENTS ON ADMIRAL RICKOVER'S TESTIMONY

The Tri-Association Ad Hoc Committee on IR&D/B&P appreciates the opportunity to submit comments on the September 29, 1975, statement and testimony of Admiral H. G. Rickover.

While the Admiral's expertise and authority in the field of nuclear power plants are a matter of record, his generalizations into broader areas are unsupported by the facts.

It is patently clear that his views are uniquely isolated from the main thrust of study and thought that have been developed before and in anticipation of the subcommittee's hearings. It would appear that the Admiral's concentration on and experience in the narrow field of nuclear power plants has served to insulate him from certain verities with respect to the technical and financial management practices of government contractors, and the environment in which government procurement operates, particularly in the acquisition of defense materiel.

The Admiral's testimony gives the impression that he has not read or been advised of the Industry Position paper on IR&D/B&P, and the 322-page volume of documentation developed by the Tri-Association Ad Hoc Committee in 1974. The hearing record will show that industry's posture on IR&D/B&P is substantially in agreement with that of the report of the Commission on Government Procurement, the General Accounting Office, and the postures of the Department of Defense, NASA, ERDA, the Office of Federal Procurement Policy, and the Defense Science Board (DSB). It would seem, therefore, that the Admiral's testimony is a unique and isolated perspective. As his testimony indicates: "This statement reflects the views of the author and does not necessarily reflect the views of the Secretary of the Navy or the Department of the Navy."

To examine some specific allegations in Admiral Rickover's testimony:

"The Vast Majority of Defense Procurement is Actually Non-Competitive"

The fallacy in this provocative statement is evident from the Admiral's next words—"with only a few large firms competing for major weapons systems." As he correctly points out, it is an inescapable fact of business life the world over that the design and production of major systems require correspondingly large amounts of technical, financial and productive resources, which the smaller companies, by definition, do not possess.

The Admiral's misconception regarding the extent of competition in Defense procurement is evident from his later statement to Senator McIntyre that "About 88% of the contracts today are negotiated contracts which means they are not competitive." The Admiral is wrong. The most recent issue of Military Prime Contract Awards issued by Office of the Secretary of Defense states:

"Military prime contracts awarded after solicitation and receipt of two or more responsive offers for competitive price, design, or technical proposals totaled $15,872 million and represented 43.6% of the net amount of procurement (excluding intragovernmental orders) during fiscal year 1974 compared to $14,493 million and 43.2% for fiscal year 1973."

Admiral Rickover's further statement that "even when more than one firm is capable, prior experience, shop loading or other factors can effectively insulate the successful bidder against competitive pressures, "largely reflects his own relatively narrow experience with industry. The facts conclusively show that today, and for many years past, essentially *all* major weapon systems are bid and won competitively, and that the strongest competitive pressures remain upon the winner after contract award to conduct his business efficiently and economically.

These pressures take a variety of forms. The obvious ones are the terms and conditions of the contract, whether explicitly containing incentives on costs or requiring performance at a fixed price in times of unpredictable inflation and escalating cost of materials. Less obvious are the pressures that result from uncertainties regarding the future of most programs today, at any phase of their evolution through advanced development to "full-scale" production. Such pressures include re-competition by the award of production on an annual-buy basis, the presence, or imminent threat, of a second production-source, or competing the "buy-out" of a program on a multi-year winner-take-all basis. In addition, there is today the ever-present possibility that international agreement and/or congressional budget decisions can bring about the premature and unforeseen termination of a program that the successful contractor had devoted significant resources to winning, in the reasonable belief (in light of all information available prior to the competition) that the program represented a major business opportunity.

To judge from the Admiral's statements and certain questions asked of witnesses at the hearings, one could assume that the winning of any major weapons system program was, in effect, the guaranteed award of ten to fifteen years of business at a substantial level. Such, simply, is not the case. Recent history is replete with examples where the winning contractor has seen his program terminated or dramatically curtailed shortly after or, in some cases, prior to his initiation of work thereupon! For just these reasons a contractor, winning even a major program cannot relax and enjoy it, and abandon a fiercely competitive posture. A contractor must always be in a position to compete effectively for new work. and the prudent management of present work is a significant factor in maintaining a viable competitive posture.

Whether motivated by a need to "keep won" the weapons system business previously gained on a competitive basis, or whether forced to keep costs in line in order to win new business to protect his investment in people and facilities from any foreseen or unforeseen vagaries that might prematurely terminate his on-going programs, today's contractor is forced to remain highly competitive.

"The Lack of Incentive to Control Costs"

As stated above, the notion that there is, in general, no true competition, (which may be true in the nuclear programs managed by the Admiral) and that "actual costs incurred—generally can be passed on to the Government" reflects a viewpoint totally out of touch with the award and conduct of the vast majority of DoD business.

"(IR &D) The Government Has No Say in How the Money is Spent"

In the literal sense, the Government does not contract for and, hence, does not explicitly direct IR&D expenditures. These are company-determined projects,

but it is patently untrue to imply that DoD, for example, has no voice in IR&D expenditures. The technical merit of a contractor's IR&N work is reviewed in detail, both prospectively and following completion of the work. Ohe technical rating accorded this work is made available to the government negotiator for use as a factor in negotiating the IR&D ceiling. In addition, many advance agreements contain a re-opener clause, whereby a contractor's failure to achieve a technical rating for his program closely equivalent to that he received for the prior year automatically results in substantial further reduction of the IR&D ceiling negotiated. While his achieving of a tangibly improved rating can likewise result in an increase of his negotiated ceiling, it is obvious that this situation is biased in the Government's favor in that it is manifestly impossible to achieve a significant improvement to *one's own* prior rating year after year.

Additionally, under Public Law 91-441, the required test for Potential Military Relationship represents a further manner in which DoD "has a say" in its contractors' IR&D work.

COSTS OF IR&D

The real facts here are muddied by the use of "IR&D" costs to decribe the total of IR&D and B&P costs. A misleading and inaccurate picture is conveyed by the complete failure to mention the factors, including mandated changes to the accounting treatment of these costs, which have had the effect of escalating the amounts of IR&D and B&P *reported* as allowed against DoD contracts, although, in fact, other costs charged to these DoD contracts were correspondingly reduced!

To be specific—Beginning in 1972, the reported costs for IR&D and B&P were increased by the requirement to add overhead or burden to all such costs. This factor alone caused a $32 million increase in DoD's share of IR&D/B&P costs reported in 1972, and $55 million for such costs reported for 1973. As the DCAA report noted (for 1972) "The $32 million DoD share does not necessarily represent an increase in total costs absorbed by DoD contracts since this burden may have otherwise been allocated to *direct* costs of DoD contracts had it not been applied to IR&D and/or B&P costs."

Finally, recent year reported totals include IR&D/B&P costs allocated to foreign military sales, which costs are absorbed by the foreign purchaser and not by DoD. Thus, as Senator McIntyre clearly explained in his report to Congress on April 9, 1975, consideration of this factor resulted in net out-of-pocket costs to DoD for IR&D/B&P of $763 million for 1973 and $766 million for 1975 as contrasted with the unadjusted figures of $801 million for 1973 and $808 million for 1974 presented without explanation or qualification in the attachment to the Comptroller General's testimony at these hearings.

It is precisely the publication of confusing data of this type, especially when it is attributable to an authoritative source such as the GAO, that encourages critics to draw invalid comparisons between annual totals for IR&D/B&P allowed by DoD, and to proclaim that the current system is "out of control," contrary to the true facts of the case.

The Admiral's parochial reference to Congress' elimination of important submarine R&D projects, while "up to a billion dollars a year" were spent "financing IR&D projects," again reflects a total misunderstanding of the nature of IR&D and B&P costs. These are necessary and essential costs of doing business and, as the DSB Report states, represents the price of competition; i.e., a cost which is is recovered many times over in the lower prices of future contracts that result from the Government's ability to award them on a competitive basis.

It is unfortunate that the Nation's natural interest in determining its total annual expenditures for research and development has resulted in singling-out the IR&D and B&P cost elements from all the other cost elements comprising the major defense contractors' overhead, and reporting only the annual totals of IR&D/B&P costs. Similar annual totals for other cost elements in the major defense contractors' overhead, such as heat and light, guard forces, equipment depreciation, etc., etc., would also represent impressive dollar sums, although the contractors' vital need for such expenditures and the inability of Congress or any other body to make meaningful detailed recommendations for improving the efficient use of such monies might be more readily conceded.

IMPACT ON COMPETITION

The concept that, in general, the largest defense contractors receive the largest "IR&D payments" and that this helps them perpetuate their dominant position is to confuse effect with cause. Defense contractors of all sizes recover some portion of their IR&D and B&P costs as allowable costs to their sales to DoD. No defense contractor receives a cash payment for IR&D/B&P work. The advance

agreement of a major defense contractor is an agreement that some portion of these costs will be recognized in the prices he charges for goods or services sold to DoD. In point of fact, a small contractor may recover 100% of his allocable IR&D/B&P costs if the ratio of these costs to his selling prices remains substantially constant from year to year. Moreover, the criterion for establishing the admissible ratio is each individual small company's historic record of IR&D/B&P costs vs. selling prices. A small company can thus expend 10% to 12% of its sales for IR&D alone, permitting it to recover the costs of performing twice or more the advanced work relative to its sales volume than the major defense contractors are allowed. Of course, as small companies grow, they arrive at the dollar threshold for IR&D/B&P expenditures where they no longer may use a formula basis for determining the allowability of these costs, but must execute advance agreements and be subject to the same constraints as the major defense contractors.

The example quoted of a nuclear-powered commercial submarine tanker postulates an absolute lack of military value for the project, which would appear extreme. No reference is made by the Admiral to substantial cost benefits the Navy could have received through the absorption of a portion of the contractor's overhead costs by the commercial project, had he been successful in selling such vessels.

PROMOTING A MODERN INDUSTRY TECHNOLOGY BASE

Industry's reference to the need to *maintain* and hence retain an up-to-date modern industrial technology base for defense needs is here confused by the Admiral with an alleged need to *broaden* the industrial base. This base currently comprises companies of all sizes and with varying mixes of defense and non-defense and commercial sales. Large companies with adequate facilities, financial resources and technical capability are mandatory for the prosecution of major weapons systems. The medium and smaller size companies compete either as prime contractors for the award of smaller systems, subsystems, components or piece-parts, or as subcontractors to the major defense contractors for substantial portions of their prime contract business.

In all cases, irrespective of size or customer mix, no company recovers any IR&D/B&P costs from DoD until and unless it wins Defense contracts. Such recovery of a normal cost of doing business does not become a "subsidy" to a company just because it has the DoD as a customer. In fact, precisely the converse is true for the major defense contractors, who subsidize the government to the extent that they are not allowed to recover the full amount of IR&D/B&P costs properly allocable to DoD contracts.

BENEFITS FROM IR&D

As both the DSB report and the Tri-Association Study point out, IR&D/B&P are essential to the maintenance of competition and the major cost benefit is in the ensuing reduction of the cost of contracts that DOD awards because of it *is* able to make such awards based on competition. The concomitant yield of advances in technology, superior performing systems or hardware or reductions in their intrinsic cost while retaining acceptable performance is in a real sense an additional benefit of IR&D/B&P and not the sole output.

IR&D AS A NORMAL BUSINESS EXPENSE

If, as the Admiral contends, there is no true competition, prices are based on the actual costs incurred, and these costs can generally be passed on to the Government, it appears inconsistent to argue that "there is no incentive for a contractor to waste heat or light," i.e., that there is a strong incentive for him to control such costs, but no incentive for him to control IR&D/B&P costs despite the existence of a ceiling limit for the latter.

Qualitatively, the assertion that "increased IR&D spending can enhance the company's profits and strengthen its market position, military and commercial" is correct. Quantitatively, however, any increased level of IR&D/B&P expenditures must be carefully weighted against the resulting increase in overhead rates which militates against a company's competitive position, and also against the dollar-for-dollar profit erosion consequent upon IR&D/B&P expenditures exceeding the ceilings negotiated with DoD.

Here again, the Admiral's continued inaccurate reference to IR&D/B&P as "IR&D" overlooks the fact that almost half of these costs accepted by DoD are associated with B&P. The fact that the majority of B&P work of the major defense contractors is performed in preparation for and response to RFP's initiated by DoD is clear demonstration that the associated costs are a legitimate and necessary cost of doing business.

RIGHTS TO INVENTIONS, PATENTS AND TECHNICAL DATA

It is noted that in the Admiral's statement on rights to inventions, patents and technical data he stated that the Government "may" pay for most of the work and that a contractor "may" extract a royalty. It would appear grossly inequitable for the Government to seek rights based upon a mere assumption that the Government "*may*" have paid or "may" have to pay a royalty. As to the first part of the statement, it should be noted that of the major companies doing business with the Defense Department, only a handful—probably less than ten—do more than 50% of their total business with Defense. Thus, it would appear to be the rare exception rather than the rule for the Defense Department to "pay for most of a Company's (IR&D) work." Further, a contractor *cannot exact* a royalty from the Government. Under 28USC1498, the Government can infringe any U.S. Patent and the owner's (contractor) sole remedy is an action in the Court of Claims for fair and reasonable compensation. We believe that our Courts can be relied upon to assure that any compensation a contractor would receive would be fair and reasonable.

The Admiral apparently confuses the relationship of employer-employee and that of an independent contractor. The research employee hired by a contractor enjoys job security, benefits, facilities, background know-how and assistants. Moreover, inventive employees often receive awards both in remuneration and position. On the other hand, a company's relationship with the Government is that of an "independent contractor" and being a Government contractor does not enjoy "job security" or any other benefit listed above that are provided to an employee. Finally, a contractor receives no additional consideration for the making of an invention or obtaining a patent. In fact, the Defense Department disallows any cost *incurred* by a contractor in obtaining a patent on an IR&D invention.

Any attempt by the Government to acquire rights in IR&D inventions, patents and technical data can have only an adverse impact on defense procurement. Such a policy would most certainly reduce competition for defense contracts because a company would not and should not jeopardize a *proprietary* position in order to accept a Defense Department contract. Such a policy would also probably inhibit IR&D expenditures in areas of concern to the Government.

DOD ADMINISTRATION OF IR&D

The Admiral's discussion contains much subjective opinion, innuendo and generalizations that are at considerable variance with the facts. For example:

(1) "The Defense negotiators are in a weak bargaining position. Large contractors can hold out for a higher ceiling amount and usually get it."

Again the Admiral is wrong. The Armed Services Procurement Regulation (ASPR) states:

"When negotiations are held with a company meeting the $2 million criterion—and an advance agreement is not reached, payment for IR&D costs is required to be reduced substantially below that which the company or profit center would otherwise have received. The amount of such reduced payment shall not exceed 75% of the amount which, in the opinion of the contracting officer, the company or profit center would be entitled to receive under an advance agreement. Written notification of the contracting officer's determination of a reduced amount shall be provided the contractor. In the event that an advance agreement is not reached prior to the end of the contractor's fiscal year for which such agreement is to apply, negotiations shall immediately be terminated and the contracting officer's determination of the reduced amount shall be furnished."

The effectiveness of DoD's negotiations is attested to by the fact that DoD's acceptance of IR&D/B&P costs has been a steadily declining percentage of sales to DoD. Also, most major defense contractors consistently spend significant (and unreimbursed) dollar sums for IR&D/B&P over and above their negotiated ceilings. Why would this happen if the Admiral's contention were correct?

(2) DoD's technical review of IR&D is far from casual. The Admiral is possibly unaware that what he calls "IR&D proposals" i.e., the contractors' Technical Plans, have for some years been required to present the progress accomplished in the prior year on all completed, terminated or continuing tasks, and that this progress is accorded a technical rating directly impacting the overall technical rating accorded a contractor's planned IR&D work for the following year. Contrary to the assertion that these evaluations have little or no impact on "how much IR&D will be handed out," there is a very tangible impact as discussed previously under "Lack of Incentive to Control Costs."

(3) The statement that "Unless Government reviewers can *prove* that a project has no potential military relationsip the cost of the project is allowed" is incomplete and conveys an erroneous impression. Costs of a contractor's IR&D program are allowed up to the DoD's pro rata share of his negotiated IR&D ceiling (*not* of the contractor's total IR&D program) *provided* that the dollar value of the portion of his IR&D program judged to have a potential military relationship equals or exceeds the DoD share. Thus, the full costs of all projects judged to have a potential military relationship are *not* generally allowed to be charged to DoD contracts.

(4) "Under the current IR&D program, the Government is committed to supporting any new venture a defense contractor decides to undertake."

Again, the Admiral is wrong. The criteria used for determination of "a potential relationship to a military function or operation" (Potential Military Relationship) and published in the Congressional Record (May 8, 1973, S8575) already exclude many worthwhile IR&D projects closely related to DoD's interests. The ludicrous example laboriously contrived by the Admiral serves as eloquent testimony to his utter lack of understanding of the current system.

IMPACT ON NATIONAL DEFENSE

On page 10 of his testimony, Admiral Rickover states "The impression is left that IR&D helps us hold our lead in technology despite mounting expenditures by the Soviets" while on page 11, he further states, "In my view, the fact that the Soviets are spending far more than we are for research and development is all the more reasons to spend our limited funds in areas that are most likely to be profitable from a technological standpoint."

Obviously the Admiral desires that all R&D be government-directed—this indeed is the Soviet system. His statements reveal that the Admiral completely misses the manner in which IR&D is such an important contributor to this nation's technology base. IR&D involves the prime attention of the most creative technical and management people in thousands of companies—all independently determining through this competitive process their degree of success and their economic future. It therefore multiplies manyfold the capabilities of the relatively much fewer governmental personnel, no matter how competent and creative those personnel might be. It is exactly the fact that the Soviets do not have an equivalent ability to enlist the innovative thinking of large numbers of engineers and scientists as inputs to their decision processes, and must rely wholly on successful consummation of government planning by a relatively small number of experts, that provides grounds for belief that this nation can offset their demonstrated willingness to devote more resources to Defense. Supporting the validity of this belief is the fact that the declared Soviet intent to bury the United States has not occurred in leading areas of the commercial arena, such as civilian aircraft, computers, and microelectronics to name but a few. It is not evident that the Soviet lack of success is attributable to inadequate resources applied to these tasks, but more likely that its determination of the technical approaches judged to be profitable proved to be inadequate or too rigidly selected and specified.

The following excerpts from the Tri-Association Study elaborates upon this point:

"The majority of IR&D work (some 80% or $320 million annually) lies in the areas of Applied Research and Development; i.e., in the application of new technology, to operational requirements. This Nation's technical strength lies precisely in this area. Often, in the past, new technology has first emerged overseas; but its efficient, effective application to cost-competitive operational systems or hardware has first been accomplished in this country. IR&D is the early R&D most tightly coupled to potential producers of end-items, and it is intrinsicially stimulated and urged by company management toward the realization of operational devices and systems, rather than indulged as a leisurely conduct of technically elegant work."

"IR&D gives us an important kind of insurance in that experimenters who may think there is a better approach to the desired capability than that which has been covered by technology contract may be pursuing that alternative within the reasonable constraints—under IR&D."

The Admiral goes on to illusrate the effectiveness of the burecratic process for technical decision making, using the example of the Atomic Energy Commission and stating that its restrictive policy on IR&D did not impede the development of atomic energy, a fact that cannot be measured or properly assessed. However, one fact *is* clear, this policy contributed heavily to the reduction of competition in this arena.

While the AEC method provides very tight control of IR&D and B&P expenditures, it would be totally unworkable if applied across the board. AEC (now a a component of ERDA) operates in a very narrow field, primarily with "captive" contractors operating AEC's GOCO (Government Owned Contractor Operated) facilities; these contractor segments are very dependent upon AEC and have very little choice but to accept AEC's directives on IR&D and B&P. Moreover, AEC has reaped the benefit of the support of DoD and all other private industry, of IR&D in the broad range of high-technology, non-nuclear disciplines AEC requires in such fields as electronics, controls, materials, etc. The AEC approach broadly applied would stifle contractor creativity and innovation. The AEC method not only fails to recognize IR&D and B&P as fully recoverable costs of doing business, but it also fails to recognize that IR&D is an indispensable innovative process and that B&P is the competitive mechanism for turning these innovations into products.

It is significant that Mr. Romatowski testified that ERDA had abandoned the AEC policies on IR&D reimbursement and the acquisition of rights in IR&D patents and technical data, because the Government received no benefits therefrom, and to align ERDA policies with other Federal agencies.

SUMMARY

This section repeats in summary form the misconceptions that DoD's allowace of a portion of IR&D/B&P costs against its on-going contracts for goods and services represents a subsidy, assists the concentration of economic power in the hands of a few large defense contractors, and that superior results would be obtained by DoD's specifying all R&D projects and directly funding them on a contractual basis. The Admiral states that "in this way, Congress could also properly exercise its oversight function over IR&D expenditures——."

The Admiral seems to be unaware of the continuous Congressional review of IR&D/B&P, or of the GAO report B-167034 issued in February on the subject of DoD's efforts to plan for the support of innovative research. Some quotations therefrom appear to be supportive of industry's position that the contractor's initiative is a vital ingredient in the productivity of innovative ideas for DoD.

"FACTORS TENDING TO LIMIT INNOVATIVE RESEARCH"

"Service officials state that, before approving funds, the Congress requires the services to provides some indication of the results expected from a reaesrch project. They believe this requirement restrains the funds allocated to innovative research because it is very difficult to predict what specific results, if any, will be achieved from high-risk, long-term research."

Other factors which have caused program managers to hesitate to perform innovative research are:

1. Availability of funds.—It is becoming more difficult to obtain funds for research that is not directed toward solving an existing problem in a relatively short time.

2. Extremely high risk.—Program managers hesitate to take big risks because they are pressured to show results to justify the funds on research.

3. Transfer difficulties.—Often great difficulty exists in finding a "customer" who will buy a new or unconventional "idea." Program managers do not know if new ideas resulting from innovative research will be accepted and used.

CONCLUSIONS

As indicated by the foregoing specifics, Admiral Rickover's continuing and inherently narrow view of the vital nature of IR&D/B&P stands in sharp contrast to the predominant consensus of opinion between COGP, GAO, DoD, NASA, ERDA, DSB and OFPP.

As described in the testimony presented at the recent hearings by the Tri-Association witnesses:

"While we as a country are reducing our R&D expenditures, most of our major economic competitors are increasing theirs at significant rates. Since 1963, the U.S. has lagged such progressive countries as Japan, West Germany, and France in the growth rate of R&D.

"This de-emphasis on R&D compared to our past expenditures and compared to our economic competitors should be of great concern to all of us. It is equally worrisome that as our R&D expenditures decrease, our rate of growth in both productivity and GNP is markedly lower than these other countries.

"IR&D has over the years contributed invaluable advances to our nation's security and to the national technology base, which heretofore has been second to none. IR&D has helped gain and maintain our position as leading developer of superior military equipment.

"There has been a significant reduction in DoD's share of contractor IR&D/B&P in recent years—down from a 51% share in 1969 to only 40% in 1974. In our judgment, this may result in disastrous consequences in the future. It is clear that the low profit levels of the defense and aerospace industry—averaging only 3% of sales in 1974—preclude the possibility that reductions in defense IR&D/B&P allowances can be offset by increased expenditures of company funds."

B. Tri-Association Ad Hoc Committee on IR&D/B&P Comments on the Testimony of F. A. Long and Judith Reppy

Drs. Long and Reppy's piece of research and report on IR&D and their statement, presentation, and concluding suggested changes is neither an acceptable piece of research nor objective. To be such it would presume several things: 1) that the data and facts have truly been researched; 2) That all the data and facts known have been collected; and 3) That the facts and data are properly evaluated and understood. Only then can conclusions be reached and truly meaningful alternative recommendations be presented.

Under close examination the testimony presented proves to be anything but objective. The facts to substantiate the alternatives are not presented; actually, the investigators in their presentation to the Subcommittee stated that they did not have many of the facts and data which they believed they needed. However, this in no way deterred them from presenting to a formal joint session of two Subcommittees of the Congress of the United States an admittedly inadequate piece of research. From this tenuous basis the investigators were quite willing to advocate certain "modifications in the IR&D/B&P program" and "alternatives to the IR&D program."

The investigators, by way of their prepared statement and answers to questions, indicate a complete misunderstanding of the fundamentals of IR&D. Let us for a moment return to basics.

IR&D is a company's technological homework which is selected by, funded by, and accomplished by a company to assure technically better products and services for all of that company's current customers and to place it in a competitive position to serve those new customers which the company hopes to acquire in the future. It is *not* an effort that is *for sale.* It is *not* designed just *for DoD.* It is *not* a supplement or addition to the DoD *RDT & E* budget. It is *not "paid for"* in any prearranged form by the Government. It *is* an essential function of any technology oriented company in the same manner as the company's executive management, their accounting department, their facilities amortization program, etc., all of which contribute to, or bring past experience to, the management of the customer's products at any particular time.

Without confirming or denying this fundamental principle of IR&D, the investigators have chosen instead to determine that IR&D is a discrete "program" funded by the DoD, and therefore they consider it an adjunct to the RDT&E appropriation, with no accountability to the Congress. In effect they are accusing industry and the DoD of making an end run around the duly constituted authority of Congress in appropriating funds for the DoD. This interpretation may of course have resulted from the short period of their research, their academic background, unfamiliarity with detailed operation of a competitive technology oriented company or of the fact that Congress has frequently reviewed the IR&D/B&P program.

While many comments can be made as to the validity of the study as presented, we have chosen to address only the main points made by the investigators. They state that there are "some very obvious deficiencies within the program, the special ones being lack of program accountability, questions of program management, and absence of information about program details." We will comment on these points.

LACK OF PROGRAM ACCOUNTABILITY

The investigators have at the outset tried to determine the importance of the IR&D contribution by comparing it with the research and exploratory development categories of the RDT&E appropriation for the Department of Defense. In so doing they make the assumption that IR&D is a part of the overall program of military research and development. Since *IR &D is not a part of the Govern-*

ment's program, the comparison discussed is no more appropriate or valid then would be a comparison of the defense industry's facilities capital investment program with the DoD's military construction program, or a comparison of maintenance and operating expenses (M&O) of the defense industry with the M&O appropriation of the DoD. It seems that it is this misunderstanding and assumption that brings the investigators to believe that considerably more information was required in order for investigators like themselves, or for the Congress of the United States, to make an adequate evaluation of the industry's IR&D efforts and to determine what work American industry can or cannot do for itself.

This misconception should in no way be interpreted to mean that there is no accountability. Accountability at an appropriate level and to a proper and effective degree does exist. At the company level there is very real and meaningful accountability in terms of the work performed and costs of the effort. It is real in that the company management makes a determination of the need for the work and assessments during the course of the technical effort. It is meaningful in that if the costs are inappropriately high, then overhead increases, causing costs to rise to where a company is no longer competitive and hence will not win contracts or make sales. If no change to reduce costs is made, the company cannot survive. This is a most effective form of accountability.

Also, where there are no contracts or sales to carry their share of the overhead then there cannot be any recovery of IR&D from anyone. There is no "pot of money" given by the Government to anyone for IR&D.

From the Government point of view, accountability is also real. Pure price-competitive sales force the IR&D costs included in a company's selling price to be held to a minimum. In cost type contracts the law requires that the Government make a determination of the reasonableness of all costs included in the purchase price; hence the Government will not allow unreasonable costs of a company's IR&D program to be included in its contracts.

From the Congressional point of view, accountability also exists through the individual program approval process; i.e., when the Congress authorizes the DoD to buy X number of a certain missile for Y dollars, those dollars approved include the direct costs, the indirect costs (*including a pro rata share of IR &D*), and profit. And even if competing manufacturers desired to stray, the antitrust laws assure the presence of effective competition. Actually, there is no fiercer competition than that which exists between companies which vie for defense contracts.

In discussing accountability of IR&D in terms of the independent nature of IR&D, it is indeed unfortunate that the investigators, in their attempted analysis, feel that they cannot "take this argument very seriously" and feel that "who pays the piper, calls the tune." The question which they raise, "How much of their own funds, not recovered from DoD and NASA, do the major contractors allocate in their Government divisions for their in-house research effort?" is easily answered from the figures periodically published by the Defense Contract Audit Agency (DCAA), which show that industry has consistently incurred far greater costs for IR&D than they have recovered from the DoD.

QUESTIONS OF PROGRAM MANAGEMENT

The investigators seem to confuse control and regulation with management, and assume that only through extensive control and regulation is good and effective management possible. This is simply not true. The current Federal law and regulations and controls in this area, developed and exercised by the Government, are not required or demanded by commercial customers for the same effort under similar circumstances. IR&D efforts in a company are managed, by that company to at least the same extent as contracted efforts are managed, and are generally managed by the same or higher level people.

The depth of evaluations performed by the Government and competence of the Government people making the evaluations can only be commented on from industry's point of view, and in particular those evaluations performed by the Government on-site at a contractor's plant, where there is a person to person (Government to industry) interface. In these cases it is concluded that the Government people attending these on-sites and performing the evaluations are competent in the eyes of their industry peers and that they explore projects to a depth necessary to make a competent judgment of their technical quality.

How these results are used within the Government and the meaning and effect they have in the negotiation process can only be addressed by the Government agencies involved. However, it is patently apparent that in the case of those contractors negotiating with the Air Force there is a demonstrable relationship

between the technical quality of the IR&D program and the dollars reimbursed. This is accomplished through the use of the reopener clause in the negotiated advance agreement, which is effected if the IR&D scores for the year vary more than plus or minus three tenths (0.3) of a point from the previous year's score.

ABSENCE OF INFORMATION ABOUT PROGRAM DETAILS

We find this statement difficult to understand. Each and every IR&D project is documented in a high degree of detail. The costs associated with each of these projects are presented in terms of labor costs, material, and other costs. These projects, often several hundred per company, are presented to the Government annually for technical review and evaluation. Financial information in terms of dollars of sales, dollars by types of contracts, IR&D costs incurred in previous years, projected sales for coming years, IR&D costs proposed for the coming year, etc., are provided each year to the DoD procurement people for their review, analysis and use in the determination of reasonableness of the company's IR&D program. Summary information, broken down by individual companies, is prepared and presented annually to the Congress by the DoD in accordance with the provisions of PL 91-441.

Additionally, summary information on each IR&D project, of all companies with advance agreements with the DoD, are furnished to the DoD for incorporation in the DoD IR&D Data Bank. These data are for the information and use of all DoD and NASA agencies, and it is our understanding that in the near future this Data Bank will be made accessible to authorized technical personnel in all other agencies of the Executive Branch. The only limitations on the use of all of these technical and financial data is they are proprietary to the company involved. This in no way hinders any authorized Government official who wishes to review the information. Its sole purpose is to provide protection to a company's created technical property—its corporate "brains" or know-how.

This is the very essence of the competitive system. It is the foundation of the incentive system which motivates people in a company at a particular time to produce a better, a more technically imaginative or a cheaper product for sale than that company's competitors. To disclose proprietary data, either technical or dollars, associated with a program to all competitors will reduce the technical competence and competition of American industry to a common denominator and remove all incentive to excel. Hence, over a period of time all technological edge and lead is eliminated. Again—*there is no objection to the use and interchange of proprietary information by and between authorized Government officials as long as that information stays within the Government and is not released to our competitors.*

ALTERNATIVES TO THE IR&D PROGRAM PROPOSED BY PROFESSORS LONG AND REPPY

The investigators proposed three alternatives to the present way in which industry's incurred costs of IR&D is reimbursed to contractors. They believe that "Congress should insist that DoD explore these alternatives and should itself be prepared to analyze them." Two of the three alternatives proposed, Contracts and Profit, were among the many alternatives that were explored by the GAO and included in their report to the Congress which preceded these hearings. No acknowledgment is given, or comments made, on the GAO review in these alternatives, or is any reference made to the coverage of these same points in the Industry Tri-Association study and report on IR&D published in March 1974. This indeed casts great doubt upon the depth of Professors Long and Reppy's research.

The use of "well defined R&D contracts" to accomplish the objectives of IR&D is an excellent example of the investigators' lack of understanding of the most fundamental aspects of industry IR&D. To contract, one has to know what one wants. When the Government can describe what is to be done, what the product is to be, when it will be delivered, and what will be paid for it, then by all means a contract should be let for the effort.

IR&D, on the other hand, is a contractor's effort in terms of experimentation, exploration of ideas and alternatives for doing something; it is the development of *his* know-how. It is not a product for sale and therefore cannot be contracted. If, however, the Government believes that one of the IR&D efforts could lead to a solution to a Government requirement or be refined, expanded, and incorporated in a product which the Government desires, then the Government can logically contract for that product—but it does not contract for the IR&D.

Level of effort contracts or grants suffer from the same problems as the R&D contracts cited above. In addition, the Government has a problem of determining who receives these contracts and who does not. Presumably this would be determined on merit. This decision in turn leads one back through the same review and

avaluation, company by company, as is now practiced in IR&D and, from the Government's standpoint, merely ends up with another layer of administration and expense to the Government. Under such an approach there would now be a requirement within those companies receiving IR&D/B&P by line items for two financial accounting systems—one as currently operated for commercial and non-DOD and non-NASA contracts and another system with all its attendant added costs for DOD and NASA contracts.

This new group has looked at IR&D and become an "instant expert" and immediately latched on to the completely "simple and obvious" solution to the alleged problem—simply eliminate IR&D as overhead cost and increase the company's profit. This is a head-in-the-sand approach. The alleged problems don't go away; they just disappear from view. To move this cost to profit is to, in effect, make it a fixed charge which would not vary with the effort expended on IR&D or take into consideration the quality thereof. Recovery would be more contingent on the company's bargaining position on individual contracts than on quality or need for IR&D. Additionally, and more importantly, there would be the complete loss of technical visibility and inter change of information between Government and industry and less awareness of who is doing what and how it relates to Government interests.

Another aspect of the profits theory which needs to be understood is that having a negotiated profit factor for recovery of these costs is not synonymous with realized profit, which is greatly affected by actual contract costs. Realized profits, which would be the source of IR&D financing under this approach, are an extremely unstable entity. Therefore, IR&D under this approach would lack any steady and reliable source of capital essential to a well managed effort and, as a consequence, IR&D would tend to become inefficient and disorganized.

The third alternative proposed is to "modify the current ARPA program to respond more fully to some of the objections." Again, form is confused with substance. ARPA's function as currently stated is to "provide for the conduct of basic and applied research and development for such advanced projects as may be designated by the Secretary of Defense. In the performance of its project, the Agency utilizes the services of the Military Departments, other Government agencies, private industry and public entities, individuals and education or research institutions."

This function they perform extremely well. In fact, much of the currently ARPA funded work is the result of their capitalizing on a new or promising idea from some company's IR&D program. They then contract with the company to take this germ of an idea and, it is hoped, direct it to fulfill a military need. To do as proposed by the investigators would simply be to cut off another of all too few sources of innovative ideas.

IN CONCLUSION

1. The testimony of Professors Long and Reppy:
a. Is founded on incomplete data which have been misinterpreted.
b. Proposes alternatives without the legitimacy of supporting data.
c. Proposes alternatives that have been previously suggested, discussed, evaluated, and discarded by both Government and industry.
2. The investigators indicate that they "have grave doubts" that the dollars spent by industry for IR&D are well spent. However, when asked, they were unable to answer the fundamental question of how one determines the cost effectiveness of either R&D or IR&D.
3. IR&D is considered and presented by the investigators as a separate part of the RDT&E efforts of the DoD, for sale by industry and funded by the DoD, rather than as a company's in-house effort conceived and funded by the company for the betterment of its products and services to its customers.
4. IR&D, in the testimony presented by the investigators, is considered to be something entirely different from the in-house R&D accomplished by companies selling only to commercial customers. IT IS NOT.

C. Replies for the Record to Questions Posed for Mr. Thomas J. Murrin

Question. What has been the trend of total R&D expenditures by industry during the past five years as compared with the Government?

Answer. Industry has contributed a growing percentage of the total National R&D expenditures—increasing from 38 percent in 1969 to 42 percent in 1974. During the same period, the Government R&D expenditures dropped from 58 to 52 percent of the total. SOURCE: National Science Foundation.

Question. Has the trend been the same for defense-related R&D?

Answer. The figures given in answer to question five above for the Government R&D expenditures include the Department of Defense expenditures and the industry percentage includes IR&D funds expended by industry. However, during the same period in 1975 dollars, DOD's RDT&E expenditures dropped from approximately $11 billion to $9 billion.

Question. To what extent do you believe that industry's level of investment in IR&D would be affected in each of the following situations?

c. An FY 1977 ceiling equal to 1974 payments increased 5 percent per year to cover inflation.

d. An FY 1977 ceiling 5 percent lower than the amount spent in 1974?

Answer. Any ceiling established by Congress on recovery of IR&D and B&P costs by Industry would in effect be an attempt to price IR&D and B&P efforts as though they were commodities for sale. IR&D/B&P is not an item to be priced in that manner. A ceiling would be an attempt to price an overhead cost that, as GAO and the Commission on Government Procurement have stated, is "a necessary cost of doing business" and "in the Nation's best interest."

In addition, any ceiling would be virtually impossible to administer as Congress discovered after it enacted the 93 percent ceiling statute in 1969 and had to repeal the Act the very next year.

Any ceiling would ultimately force industry to seek new customers from which it could recover all its costs of doing business.

Question. Don't you agree that technical surprises such as Sputnik are less a reflection on the level of R&D spending by the United States and more a reflection on the lack of vision or imagination on the part of our Government and industry leaders?

Answer. No. Technical surprises result from a choice of certain priorities by Governments and industries. With finite resources each government and each company management chooses the areas in which to employ technical personnel. To the extent another government chooses an area in which to work or an application of resources to a lower degree of expenditures, one country or company can "surprise" another.

Question. You state that industry has increased its contribution to total national R&D expenditures from 33 percent in 1965 to 42 percent in 1974. What part of these percentages are recovered from Government payments for IR&D?

Answer. Government does not make "payments" for IR&D/B&P. These are overhead costs and are part of Industry's cost of doing business. In a very rough calculation one could say IR&D/B&P costs are recovered in the prices of products and services sold to the Government in the same ratio that Government sales bear to total sales. But this would be very approximate for several reasons, which include that fact that industry does not recover the full allocable share of IR&D/B&P costs in prices from sales to the Government.

Question. You state that profit levels of the defense and aerospace industry are low averaging only 3 percent of the sales in 1974.

a. How does this compare with the percentage of profit for other industries?

b. If the Government agreed to increase the profit percentage to 4 or 5 percent to compensate for complete disallowance of IR&D and B&P costs, would this be acceptable to industry?

c. What is the rate of profit based on funds invested? How does this compare with other industries?

Answer. (a) The average of other manufacturing industries for 1974 is about 5.5 percent of sales after taxes, according to *Fortune Magazine,* while defense industry profit was less than 3 percent of sales, according to the Renegotiation Board Report.

(b) No, as evidenced by the DCAA figures published annually in the Congressional Record, from which one would infer the average IR&D/B&P costs represent some 5 percent of sales. It is therefore unacceptable to "compensate" for the total disallowance of IR&D/B&P costs by an increase of profit from 3 percent to "4 or 5 percent."

(c) The return on equity capital for all industry is about 15 percent after taxes and for defense is about 10 percent.

Question. Mr. Murrin, assuming that the Congress not only fully understands but also agrees with the need for adequate Defense R&D as well as IR&D fund-

ing, do you think it is unreasonable that the Congress wants to know and have voice at the beginning of each year in how much of Government funds will be paid out for IR&D?

Answer. Government funds are "paid out" only in prices. Government pays for the products and services it buys. For the effort required, to delve into one item of cost would seem a very unwise use of valuable time. Congress has available to it yearly reports in great detail as to IR&D and B&P expenditures. This should give Congress all the information it needs. For Congress to consider detailed information of one item of overhead cost in a timely fashion in the budget schedule would seem to be infeasible.

Question. As you have stated, this country has steadily reduced its R&D expenditures for R&D as a percentage of Gross National Product since 1964. Yet the ratio of IR&D to the RDT&E appropriation has increased particularly during recent years. Wouldn't this indicate a need for Congressional oversight of Government expenditures for IR&D, even a line-item control over the amount budgeted?

Answer. No. IR&D and B&P cost may have increased recently for several reasons. (1) Direct costs of IR&D and B&P are now required by DOD to be burdened; (2) allocations of IR&D and B&P costs to sales to foreign nations have not been subtracted from amounts allocated to United States Government costs of sales. As Senator McIntyre's report to Congress in the *Congressional Record* of April 9, 1975 shows, IR&D/B&P effort has decreased in recent years.

The ratio of IR&D/B&P cost to RDT&E is not an indication of a need for statutory action by Congress.

Question. You have illustrated the value of IR&D with a case study concerning evaluation of several electro-optical systems. As I understand it, this case was undertaken independently by your company without Government support. I feel that such actions should be applauded. What this hearing concerns is the fact that a significant amount of Government spending is used to support contractors' independent R&D, and this amount is greater than the amount appropriated for NSF.

Don't you agree that the Congress, representing the public interest, must concern itself with such large expenditures of Government funds?

Answer. We agree that Congress must concern itself with large expenditures of Government funds. However, IR&D/B&P is an overhead cost, not a product to be bought. As such, Congress should not concern itself with individual items of costs which are controlled in the overall budgetary process. Congress has full visibility into IR&D and B&P activities through DOD's annual report to Congress. The inevitable fact that the dollars associated with any individually small cost elements forming part of a $20 billion annual defense expenditure will collectively represent a total comparable with, say, the NSF budget is no criterion that such costs should be singled out for, or are indeed susceptible of, control by Congress.

Question. You refer to IR&D expenditures as about 5 percent of the total RT&E budget. Evidently you exclude B&P from your calculation. Can the technical effort in B&P be clearly defined from the technical effort in IR&D? If so how?

Answer. The basic difference between IR&D and B&P should be clearly recognized. IR&D efforts are primarily exploratory in nature, are directed toward the advancement of technology, are aimed at future needs, and are subject to continual evaluation to determine if adequate progress is being made or if a new or different approach is needed. By way of contrast, B&P efforts are directed toward a specific set of requirements, are aimed at present needs, and are primarily concerned with thoroughly explaining that the company has already developed its expertise and technological capability to a sufficient degree to assure success. A company's proposal must demonstrate a complete understanding of all technical problems, to the point of describing therein a substantially finished design of a viable version of the system to be furnished and discussion of the merits of the chosen design versus possible alternatives. Associated technical effort ranges from studies, computer modeling and design calculations to, in many cases, the construction of prototypes. Also involved in the B&P effort is the actual preparation of proposals, engaging in presentations and negotiations, and otherwise responding to the requirements of the procuring agency. This effort is often difficult and sometimes impossible to forecast, since companies are responding to evolving Government statements of need. Clearly, IR&D and B&P efforts should not be lumped together and treated as the same kind of effort simply because the same or similar technical

experts of a company are called on to support each of them. They are different in purpose and are performed for very different reasons. IR&D efforts can be reasonably well planned, while B&P effort is much more difficult to forecast since it must be responsive to customer requirements.

Question. In connection with the Pratt and Whitney report, the Comptroller General has recommended that IR&D agreements specifically authorize access to commercial records *to the extent necessary for Government officials to determine the propriety of questionable charges.* Do you agree? Should this be required by law?

Answer. Industry has no wish to discourage appropriate Government efforts to ascertain whether or not proper allocation methods have been followed in the case of IR&D cost recovery when such efforts are fully justified by evidence to support a belief that such allocation methods were not followed. At the same time, we abhor any provision or law that could conceivably set the stage for an unlimited scrutiny by the U.S. Government of commercial and highly proprietary industrial records. That would, in effect, appear to authorize fishing expeditions which, in our respectful opinion, would be destructive of industry's rights to corporate privacy and could inflict great harm on the competitive system in this country. Because of the extremely controversial nature of this entire subject and the legal ramifications thereof, we strongly recommend that the subject of Access to Records be disassociated from the subject of IR&D/B&P cost recovery and that legislative inquiry, if any, be handled separately.

Question. What is your opinion of the CWAS (Contractor's Weighted Average Share of Risk) system to minimize administration of IR&D? I understand that many firms have not applied for CWAS ratings and that no agency other than DOD will accept the CWAS system. Are you in a position to comment on the reasons for the disinterest in CWAS?

Answer. The basic concept of CWAS is good.

I cannot say why many firms have not chosen to apply. The threshold may be too low for many profit centers to qualify and too few costs are eligible for CWAS qualifications. Perhaps during the early years of CWAS, contractors attempted to qualify and failed and simply haven't afforded themselves of the opportunity to requalify. I can assure you industry is interested in ways in which will reduce Government surveillance, with the concurrent benefit of lowering cost to the Government.

Question. Can you suggest any other means for Congress to exercise control over the total amount spent for IR&D without interfering with freedom of enterprises?

Answer. Your question assumes there is a need for Congress to exercise control over the total amount "spent for IR&D/B&P." Congress does not "spend" for IR&D/B&P. IR&D/B&P costs are included in the prices of products and services bought by the Government. Congress has no need to control IR&D/B&P costs any more than any other overhead cost incurred by contractors. In any event, Congress receives detailed annual reports on IR&D/B&P and the current law gives DOD more control than is needed over a necessary cost of doing business which is in the Nation's best interest.

D. Reply for the Record to Question Posed for Mr. Thomas G. Pownall

Question. You mention that one of the major benefits of IR&D is the "successful failure" where it is demonstrated at less cost that a proposed approach will not work well. Please describe one such instance and identify which of the 48 examples in your study cover this point. In your description, explain how you determine that the cost of the unsuccessful project is "low".

Answer. The 48 examples shown in the Tri-Association Study were illustrative both of the contributions, and the difficultv implicit in tracing such contributions, of successful IR&D work in the four categories of Technology Advancement, Components, Sub-systems and Major Systems. No examples were given of "Successful Failures."

One recent example in this latter category was an attempt to detect tracked vehicles in motion via any unintentional radiation of microwave energy produced by the moving metal parts in their propelling treads. In view of the nature of the expected signals, a wide-bandwidth (500 MHz) receiver covering 2-4 GHz and optimized for the detection of very short (2 nanosecond) pulses was built, and tests were conducted on a number of potential sources of unintentional microwave

radiation. For a total cost of some $20,000, it was shown that the range obtained would be inadequate to allow the implementation of this technique in tactical missile seekers.

As is the case with all IR&D projects of the major defense contractors, this result was documented and included in the contractor's Technical Plan so that, DOD was made aware of the limitations of this approach.

While for the subject example the *absolute* cost was also low, the prime quality of "Successful Failures" is their ability to demonstrate in a highly cost-effective manner the infeasibility or uneconomic aspects of some apparently promising approaches to satisfying a customer requirement. The Tri-Association Study amplified this point, explaining that the cost of technical work performed under IR&D is significantly lower than if it were conducted under a contract, with its attendant surveillance, formal controls, and other administrative burden. More specifically, the Tri-Association Study states:

"IR&D work, contrasted with contracted R&D, is characterized by its extreme flexibility (easy for a company to start, redirect, or stop) and by its relatively low cost, since its in-house management eliminates the need to add the administrative overlay necessary to furnish the formalized financial data and technical reporting attendant to contract R&D. These attributes are highly synergistic. There is no external customer concerned with any potential for criticism of his judgment in awarding a contract for work which later proves to be incapable of achieving the desired result. Such concern, which extends and complicates the contract award process and inhibits speedy redirection of contracted R&D work, is essentially absent in IR&D work."

E. Replies for the Record to Questions Posed for Dr. Richard D. De Lauer

Question. You state the IR&D and B&P are overcontrolled by current Government regulation. Is this directly attributed to Section 203, P.L. 91–441 or to more stringent regulations prescribed by DOD?

Answer. DOD's overcontrol is directly attributed not only so the law itself, but to the intensive pressures brought to bear by Congressional hearings, GAO studies, etc. over the past several years. The result is that these necessary costs of doing business are now surrounded with a very complex and costly maze of control measures which go beyond the statutory requirements. Incidentally, both the GAO and the Defense Science Board reports pinpointed the need for reducing today's burdensome administrative complications, which stem from overcontrol.

Question. Have any industry-wide studies been conducted to compare defense and aerospace with all other industries to determine how their ratio of earnings to invested capital compare? If so, what were the results?

Answer. Yes. The results are that aerospace earnings compare very unfavorably with other industries. With this fact facing us, we should keep in mind what Senator Proxmire cautioned when he called the attention of Congress to the unhealthy trend in the nation's corporate profits on January 21 of this year:

"But we should not lose sight of the fact that for 25 years corporate profits have been falling in relation to other income shares in our economy, and it would be foolish and counterproductive for us to adopt any policy designed to penalize them further."

As to some specific data, the attached chart, which has been prepared from information gathered by *FTC, IRS,* and *Moody's Industrial Manual,* compares aerospace earnings with all manufacturing industries in the United States.

It should be noted that profits after taxes on aerospace equity capital exceeded all manufacturing prior to 1969, at which time aerospace declined sharply to levels substantially below manufacturing. For the entire period 1960–1974, returns on sales and total capital invested were higher among all manufacturing ndustries than within aerospace.

Throughout the last decade, rates of return on total capital invested for aerospace have averaged 85 percent of the rate earned by all manufacturing. For aerospace, the rates fell appreciably from 1968 to 1971 and continued to decline at a lesser rate into 1972, as opposed to a recovery in 1972 for manufacturing. In 1973, aerospace rose to 6 percent, but then promptly fell in 1974 to 4.3 percent, slightly more than one-half the 8 percent rate achieved by all manufacturing.

Other studies indicate similar trends. The *Logistics Management Institute* made a study which compared total capital investment (TCI) of 41 defense oriented companies with 217 commercially oriented companies over an eleven-year period (1958–1968). This study shows that in 1958, the average return on TCI for the

41 defense oriented companies was 5% higher than that of the commercially oriented companies, but for the period from 1959 through 1969, this was reversed, with the commercially oriented companies leading the defense oriented companies by 1 to 5%.

In 1971, the *General Accounting Office* made a study of the return on defense and commercial business of 74 large defense contractors during the period 1966 to 1969. This study resulted in rates similar to the LMI Study.

In its January 1, 1975 issue, *Forbes* published its 27th Annual Report on American Industry, which analyzed the profitability of thirty industry groups over a five-year period. This report indicates that aerospace and defense, with an 8.8% return on total capital employed, ranked 24th of the 30 industries studied.

ALTERNATIVE RATES OF RETURN BEFORE AND AFTER TAXES, AEROSPACE AND ALL MANUFACTURING 1960–74

[In percent]

	On sales				On equity capital				On total capital invested			
	Before taxes		After taxes		Before taxes		After taxes		Before taxes		After taxes	
Year	Aerospace	Manufacturing	Aerospace	Manufacturing	Aerospace	Manufacturing	Aerospace	Manufacturing	Aerospace	Manufacturing	Aerospace	Manufacturing
1960	2.6	8.0	1.4	4.4	13.3	16.6	7.3	9.2	7.4	11.8	4.7	6.9
1961	3.7	7.7	1.8	4.3	19.8	15.9	9.8	8.9	9.8	11.3	5.5	6.7
1962	4.5	8.2	2.4	4.5	24.0	17.6	12.7	9.8	11.8	12.3	6.8	7.2
1963	4.3	8.5	2.3	4.7	21.5	18.4	11.3	10.3	11.3	12.8	6.5	7.5
1964	4.9	8.9	2.6	5.2	23.1	19.8	12.2	11.6	12.7	13.5	7.3	8.4
1965	6.1	9.5	3.2	5.6	28.4	21.9	15.1	13.0	5.6	14.7	8.7	9.0
1966	5.4	9.3	3.0	5.6	26.4	22.5	14.4	13.5	13.4	14.4	7.9	9.1
1967	4.8	8.3	2.7	5.0	23.1	19.3	12.8	11.7	11.5	12.7	7.1	8.3
1968	6.0	8.8	3.2	5.1	26.6	20.8	14.2	12.1	14.0	13.4	8.7	9.6
1969	5.4	8.4	3.0	4.8	18.9	20.1	10.6	11.5	10.2	13.0	6.6	8.1
1970	3.5	6.8	2.0	4.0	12.0	15.7	6.8	9.3	7.3	10.5	5.3	7.0
1971	3.2	7.1	1.8	4.1	10.4	16.5	5.8	9.7	6.9	10.6	5.1	6.9
1972	4.4	7.5	2.4	4.4	14.3	18.4	7.9	10.6	7.4	11.3	5.0	7.3
1973	4.9	8.0	2.9	4.7	17.5	21.8	10.3	12.8	8.9	13.3	6.0	8.5
1974	4.6	7.7	3.0	5.5	17.9	23.4	10.5	14.9	6.6	11.2	4.3	8.0

Sources: FTC, "Quarterly Financial Report for All Manufacturing Corporations" IRS, "Corporate Source Book of Income 1960–1970" "Moody's Industrial Manual".

Question. Isn't the ratio of earnings to invested capital a more equitable measure of what is a fair return to a given company?

Answer. The return on invested capital should not be considered, by itself alone, as the measure of a fair return to a given company. Whatever method is used, aerospace earnings compare very unfavorably with other industries, as shown in the chart answering above Question. Aerospace return on sales has remained below the composite for all manufacturing since World War II. Aerospace return on equity has been below the composite industrial return since 1969. Aerospace return on total capital invested has averaged about 85% of all manufacturing industries during the last decade.

Regardless of which measure of earnings were used, the idea of using a profit factor for IR&D/B&P cost recovery is not a feasible alternative. It would not work in practice under negotiated contracts with the government, and only result in further erosion of already low profits.

Let me go back to my initial comment that the return in invested captial should not be considered, by itself alone, as the measure of a fair return to a given company. In addition, what constitutes a fair return depends on (1) the nature of the services to be performed, (2) the type of resources and know-how to be applied, and (3) the technical and financial risks involved.

There really is no single measure of return that is per se more or less equitable or more or less fair than any other measure of return. The earnings a given company should receive under a contract should vary depending upon the skills, know-how, and other resources it will devote to the contract task and the inherent difficulty and risk of the project.

Question. You state that the Government should not seek through legislation to establish perferred customer status over all other customers. Isn't it true that no private contractor is compelled to do business with the Government?

Answer. Not necessarily so—the Defense Production Act, for example, might be used by the Government to compel a private contractor to do business with the Government. And unless and until a contractor heavily oriented to high technology Government business can redistribute his resources to other customers, he in effect is compelled to continue doing business with the Federal Government. Only when and if the Government makes itself an unattractive customer, does it become necessary for the Government to formally or informally "compel" private firms to do business with it, using informal pressures if not the law. For example, informal pressures have been brought to bare in recent cases involving companies not wanting to accept Cost Accounting Standards under Government contracts.

But the real issue is this: whether the Government should use its sovereign power to legislate itself into a preferred status when it is a customer with private industry. We believe this would not be in the national interest.

Question. You state that Congress, in the national interest, should reverse the current trend to continually reduce its contribution to IR&D effort. Is your reference to the declining trend in IR&D effort based on constant or actual dollars?

Answer. Neither, though the trend in constant dollars, no doubt, is down. Our phrase was "the current motivation to continually reduce this *effort.*" We were referring to the decline in industry's actual scientific *manpower* expended in IR&D/B&P. As pointed out in the Tri-Association's Technical Papers, the actual manpower level between 1968 and 1972 decreased by 28% while the cost figures that Congress saw were going up. Why were the cost figures increasing under these circumstances? Not just because of inflation, but more so because of the Government directed accounting change to require the addition of overhead to these costs.

For example, assume our labor and material costs for IR&D were $1 million. Then the Government required us to start applying overhead to this cost, which, had not been our accounting practice in the past. At an overhead rate of 130% the IR&D cost would jump to $2,300,000—from $1 million—without any change in the manpower expended. That kind of cost data has given the misleading impression that IR&D/B&P costs are increasing abnormally.

Most important, we are not asking the Government to "increase its contribution," as though it were a hand-out or subsidy. We are asking the Congress to set no legislative restrictions that preclude government contract prices from including their fair share of IR&D/B&P costs.

Question. Why do you find it difficult to understand how a specific amount could be established for IR&D and B&P when experience during the past has indicated the Government's capability to substantially stay within a predetermined ceiling?

Answer. Obviously, a ceiling could be arbitrarily established. What is difficult for us to understand is the illogical rationale for wanting to establish a ceiling or a budgetary line item for an indirect cost of doing business. It is erroneous for the Government to treat this as a Government program when it is *not,* and to decide who will get how much of this "necessary cost of doing business" in lieu of relying on the forces inherent in the marketplace. It's wrong for the Government to assume the omnipotent role of shaping the future success of failure of private contractors.

Question. You state that IR&D and B&P cost should be fully recovered to the extent reasonable. Who should determine what is reasonable? Why shouldn't it be the Congress which has responsibility for providing all funds used by DOD?

Answer. Traditionally, the Executive agencies have made all determinations of cost reasonableness under negotiated contracts—specifically the contract administration function, assisted by the contract audit function. The suggestion to transfer this contract administration function from the Executive to the Legislative Branch—whether for two cost elements or for all the various cost elements—is illogical. Congress couldn't handle the detailed work load, and such administrative detail doesn't seem appropriate for Congressional involvement. This seems to go beyond the immediate IR&D issue, to the question of constitutional separation of powers.

Question. You state that Congress should recognize that IR&D and B&P costs are not commodities to be purchased and should not be singled out for undue scrutiny. Wouldn't you agree that profit is not a commodity to be purchased but it is accepted as appropriate for a scrutiny by DOD and the Congress?

Answer. Yes, profit is not a commodity to be purchased. It is what is left of the contract price after paying for all direct costs and a fair share of indirect costs, like IR&D and B&P, which go into the contract price. It is appropriate for the Government to ensure reasonableness of the price, i.e., reasonableness of the profit and cost elements that go to make up the negotiated price. It is inappropriate and wrong to take one element of indirect cost—which is spread across all business—and make it a line item in the federal budget. In fact, to do so would be the ultimate in bureaucratic futility.

Question. You underline the statement that IR&D and B&P *must* be performed and *must* be paid for. There is no disagreement with this. But why does your statement mean that it *must* be by the Government?

Answer. It doesn't. The statement does mean that such costs must be recovered through the contract prices charged to all customers, and that applies to the Government only when it is a *customer*. Only when the Government is a customer must it pay its fair share of IR&D and B&P through the contract price. If the Government doesn't pay its fair share in the price, then the Government is being subsidized by industry, not vice versa.

As a customer to TRW, and only as a customer, must the Government pay its fair share of our IR&D and B&P costs. If TRW has no Government contracts, then the Government doesn't pay for any of these costs. The price of each contract includes a piece of these IR&D and B&P costs. How? By spreading these costs across the board to all business, commercial and Government alike.

Question. You state that the Government has the right to question, and if appropriate, deny the reasonableness and allocability of IR&D/B&P costs. Well, since the Congress is the legislative branch of the Government and has the constitutional responsibility for making funds available for expenditure, doesn't such right to question and deny go hand-in-hand with Congressional control?

Answer. This question is very similar to Question No. 13 and for the same reasons, it appears inappropriate for Congress to involve itself in such depth of administrative detail.

Question. Why are you apprehensive about the possibility that the relevancy test may be narrowed to *current* military requirements and contracts?

Answer. We likewise must be guided by anticipated *future* needs in doing our R&D homework today so we will have necessary capabilities for tomorrow. Such capabilities can not exist if we are limited by today's current requirements. A constraint to block our *future* considerations would be disastrous from both a military and a business view.

Question. You state that the concept of a single customer having preferential rights to patents and technical data is directly contrary to and actually destructive of our American free enterprise system. Does this mean that you consider AEC's practices to be destructive of our free enterprise system?

Answer. Definitely, but the AEC policy no longer exists. ERDA did not adopt AEC's policy on patent and data rights in industry IR&D. This will help attract private industry to do business with ERDA, rather than be a disincentive.

Our statement that AEC's practices are considered "to be destructive of our free enterprise system" should be examined in the light of the fact that the vast majority of AEC effort is conducted in Government-owned, contractor-operated plants. Thus, the Government *owns* the capital goods of this field of endeavor and industry provides management skills. Is Government ownership free enterprise? Further, the number of American firms willing to risk private capital in the field of nuclear development is very few, particularly, when compared with the history of other recently developing fields of technology e.g., aviation, automotive, electrical/electronic appliances.

We must ask then to what extent the repressive policies of AEC as to non-allowance of IR&D cost—save under a most restrictive relevancy test—and the acquisition of rights in IR&D patents and technical data have hindered the number of companies competing in the advancement of practical nuclear technology and the application of nuclear resources to meet our Nation's energy needs. Stated differently, how much farther would nuclear technology have advanced under the more equitable and realistic policies of the Department of Defense and the National Aeronautics and Space Administration?

It is significant that ERDA has abandoned the AEC policies on IR&D reimbursement and on acquisition of rights in IR&D patents and technical data because the Government received no benefits therefrom, and to align ERDA policies with other Federal agencies.

Question. If the Government repays 90 percent of a contractor's total IR&D expenditures for an invention and asks for a royalty-free, non-exclusive license, why isn't this reasonable? How does this differ from a direct R&D contract for the same item where the Government automatically obtains such rights with no legal objection from industry?

Answer. You can't be just a little pregnant—something is either on contract or it is not. Industry IR&D is *not* performed as a contracted sale to a customer. It is company initiated, directed and funded as part of the company's necessary costs of doing business. How well or poorly a company manages its IR&D determines the company's future capabilities and very survival. For contracted R&D, the customer is in the driver's seat in deciding what he needs and when and how much he's willing to pay.

The U.S. Patent System was devised to encourage invention through the granting of exclusive rights to inventors. Government acquisition of rights in industry's IR&D patents and data would undermine and defeat this basic purpose and would become a disincentive to competent companies to compete for Government contracts.

Also, the question assumes, contrary to fact, that industry has not raised legal (as well as practical) objections to the Government acquisition of rights in Government contracted R&D, other than a royalty-free license limited to Governmental purposes. Industry has strongly opposed any broadening of this very limited license in the Government, witness industry's objections to the various Acts under which the Government acquires title i.e., the Atomic Energy Act and the Space Act, as well as the recently enacted statutes bringing ERDA into being.

Question. Does a company now have the choice of spending its own funds for an invention and not seeking repayment from the Government if the commercial potential for such an invention is so promising that the company does not want to give the Government a license?

Answer. This question appears to reflect a substantive misunderstanding of IR&D expenditures. Such expenditures are in fact, *company funds* and are recovered only in sales of goods or services whose prices included an allocated share of such expenditures, and then only to the extent that the full price is received.

Yes, a company does have that choice; however, under such circumstances it is the company that is subsidizing the Government—not vice versa—because the Government as a customer is thereby accepting less than its fair share of IR&D.

Question. Your slide #3 evaluating alternative methods for Government funding of IR&D and B&P costs analyzes budget line items under method F. The direct contract method shows numerous problems, but the level of effort approach is acceptable in most respects.

(a) As you know, the Comptroller General has supported the budget line item approach. Do you feel that this approach, applied to level of effort contracting, would be acceptable to industry?

(b) Inasmuch as the use of a level of effort contract for all IR&D/B&P effort would eliminate the need for the numerous overhead adjustments now required, why do you rate the level of effort contract as "poor" for "administrative economy and practicability"?

(c) If a budget line item is established comparable to the current annual amount of IR&D/B&P, why do you feel that the budget line item would be "poor" in motivating contractors to continue in Government business? Why would there be "no assurance" of consistent Government funding?

(d) Why would the level of effort contract be "poor" in promoting the survival of the fittest contractor?

Answer. (a) No, the budget line item approach with level of effort contracts is definitely not acceptable to industry. Further, we must correct your premise that our matrix chart shows the level of effort approach "acceptable in most respects." It does not. We also take issue with your premise that the Comptroller General supports the budget line item approach. His latest report and formal statement did *not* advocate this approach, and his responses to questions during testimony were, at most, acknowledgment of possibility, not support, for this approach.

(b) Replacing the fundamental approach for recovery of industry IR&D and B&P through overhead, with level-of-effort contracts would in no way eliminate the negotiation of bidding and final overhead rates each year. But a sizable administrative work load would come with level-of-effort contracts. They would have to be proposed, evaluated, negotiated, reviewed, definitized, administered, audited, vouchered, settled and closed out each year. The contract administration overload would be much greater than the already complex and costly process of using advance agreements for these overhead costs. To this would be added such problems as (a) determining the size of each contractor's annual contract without advance knowledge of what his annual level of Government sales actually would be; (b) issuing all such contracts far in advance so each contractor would have adequate time for advance planning; (c) placing some contractors under the contract approach while having others on the overhead approach, with some moving back and forth from one approach to the other due to annual sales fluctuations; (d) funding for the uncertain timing of sizable B&P efforts in response to RFP's; and (e) causing the productivity of each IR&D/B&P dollar to be eroded by the imposition of contractual requirements and red tape.

(c) The idea of using level of effort contracts for IR&D and B&P of large contractors could cause discrimination against smaller contractors, who would continue the normal practice of including these costs in their overhead. Thus, their prices for doing the same work trend to be higher than large contractors. Contractors would no longer have control over the "life blood" to their future survival—their IR&D/B&P efforts. Under level of effort contracting, the critical "independence" of industry's IR&D ultimately would be lost and replaced by Government-directed R&D. The Government would be able to "make-or-break" any contractor simply by reducing his IR&D/B&P level-of-effort contract. Certainly today's Congress can provide no assurance of consistent Government funding by subsequent Congresses. More likely, IR&D/B&P as a line item in the RDT&E budget would be most vulnerable to the arbitrary cuts which occur every year, and hence vary widely in amount from year to year.

(d) The level of effort contract approach would leave little, if any, connection between the contract award and its size and the company's merit as determined by competitive status and pressures.

Question. You point out that foreign governments have developed far reaching and generous R&D incentive policies. What do they do as to IR&D costs of their contractors?

Answer. Keep in mind that Industry R&D is synonymous with industry's "R&D homework" or "IR&D".

Competing nations have devised an array of incentives for furthering industry's R&D and technological progress, while the U.S. takes little if any action at the national level to stimulate industry R&D within the U.S. and indeed places disincentives or constraints on industry's IR&D.

Please refer to the Tri-Association's *Technical Papers on Independent Research and Development and Bid and Proposal Efforts*, and specifically the discussion headed "U.S. and Foreign Nation Support of Industrial Technical Effort." Appendix A of that section provides a detailed list of incentives provided by selected industrialized countries for the purpose of stimulating industry's R&D and technological advancement. Some provide direct subsidies which we believe are harmful to free enterprise, and therefore not sought or recommended by U.S. industry. We are only insisting that the Government accept its fair share of IR&D costs when it is a customer.

F. Replies for the Record to Questions Posed by Senator Barry Goldwater to the Tri-Association Ad Hoc Committee

Question. Don't smaller firms lose out in the recovery of IR&D, since the big companies get virtually all of DOD's reported reimbursement of IR&D?

Answer. Absolutely not. As attested to by the WEMA representative whose testimony preceded ours, every company regardless of its size can recover a portion of its expenses for IR&D/B&P as allowable costs against defense contracts it holds. A qualitatively similar situation exists, whether the company's business is primarily commercial or involves selling to the Government. The larger companies "recover" more gross dollars by virtue of their (larger) costs of doing business (which include IR&D/B&P) than do the smaller companies. The Department of Defense reports the IR&D recovery of only its largest contractors since it is impractical to audit the financial records of every defense contractor regardless of its size.

The DOD annual reports to the Congress of IR&D/B&P cost recovery list two categories of contractors, those with advance agreements and those without advance agreements. However, the latter category does *not* contain the IR&D/B&P costs of *all* contractors without advance agreements, but only those who had an annual auditable volume of costs incurred of $15 million or more or who required 4,000 hours or more of DCAA's direct audit effort per year.

The smaller companies are reimbursed for their IR&D/B&P costs on a formula basis, which relates allowable percentages for IR&D/B&P to each company's prior history. A small company may thus recover in excess of 10 percent of sales for IR&D costs alone, as contrasted with an average of some 5 percent for the *total* of IR&D/B&P costs for the major contractors. In addition, a small company with relatively stable sales may recover from DOD its full pro-rata share of allowable costs for IR&D/B&P, in contrast to the major defense contractor who normally recovers substantially less from DOD than its full pro-rata share of such costs. Of course, as small companies grow, they arrive at the dollar threshold for IR&D/B&P expenditures where they may no longer use a formula for determining the allowability of these costs, but must execute advance agreements with DOD and be subject to the same constraints as other major defense contractors.

Question. Have any actions of the Government in recent years resulted in an increase of the reported costs for IR&D and B&P?

Answer. Yes.

Responses to Requests for Proposals (RFP's) in today's procurement climate are no longer limited as they once were to furnishing evidence of a contractor's resources, past accomplishments, and his technical competence to *seek* a solution. Most RFP's now require that contractors respond with detailed credible *solutions* to customer requirements. The ability to do this substantially increases both the precursor IR&D costs and the B&P costs.

In addition, beginning in 1972, the reported costs for IR&D and B&P were further increased by the requirement to add overhead or burden to all such costs. This factor alone caused a $32 million increase in DOD's share of IR&D/B&P costs reported for 1972, and $55 million for such costs reported for 1973. As the DCAA report noted (for 1972), "The $32 million DOD share does not necessarily represent an increase in total costs absorbed by DOD contracts since this burden may have otherwise been allocated to *direct* costs of DOD contracts had it not been applied to IR&D and/or B&P costs."

Finally, recent year reported totals include IR&D/B&P costs allocated to foreign military sales, which costs are absorbed by the foreign purchaser and not by DOD. Thus, Senator McIntyre clearly explained in his report to Congress on April 9, 1975, consideration of this factor resulted in net out-of-pocket costs to DOD for IR&D/B&P of $763 million for 1973 and $766 million for 1974 as contrasted with the unadjusted figures of $801 million for 1973 and $808 million for 1974 presented without explanation or qualification in the attachment to the Comptroller General's testimony at these hearings.

It is precisely the publication of confusing data of this type, especially when they are attributable to an authoritative source such as the GAO, that encourages critics to draw specious comparisons between annual totals for IR&D/B&P allowed by DOD and to proclaim that the current system is "out of control," contrary to the true facts of the case.

Question. Why should the Government pay for the cost of competition?

Answer. The costs of competition, or the costs a contractor incurs to enable him to compete, are normal costs of business no matter whether the business is commercial or sells to the Government. In a commercial business, these costs include marketing, advertising, introductory plans, research, development, testing and other costs aimed at entering or increasing participation in a market. The amount of such costs will ultimately determine prices and the success or failure of a product to compete. The market will eliminate the high cost, inefficient producer and competition will lead to the lowest price for the buyer. Essentially, the same thing is true in defense contracting and the associated costs of doing business, including IR&D/B&P, etc. The innovative company with strong cost-conscious management will survive. All costs *must* be recovered in selling prices to both Government and commercial customers if a company is to survive. No matter what the statutes or regulations provide, in the eyes of stockholders and company management, profit is what remains after *all* costs including taxes are paid and is not a mysterious fund available to pay costs not recoverable as normal business costs.

Question. Commercial firms must absorb their losses from their profit. Why can't defense contractors do the same?

Answer. Defense contractors *do* absorb their losses from their profit just as the commercial firms do. However, defense contractors are far less capable of absorbing such losses. There are two reasons for the greater capability of commercial firms. Commercial products are priced according to market conditions regardless of the cost of producing the product. If the cost is higher than the price the market will support, the firm will lose money. Conversely, if the demand is high, the price of product will reflect that demand regardless of the cost of production and the firm may reap a substantial profit. Defense contractors operate under different conditions. Their products are priced, for the most part, according to cost estimates which must be certified. The same prudent management will generally result in a far greater probability of higher profit in commercial business than in defense business.

The second reason that commercial firms have a greater capability to absorb their losses, and correspondingly to reap greater profits, rests in the manner in which commercial firms do their accounting. Sales receipts, less the direct costs of producing the product, yield gross margin. Gross margin, less the indirect expenses of the business, results in net margin. Subtracting taxes from net margin yields net profit. If a commercial firm is able to save on either direct costs or indirect expenses, its margins and consequently its profits will be directly increased. Any savings a defense contractor may be able to effect in the production of the product do not accrue to him unless the product is sufficiently defined to have permitted a firm fixed price bid, or unless a controlled incentive arrangement has been established in this contract whereby he is eligible to receive some fraction of the costs saved. Normally, however, any savings under a defense cost-type contract result in a lower cost to the Government rather than increased profitability to the contractor. (While the contractor's profit may thus become a larger percentage of the contract costs, he does not recover additional profit dollars.)

In a commercial operation, highly profitable products will provide funds to offset losses of low or no profit products. In Government sales, other than firm fixed price contracts, each contract must stand on its own feet and a contractor cannot earn high profits under one contract to offset losses on another contract.

However, overall profit is what is left after all costs are paid, and defense operations absorb losses just like commercial operations but with less opportunity to offset them.

Question. How important to your companies is the capital "I" in IR&D?

Answer. "Independent", or synonomously "contractor-initiated", is the key word in distinguishing the nature and value of independent research and development (IR&D). Not only the growth but even the survival of industrial firms depends heavily on competitive acceptance of their products and services. To accomplish such growth or even to survive means that a company's management must have the freedom to make its own evaluation of what it must do to remain technologically competitive in the future, balanced against the competitive implications of the cost of so doing. Determining the proper balance is perhaps the most difficult and, in the long term, most significant decision of management in any enterprise. It also represents that element of managerial judgment and skill most valuable to the customer, whether commercial or governmental.

Industry-funded research and development can fulfill its vital role only if it is independent of any influence that would be imposed by direct external controls over either the kinds or degrees of such efforts and their costs.

Forces inherent in our competitive system operate automatically and effectively to guide independent research and development into appropriate channels and to constrain the costs of these efforts within limits of reasonableness.

Prudent company management must tailor its independent research and development in accordance with such factors as the competitive environment, its technical competence, the most productive uses of its resources and the relevance of such technical efforts to objectives of the company and its current and potential customers. In so doing, the company management must have the flexibility to evaluate its own research and development on a continuing basis and to redirect immediately the character or level of work on the basis of progress achieved or changes in needs. This ability to react promptly in expanding, curtailing, or redirecting efforts in response to technological discoveries, market demands and economic force is a vital factor in assuring successful and efficient performance of research and development which culminates in the creation of products and services to satisfy commercial and government needs.

External controls, as well intentioned as they may be, interfere with the automatic checks and balances of this system and thus adversely affect the quality and efficiency of these technical activities. In turn, this produces undesirable effects on the quality, timeliness, and prices of goods and services which would have resulted from unfettered creative technical effects.

External control in the form of Government direction as to what kind of effort should be performed, how much should be done, and/or who shall do it, is self-defeating and seriously jeopardizes our national interests for the following reasons:

First—who in Government is so omniscient as to be able to pre-determine specifically what research and development will be useful, how much it should take to do it right, and who is most likely to be successful? For example, would we now have such things as jet aircraft or television, if, instead of a great number of capable and dedicated organizations and people being free to conduct research and development independently, the effort had been limited by governmental direction?

Second—maintaining effective competition is such a basic national policy that laws have been enacted to ensure adequacy of competition in the commercial marketplace. Similarly, the desire for adequate competition among potential suppliers of the Government's needs also is manifest in laws and regulations. Inasmuch as technological capability is essential in establishing and maintaining an adequate body of industrial firms ready and able to compete in providing goods and services, any artificial controls over this independent technical effort can result only in reducing competition, a situation which would be in clear conflict with national policy.

RESPONSE BY ADMIRAL RICKOVER TO COMMENTS BY TRI-ASSOCIATION

DEPARTMENT OF THE NAVY,
NAVAL SEA SYSTEMS COMMAND,
Washington, D.C., December 5, 1975.

DEAR SENATORS MCINTYRE AND PROXMIRE: Upon completion of my September 29, 1975 testimony on Independent Research and Development (IR&D) and Bid and Proposal (B&P) costs, you invited the Tri-Association Ad Hoc Committee on IR&D/B&P to respond to my testimony for the record. You also invited me to comment on their response. Enclosure (1) contains my detailed comments on the Tri-Association response.

As you will remember, I testified that the present IR&D system is ill-founded and wasteful. The defense industry defends IR&D as a necessary cost of doing business; as an aid to competition; and as an essential contributor to our nation's technological progress. I testified that it is instead a subsidy to the defense industry, anti-competitive, and a form of unnecessary philanthropy in a time of limited funds for national defense. Moreover, the present IR&D system involves expenditure of public money without Congressional scrutiny, and without anyone in the executive branch being held accountable for the results.

The Tri-Association response has characterized my testimony as "subjective opinion, innuendo, and generalizations that are at considerable variance with the facts." It has attempted to rebut my arguments. However, the facts are as follows:

Defense Department figures show that competition in defense procurement is the exception, not the rule. The Comptroller General has stated that there is less competition than the DOD acknowledges.

The requirement that the Defense Department not pay for IR&D and B&P unless the work has a potential military relationship is ineffective. The GAO found that this requirement has had no effect on DOD's reimbursement of IR&D. Under present rules, even the development of home appliances has been accepted as having a potential military relationship.

The reported cost of IR&D and B&P to the Defense Department equals 3.73% of defense sales. Scarce procurement dollars are thus being diverted from hardware to Independent Research and Development when the Navy, for example, cannot get enough money for well-defined research of its own.

The present IR&D system is anti-competitive. First, the largest reimbursements for IR&D and B&P go to large and well-established defense firms to the detriment of smaller companies. Second, by being able to employ otherwise idle employees on make-work IR&D projects during periods of low workload, large defense oriented firms gain an advantage over smaller or more commercially oriented competitors since the Government picks up most or all of these IR&D costs. Third, large defense contractors with large government-subsidized IR&D programs can develop inventions and patents to help retain their technological advantage over smaller companies.

Over 25 percent of all contractor divisions listed in the DOD's IR&D and B&P report do 90 percent or more of their business with the Defense Department. The Government pays all or nearly all of these firms' IR&D and B&P costs, yet it retains no rights to inventions, patents, or technical data; DOD, in fact, may have to pay a royalty to use inventions developed under IR&D programs.

The Tri-Association refers more than once to my position on IR&D as "unique," "narrow," "parochial," "isolated." Industry's view, on the other hand, is stated to be "substantially in agreement" with the views of various Government departments, offices, boards, and commissions. I recognize that various Government departments have supported the IR&D and B&P program. But this support undoubtedly would weaken if IR&D were not buried in other budget figures, and had to compete openly and directly with other R&D projects for the available funds. I also recognize that the Tri-Association has vested interests to protect. Congress, on the other hand, has the responsibility to conserve public funds and see that they are spent to best benefit the nation's defense. It was in this context that I gave my testimony.

I appreciate this opportunity to respond to the defense industry's comments on my testimony. I would appreciate it if you would include my response in the record of the hearings and wherever else your committees elect to publish the Tri-Association comments.

H. G. RICKOVER.

Enclosure.

COMMENTS ON TRI-ASSOCIATION RESPONSE TO ADMIRAL RICKOVER'S TESTIMONY ON INDEPENDENT RESEARCH AND DEVELOPMENT AND BID AND PROPOSAL COSTS

1. *Competition in defense procurement*

The Tri-Association response calls my statement that the vast majority of defense procurement is actually non-competitive "provocative and a fallacy." It supports its position with Defense Department figures on the extent of competition in defense procurement, and then proceeds to describe the pressures of competing for additional business placed on defense contractors.

My statement may be provocative to the defense industry, but it is not fallacious. Defense Department figures for Fiscal Year 1975 show that 61.6% of military procurement is sole source, and therefore non-competitive. Formally advertised procurement amounts to 8.5% of military procurement; even if formally advertised procurement under the small business setaside program were included, the figure would be only 12.3%. Nearly all of the remaining military procurement—classed as competitive by the DOD—is placed either under so-called competitive negotiated contracts, or as a result of design or technical competition. These are not truly price competitive awards. In such procurements, shop loading, prior technical experience, and factors other than price often dictate which company will win the contract. The net result is that there is very little true competition in defense procurement, contrary to the impression given by the Defense Department's figures.

The GAO has also come to the same conclusion. In testimony before Congress a few years ago, Comptroller General Staats said "A large percentage of the actions which were classified and reported to higher management levels within the Department of Defense as competitive procurements in our opinion were in fact made without competition."

This is not to say that defense contractors do not vie with each other for defense work. But a defense contractor's ability in public relations and lobbying is often as important a factor in the competition as is his engineering and production capability. To win a contract, a contractor might even bid less than his expected costs, hoping to recover any loss through claims, changes, or subsequent sole-source procurements. This is not true price competition which promotes cost control and efficiency. Rather it is a sort of competition to determine which firm can get into a sole source position.

The fact is that the amount of true competition in defense procurement is limited. It is not adequate to ensure that only reasonable costs are charged to Government contracts.

2. *Defense Department administration of IR&D*

The Tri-Association characterizes my testimony on the DOD's administration of the IR&D program as "subjective opinion, innuendo and generalizations that are at considerable variance with the facts." It contends that the Government does have influence over the type and amount of IR&D conducted, and cites technical ratings, negotiated ceilings, and the potential military relationship requirement as evidence of Government control.

The Tri-Association misses the point. Laws and regulations may exist to control the cost of IR&D and B&P to the Defense Department. But as implemented, these controls are largely cosmetic. Take the Armed Services Procurement Regulation (ASPR) provision on negotiated ceilings as an example. The Tri-Association points out that ASPR gives the contracting officer unilateral authority to set a ceiling on IR&D costs. In actual practice, this power is seldom used; it is almost impossible for the Government to establish unilaterally a ceiling substantially lower than that insisted on by a contractor. If the contractor insists that the proposed IR&D and B&P is necessary to the firm's future, and that it has a potential military relationship, the contracting officer has little basis for establishing a lower ceiling. In one case where a contracting officer has attempted unilaterally to set a ceiling, the contractor has challenged that determination in court.

The requirement that DOD not pay for IR&D projects unless they possess a potential military relationship (PMR) is also cosmetic. DOD's mission is so broad that almost all efforts of defense contractors can be shown to have potential military relationship. Moreover, as pointed out in my testimony, DOD has even accepted such projects as the development of home appliances as having a potential military relationship. The GAO found "that the PMR requirement has had no effect on DOD's reimbursement of contractor's costs."

3. *Cost of IR&D*

I had testified that, as a percentage of defense sales, IR&D and B&P costs to the Defense Department have risen from 2.73% in 1968 to 3.73% in 1974. The Tri-Association explains that accounting changes make the apparent increase in IR&D/B&P costs since 1968 greater than the actual increase. The Tri-Association is correct in this regard and the fact that the actual cost of IR&D and B&P has been understated in the past should be recognized by the Congress.

Moreover, reported figures are still understated because (i) they cover only 90 of the largest defense contractors, and (ii) they do not reflect their share of company general and administrative costs.

The question at hand, however, is why there should be a 3¾% IR&D and B&P "tax" on procurement—a tax that did not exist prior to 1960 when the IR&D and B&P program was introduced.

The Tri-Association believes I am "parochial" in comparing the amount of IR&D and B&P financed each year by the Defense Department with the number of important submarine research and development projects turned down by Congress because of a lack of funds. I recognize that if Congress reduces IR&D and B&P, equivalent funds will not flow to submarine research and development work unless Congress so decides. However, members of Congress should know that while up to a billion dollars a year is spent on IR&D and B&P of unknown military significance, money is unavailable for specific, well-defined military research and development. In my opinion we should not continue to fund independent research and development projects of dubious military merit at a time when we cannot afford to fund needed military research and development.

4. *Impact on competition*

The Tri-Association states that when I point out that the largest defense contractors generally receive the largest IR&D payments, thus enabling them to perpetuate their dominant position in the defense market, I am confusing cause and effect.

I am not saying that large IR&D programs cause companies to become large defense contractors. However, it is a fact that large and well-established defense firms receive the largest reimbursements for their IR&D and B&P costs. Contrast this with a small company desiring to enter defense work. The company must pay for bids and proposals and research work out of its own profits or with new capital, a constraint only partly shared by established defense firms. Moreover, small defense contractors are at a disadvantage because their small sales base cannot support the extensive research and development programs undertaken by their large competitors. The result is that large defense contractors have an advantage over all small firms which helps the large contractors to retain their dominant defense position.

The Tri-Association disputes an example I gave, arguing that the costs for studies of a large nuclear-powered submarine oil-tanker conducted under IR&D and B&P should be allowed on the grounds that the Navy would have benefited from lower overhead costs if the project had been successful. Unfortunately, the Armed Services Board of Contract Appeals has recently ruled that the contractor's costs of IR&D and B&P incurred on this project are allowable and must therefore be reimbursed by the Navy. Despite extensive testimony by Navy witnesses that

the work associated with the submarine tanker would not benefit the Navy's submarine program, the Board found benefit from this work. Among other points, the Board used the same reasoning put forward by the Tri-Association, i.e. that the Navy would have benefited from the lower overhead attendant with the future commercial work had the project been successful.

In my view the Board made a bad decision, but the Board's job is to apply the Defense Department's procurement rules whether or not they make sense or protect the Government. The argument that anything that will promote more business should be an allowable cost because it may result in future lower overhead costs is not sound. On that basis the DOD would have to pay advertising costs and entertainment expenses—which under ASPR are unallowable—because it could be argued that such expenditures would generate new commercial work. The Armed Services Procurement Regulation should be revised to preclude such reasoning in the future.

5. *IR&D as a normal business expense*

Defense contractors often argue that IR&D costs are normal business expenses as are rent, heat, light and maintenance. In my testimony, I stated this is not a valid comparison—that there is no incentive for contractors to waste light or heat, while there is an incentive for them to increase spending on IR&D and B&P. The Tri-Association finds my view "inconsistent;" that if there is little true competition, defense contractors would have no more incentive to control costs such as heat and light than they would to control IR&D and B&P costs.

The Tri-Association is correct in highlighting that in a non-competitive situation, a contractor may have little or no incentive to control costs. Nonetheless, large defense oriented firms have a positive incentive to use IR&D and B&P as a means for financing make-work projects to keep employees available for possible future work, and to strengthen their market position. The more they spend in this manner, the better their chances of winning new contracts, thereby enhancing their advantage over smaller, more commercially oriented companies.

6. *Rights to inventions, patents and technical data*

The Tri-Association states that it would "appear grossly inequitable" for the Government to seek rights to patents, inventions, and data merely on an assumption that the Government "may" have to pay a royalty to a contractor for these rights under the present system. It disputes my statement that the Government may pay for most of the work by noting that "only a handful—probably less than ten" of the major companies doing defense work do more than 50% of their total business with the Defense Department. Finally, it attempts to justify why it is fair for companies to deny rights to their inventive employees, but not fair for the Government to do so with contractors.

The Tri-Association's statement on this issue is misleading. Well over half of the 236 contractor reporting divisions or operating groups listed in the Fiscal year 1974 IR&D and B&P report of the Defense Contract Audit Agency do more than 50% of their business with the Defense Department. Over 60 of these divisions do 90% or more of their business with DOD. In such cases, the Government may end up paying virtually all of the costs of an IR&D project and still have no right to the resulting inventions or technical data.

The Tri-Association argues that individuals can cede their rights to inventions without losing their inventiveness, but companies cannot. In my opinion, that argument defies logic. The public should receive rights to inventions commensurate with the share of the costs financed with public funds. This was the method used by the Atomic Energy Commission, and advocated by the GAO.

7. *Impact on National Defense*

The Tri-Association states "Obviously, the Admiral desires that all R&D be government-directed." I do not advocate Government direction of all research and development. Companies and universities should be free to pursue without outside interference those areas of research which they themselves fund. But it does not mean that companies should be able to pursue research funded by the Defense Department without Defense Department control. To do so without specific Congressional authorization violates the basic principle of accountability of public funds.

The Tri-Association implies that continued Government support of IR&D is essential to national defense. Yet, it does not explain how, prior to 1960, defense contractors were able to fund their own research and development programs when the costs of such programs were generally unallowable.

The United States must maintain a high level of support for military research and development to meet the increased effort put forth by the Soviet Union.

However, elimination of Defense Department support for IR&D would not be inconsistent with this goal. With our limited funds, it is more important to direct public money toward solving specific military problems, than to spend it in the hope that something of military value may eventually result.

8. *Summary and Conclusions*

The Tri-Association states that the Defense Department's share of contractor IR&D and B&P costs is down from 51% to 40% in the last five years. It concludes "this may result in disastrous consequences in the future" since low defense industry profits "preclude the possibility that reductions in defense IR&D/B&P allowances can be offset by increased expenditures of company funds."

These are the facts: First, no one knows how much IR&D and B&P really costs the Government because the reported figures are understated. Second, the figures that are reported show that DOD's share of contractor IR&D and B&P actually went from 57% in 1969 to 48% in 1974—not from 51% to 40%; the Tri-Association statistics refer solely to IR&D and do not include B&P. Third, the declining share of IR&D and B&P paid by the Defense Department results from a decline in defense spending in relation to commercial work, and not from any tightening of Defense rules. As explained earlier, IR&D and B&P accounts for a larger percentage of each procurement dollar spent by the Defense Department than it did seven years ago. Therefore, any implication that there has been a cutback in DOD support of IR&D and B&P is erroneous.

Senator PROXMIRE. I ask that the full statements of Professors Long and Reppy be printed in the record along with the documents previously identified.

Senator MCINTYRE. All statements abbreviated in oral testimony will be printed in the record in their entirety.

Thank you very much, gentlemen.

We will come back at 2:30 to hear Mr. Witt.

[Whereupon, at 1:30 p.m., the subcommittees recessed, to reconvene at 2:30 p.m.]

INDEPENDENT RESEARCH AND DEVELOPMENT

MONDAY, SEPTEMBER 29, 1975

U.S. SENATE, SUBCOMMITTEE ON RESEARCH AND DEVELOPMENT OF THE SENATE ARMED SERVICES COMMITTEE, AND THE SUBCOMMITTEE ON PRIORITIES AND ECONOMY IN GOVERNMENT OF THE JOINT ECONOMIC COMMITTEE,
Washington, D.C.

The subcommittees met, pursuant to notice, at 2:30 p.m., in room 1114, Everett M. Dirksen Senate Office Building, Hon. Thomas J. McIntyre (chairman).

Present: Senators McIntyre (presiding) and Proxmire.

Also Present: Hyman Fine, professional staff member, Senate Armed Services Committee; and Richard F. Kaufman, general counsel, Joint Economic Committee.

Senator MCINTYRE. The committee will come to order. We have as our first witness Mr. Hugh E. Witt, Administrator for Federal Procurement Policy, Office of Management and Budget.

There may be questions we will submit to all of you witnesses for the record. Proceed.

STATEMENT OF HON. HUGH E. WITT, ADMINISTRATOR FOR FEDERAL PROCUREMENT POLICY, OFFICE OF MANAGEMENT AND BUDGET, ACCOMPANIED BY FRED H. DIETRICH, ASSISTANT ADMINISTRATOR FOR SYSTEM ACQUISITIONS, OFFICE OF FEDERAL PROCUREMENT POLICY, OMB.

Mr. WITT. Would you like me to go through the entire statement?

Senator MCINTYRE. I would like you to paraphrase it and we will include it in the record in its entirety and that will save us a little time.

Mr. WITT. It is a pleasure to be here. After this morning, I think it is still safe to make that statement, Mr. Chairman.

I am reminded of the story of the man hauled into the courtroom. The judge said, "We have two charges against you, one that you were drinking and a second of arson. You are accused of setting a bed on fire." The man said "I plead guilty to being drunk but the bed was on fire when I got into it. [Laughter.]

The Office of Federal Procurement Policy was established by Public Law 93–400 which was passed unanimously by the Senate and signed by the President in August of last year. The purpose was to create an office to provide overall direction of procurement policies, regulations, procedures, and forms for the executive agencies in order to improve economy, efficiency, and effectiveness in the Federal procurement process.

I feel we should evaluate the merits of I.R. & D. and B. & P. on the basis of three points—benefits to the Government and to the Nation as a whole; benefits to the Government of I.R. & D. enhancement of the competitive procurement process; and benefits to the Government of the current business arrangements with industry.

We have spent many hours digging into some specific examples and I would be glad to discuss that a little further with you later on. I also want to touch on the enhancement of competition.

We do feel that there is an enhancement of competition under the present I.R. & D. program on the bottom of page 4 of my statement—I think it is important to refer to Senator Chiles' Subcommittee on Spending Practices, Efficiency and Open Government.

I report to those gentlemen on the basic thrust of how I am doing my job. Senator Chiles is going to keep a close watch as this new office gets off the ground. Senator Proxmire appeared before that subcommittee and I think his statement is germane to this issue:

> It is unwise to assume that government laboratories in all cases come up with the best designs and that these designs should be foisted upon private contractors for futher development. It would be equally unwise to assume the reverse, that the private laboratories will always come up with the best designs and that the only function of the government laboratories is to test these private designs. I would hope for more balanced implementation of the recommendations so that neither the government laboratories nor the private laboratories are unfairly restricted.

This is a tightrope I plan to walk as I move into making improvements in this area. We moved out on major systems acqusitions in line with the responsibility you and the Senate have assigned to me. We have come up with a draft on major systems acquisitions for the executive branch to follow.

I think that the thrust of the I.R. & D. program fits in with the thrust of the major systems acqusition policy that we have now put into draft form.

I would like to touch briefly, if I could, at the bottom of page 5 of my statement. "I.R. & D. can be viewed as equating an insurance policy against the Government overlooking the viable alternatives to Government-sponsored solutions."

The insurance policy premium runs about 2 percent of the total Government-sponsored R. & D. In regards to the laser program that I referred to earlier on page 2 of my statement, Mr. Dietrich and I did go into that in considerable detail and we tracked it all the way back through the system.

This is just an identification of all the I.R. & D. tasks and contracts dealing with the laser program. (Diagram displayed.) As different parts of the laser program using I.R. & D. were developed the Government was able to identify where contracts could then be let and they went out on firm contracts.

Senator McIntyre. What is the first date that you have with I.R. & D. being involved in laser dynamics?

Mr. Witt. One company we looked at began in 1963. Interestingly enough, one of the first I.R & D. efforts was financed by the Advanced Research Projects Agency in DOD. They were interested to push the basic fundamental knowledge in the laser area. That is an example.

But one reason we went into this, is because there has been so much controversy in the last few years as to whether or not you could actually track some of these efforts back through the system.

I am convinced it is not easy but it can be done. I am not saying that you can take each one of these contracts and every dollar that went into them and trace I.R. & D. into firm contracts which lead into additional I.R. & D. and get a cost benefit trade off.

As Mr. Staats said, it was impossible to be done. I agree. There is no way you can absolutely pin down the benefits in dollars and cents. I am convinced based on quite a few hours of work that these efforts can be tracked all the way back through the system, however.

On that basis, I feel we should go ahead and support some form of an I.R. & D. program. I did want to give you the benefit of these analyses to let you know that I did not just read a lot of reports and automatically assume that everything was rosy or things in this area could not be improved.

I do feel that the I.R. & D. business arrangement is beneficial to the Government and I do feel as stated on page 7 of my statement, that the money that is invested with some 90 contractors has provided the Government access to $1.1 billion worth of projects.

The DOD is paying what I would consider 43 cents on the dollar for access to all the contractors' I.R. & D. efforts which have military relevance. It is important we have technical interchange and understanding between industry's technical people and their counterparts in the Government.

I think the use of advance agreements is good. I think the establishment of dollar ceilings is a workable program. With respect to B. & P. costs, our records show that the Government accepted 92 percent of the actual B. & P. costs incurred by the contractor for inclusion in the contractor's overhead determinations.

I feel that, as stated on the bottom of page 8 of my statement, if I could pick up there, Mr. Chairman, in compliance with my responsibilities as Administrator of OFPP to assure coordinated, and when feasible, uniform procurement policies across the executive branch, I am considering the issuance of an OMB circular establishing an executive branch policy for the management of I.R. & D. and B. & P.

When Public Law 93–400 was written, one of its main thrusts was to the effect that the Administrator of this office, whoever he might be, should come up with coordinated procurement policies across the executive branch. The policy also said, however, when it is feasible they should be uniform.

When it is not feasible, the Administrator is responsible for reporting back to the appropriate Members of Congress and the appropriate committees of Congress why uniformity does not make sense and is not in the best interests of the Government and the taxpayers.

I plan to carry out that responsibility. Now we are going to go ahead as indicated on page 8 of my statement and considering everything that has been done, all field work, the reports, we have already covered 20 different Government and industry entities in getting a good cross section of philosophy and positions on the I.R. & D. subject. We do feel, however, that certain criteria should be established as we move into writing a policy.

I won't go into all those in detail. At the top of page 10 of my statement, we realize that cost allowability principles in I.R. & D. and B. & P. expenditures are in the Nation's best interest. Recognition of I.R. & D. and B. & P. efforts as being necessary costs of doing

business; sufficient uniformity for executive agencies to permit a "single face to industry" through the use of a lead agency for a single advance agreement; and in addition, placing a requirement for advance agreements by establishing a dollar ceiling in accordance with Public Law 91–441 when agency's I.R. & D. and B. & P. costs exceed $2 million.

I think for contractors not required to negotiate advance agreements that the establishment of formulas for allowable I.R. & D. and B. & P. costs will suffice. I believe that there should be flexibility to permit a reasonable interchange between I.R. & D. and B. & P. costs within an advance agreement fixed ceiling to accommodate the impracticability of expecting contractors to either totally separate I.R. & D. from B. & P. or to precisely predict the release of government solicitations to which they will respond.

I think it is important that the Office of Federal Procurement Policy handle the exceptions to this rule and be prepared to defend why exceptions should be allowed if the Members of Congress or member of industry should question whether or not there is a lack of uniformity.

I also want to take a look at the criteria I feel are important. In addition I feel there are some others. As an example, I think the idea of accountability which has been bandied about considerably in the last few hearings is very important.

We would plan to take a look at what is made available now and what could be additionally made available. I am not convinced that all the data now being made available is all that could be made available. We would plan to take an in depth look at that.

I think those are probably the main points that I would touch on here. To summarize, on page 14 of my statement, we believe that we can achieve in the executive branch the desired uniformity. We can present one face to industry, and fulfill the objectives as recommended by the Commission on Government Procurement, the interagency group and the GAO.

I think we can establish appropriate management and control of I.R. & D. and B. & P. technical efforts and costs and provide better public accountability to Congress and I think we can do this without additional legislation.

If these problems should prove insurmountable, we would certainly consider going to the legislative route which is also my responsibility under Public Law 93–400. That concludes my comments, Mr. Chairman. I would be glad to answer any questions.

(The prepared statement follows:)

STATEMENT OF HON. HUGH E. WITT

It is a pleasure to make my first appearance before these Subcommittees of the United States Senate as Administrator for Federal Procurement Policy. Since the position which I occupy is a relatively new one, a brief background statement may be helpful.

The Office of Federal Procurement Policy was established by Public Law 93–400, which was passed unanimously by the Senate, and signed by the President in August of last year. The purpose of the law was to create an office to provide overall direction of procurement policies, regulations, procedures and forms for executive agencies in order to improve economy, efficiency and effectiveness in the Federal procurement process. With these responsibilities in mind, I will address technical and competitive relevance of IR&D, some aspects of the current business arrangement, criteria for an executive branch policy on IR&D, legislative considerations, and finally, my intention to explore ways to provide "public accountability," to use Senator Proxmire's, term, to the Congress and the public.

The Comptroller General's statement and subsequent discussion with your Subcommittees verified our findings that one cannot, either in advance or in retrospect, establish a precise cost-benefit relationship for each dollar spent in IR&D accounts.

Rather than attempting to justify IR&D/B&P via cost-benefit analysis, I feel we must examine the merits of IR&D on the basis of an evaluation of:

Benefits to the Government and to the Nation as a whole, of technological advancements achieved through IR&D which may not have otherwise been achieved;

Benefits to the Government of IR&D enhancement of the competitive procurement process; and

Benefits to the Government of the current business arrangements with industry.

I would like to address each of these areas.

Technological advancement

The Commission on Government Procurement, which included representatives of the Senate and House of Representatives as well as the executive branch and industry, after extensive study and deliberations unanimously recommended that: "Recognition be given in cost allowability principles that independent research and development (IR&D) . . . expenditures are in the Nation's best interests to . . . advance technology . . ." This conclusion was given continuing support by the General Accounting Office in their June 5, 1975, report. The examples provided for the record by NASA and the Tri-Industry Association Report previously discussed during these hearings give more recent evidence of the benefits derived.

Knowing the controversy which centers upon the question of actual contributions made by IR&D, we in the Office of Federal Procurement Policy have independently examined one area in which great strides have been made in the advancement of a technology and in its beneficial applications. The area we chose was the laser. We spent many hours in this effort, and found that without doubt the nucleus of most of the technological advancements was accomplished under IR&D. I am convinced that IR&D provides a high motivation for innovation and improved quality of technological output for the public good.

Enhancement of competition

With respect to benefits to the Government in the competitive procurement process, industry, as I see it, conducts independent R&D to obtain contracts or grants to further their efforts. These in turn place them in a more advantageous position as responsive, knowledgeable contenders to meet Government agencies' objectives and needs. If a contractor expends his I&RD effort in areas not oriented to the Government's future needs, his competitive position may wane both technologically and price-wise and his business base shrink. This motivation to maintain innovative, productive IR&D programs is beneficial to the Government.

Competition is also enhanced by permitting and encouraging industry to independently pursue alternatives to Government specified solutions. By considering such alternatives competition is broadened with a high potential for more cost effective solutions using innovative technology to fulfill Government needs.

In this regard I would like to refer to hearings by Senator Chiles' Subcommittee on Federal Spending Practices, Efficiency, and Open Government, concerning major system acquisitions. Senator Proxmire appeared before that Subcommittee and his statement is germane to this issue. He stated:

". . . It is unwise to assume that government laboratories in all cases come up with the best designs and that these designs should be foisted upon private contractors for further development. It would be equally unwise to assume the reverse, that the private laboratories will always come up with the best designs and that the only function of the government laboratory is to test these private designs. I would hope for a more balanced implementation of the recommendations so that neither the government laboratories nor the private laboratories are unfairly restricted."

I believe that we in the Office of Federal Procurement Policy have captured the desired balance in our draft OMB circular on Major System Acquisitions, and that competition, as well as the application of advanced technology, can be furthered by independent R&D work both within Government laboratories and within industry.

I agree that IR&D can be viewed as equating to an insurance policy against the Government overlooking viable alternatives to a Government-sponsored solution. The insurance policy premium called IR&D runs about 2% of the total Government-sponsored R&D. An example of the benefits of such a policy is evident in the current laser programs. The Government at one time decided to concentrate contractual R&D efforts on chemical reaction lasers, feeling that others had less potential. However, work was independently carried out on gas dynamic lasers which has resulted in superior performance demonstrations and enthusiastic Government sponsorship. Thus, as a result of initial and continuing IR&D efforts in laser technology there is a knowledgeable and highly competitive industrial base being drawn upon for a variety of defense and non-defense applications.

IR&D, by motivating industry to contribute to technological advancements, contributes to the U.S. competitive position in the world marketplace. This logically leads to an increase in exports and a favorable influence on the balance of payments.

IR&D can be considered an essential ingredient in any strategy oriented to retention of our leadership in high technology and its applications.

The Procurement Commission unanimously concluded, and the June 5 GAO report continues to recognize, ". . . That IR&D and Bid and Proposal expenditures are in the Nation's best interests to promote competition (both domestically and internationally) . . ."

Based on the strong endorsement of the Commission on Government Procurement, and my own independent review of the IR&D efforts underway, I have concluded that IR&D is definitely beneficial and in the best interests of the Government.

IR&D BUSINESS ARRANGEMENT IS BENEFICIAL TO GOVERNMENT

Examining the current business practices, we find from data submitted to Congress by the Defense Contract Audit Agency [1] that:

(1) An investment of $457 million by the Department of Defense with some 90 contractors has provided the Government with access to $1.148 billion worth of technology. With recognition that some 92% of all projects within the $1.148 billion are relevant to military needs, the DOD is paying 43¢ on the dollar for access to all the contractors' IR&D efforts which have military relevancy.

In the case of one commercial aircraft company, we found that the Government was paying about 10¢ on the dollar for independently derived military relevant technology.

(2) Through the use of advance agreements, ceilings are established on the dollar amounts the Government will permit contractors to include in their overhead. The same DCAA data shows that the Government allowed 78% of actual costs.

(3) With respect to Bid and Proposal (B&P) costs, the Government allowed 92% of actual B&P costs to be included in contractor's overhead.

The difference between these allowable percentages and the actual expenditure equates to $289 million which cannot be included in either direct or overhead charges and, therefore, is taken out of profit.

Considering these factors related to the current business arrangements, we believe the Government is getting one of its better buys.

OFPP POSITION WOULD CAPITALIZE ON BENEFITS

In compliance with my responsibilities as Administrator of OFPP to assure coordinated, and when feasible, uniform procurement policies across the executive branch, I am considering the issuance of an OMB circular establishing an executive branch policy for the management of IR&D and B&P. If we decide to take this action, we should be back to the Congress, following the procedures under P.L. 93-400, with an OMB circular ready for distribution during the first quarter of next year.

Broad range of considerations

These hearings have brought forth the relative merits of many of the issues involved and will certainly influence any IR&D policy established by OFPP. Our broad range of considerations also includes:

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[1] DCAA Report, March 1975, IR&D and B&P Costs Incurred by Major Defense Contractors in the Years 1973 and 1974.

The studies, reports, COGP recommendations, P.L. 91-441, and current practices introduced by others in these hearings.

The field work of OFPP with individuals from industry, Government agencies, components and associations to obtain firsthand knowledge of current practices, trends, problems being encountered, benefits being derived and suggested alternatives to current practices. We have met with individuals from over 20 such entities.

CRITERIA BEING ESTABLISHED FOR POLICY

As a result of our assimilation of information to date, the management features to be contained in an OMB policy circular should include:

Recognition in cost allowability principles that IR&D and B&P expenditures are in the Nation's best interests to promote competition (both domestically and internationally); to advance technology; and to foster economic growth as recommended by the COGP.

Recognition of IR&D and B&P efforts as necessary costs of doing business.

Sufficient uniformity for executive agencies to permit "a single face to industry" through the use of a lead agency for a single advance agreement, joint technical reviews, and a single overhead rate for each contractor's IR&D and B&P effort.

A requirement for advance agreements establishing a dollar ceiling in accord with Public Law 94-441 when any agency's IR&D and B&P costs exceed $2.0 million during the preceding year. The agency whose R&D and B&P costs exceed $2.0 million with a contractor would automatically assume the responsibility as lead agency for that contractor.

For contractors not required to negotiate advanced agreements, the establishment of formulas for allowable IR&D and B&P costs with flexibility to use advance agreements under particular circumstances.

A potential relevance requirement of a contractor's IR&D and B&P in a general proportion to each agency's mission. That is, the relevance should be generally consistent with each agency's allocated share of the costs of IR&D and B&P.

Flexibility to permit a reasonable interchange between IR&D and B&P costs within an advance agreement fixed ceiling to accommodate the impracticability of expecting contractors to either totally separate IR&D from B&P or to precisely predict the release of Government solicitations to which they will respond.

Emphasis on technical reviews oriented to increase the technical information flow to those within the Government having cognizance of the particular technology being independently pursued. Such reviews appear to be appropriate (1) during the planning cycle in conjunction with establishing advance agreements, (2) when key milestones of progress or breakthroughs occur, and (3) on a post-performance basis in conjunction with overhead cost allowability and allocability determinations.

Compatibility with the OMB policy circular on Major System Acquisitions which is currently being circulated for formal comments. The circular emphasizes the early exploration of alternative system solutions with special emphasis on increasing technological innovation and conceptual design competition. We believe the approach to Major System Acquisitions contained in the policy circular will drive the IR&D expenditures toward the areas of research, applied research, advanced technology and conceptual studies; and away from full-scale hardware developments and prototypes that require large IR&D and B&P expenditures.

Applicability of the circular to contracts for which the submission and certification of cost or pricing data are required in accordance with section 2306(f) of Title 10, United States Code.

A provision to permit OFPP to treat exceptions to the Government-wide uniformity as recommended in dissenting position #1 of the COGP recommendations.

In addition to these criteria which must be considered, there are other which require further examination. These include:

Consideration of means to provide "public accountability" to Congress with both planning and performance information that does not violate the proprietary nature of contractors' competitive information.

Requiring a certification by contractors, with qualifying contracts in excess of a fixed dollar threshold, that IR&D and B&P efforts do not include costs required in the performance of awarded Government contracts, grants or commercial contracts. Such certifications could be included in agreements of advance overhead rates or IR&D and B&P ceilings rather than in each negotiated contract.

Not allowing in overhead accounts allocable to Government contracts the costs for full-scale developments or pre-production prototypes. We found that large commercial aircraft developmental programs, such as the 747 and the DC-10

utilize this approach. They are established as separate projects without any allocation to IR&D and B&P accounts or allocations to overhead on Government contracts. This restriction would also be consistent with the thrust of the Major System Acquisitions circular and would drive the use of IR&D and B&P efforts toward the more desirable high technology, mission analysis, and conceptual design activities.

The burdening of IR&D and B&P with overhead and G&A. The current practice has raised the apparent cost of IR&D and B&P and is, I am led to believe, generally inconsistent with general commercial industry practices.

As a final note regarding the criteria being considered by OFPP, we will caution that nothing in the policy shall preclude a direct contract or grant for specific R&D projects proposed by a contractor.

We in OFPP believe we can achieve in the executive branch the desired uniformity, present one face to industry, fulfill the objectives of IR&D and B&P efforts as recommended by the COGP, the Interagency Group and the GAO, establish appropriate management and control of IR&D and B&P technical efforts and costs, and provide "public accountability" to Congress without additional legislation. If these difficult problems prove insurmountable, we will consider the legislative route, in accord with the provisions of P.L. 93-400.

Mr. Chairman, this concludes the prepared statement. I will be glad to discuss any aspect of my statement or answer any questions your Subcommittees may have.

Senator McINTYRE. You state that you have asked—you have examined the laser area to determine the actual contributions made by I.R. & D., and after many hours were spent in your study you found the nucleus of the technological advancement was accomplished under I.R. & D.

Why was the area of lasers selected for review?

Mr. WITT. We talked to a number of companies. We found about four different companies had gotten into the laser business. We were interested in the competitive aspects as well as how much I.R. & D. had been lent to the total laser effort.

If we had left the start of the laser program and in fact some of the continuing work in the development area in the laser program strictly to the Government without letting industry use their own inventiveness and innovation within their own I.R. & D. efforts we would not be where we are today.

We do know, as some of the work moved into the laser areas, the work moved from one type of laser effort into another one. The Government, due to this independent work of industry, switched their emphasis from one type of laser effort to another.

I don't believe that would have happened without I.R. & D.

Senator McINTYRE. Will you provide for the record a summary of your findings and provide the details for committee use, Mr. Witt?

Mr. WITT. Yes.

[The information follows:]

SUMMARY OF FINDINGS CONCERNING CONTRIBUTIONS OF IR&D TO LASERS SCOPE AND CHOICE OF LASERS FOR STUDY BY THE OFFICE OF FEDERAL PROCUREMENT POLICY

In the process of reviewing the current Independent Research and Development/Bid and Proposal (IR&D/B&P) policies and practices, the Office of Federal Procurement Policy (OFPP) had discussions with 16 contractors and ten Government organizations. As found by others examining IR&D, there is difficulty in selecting a specific IR&D effort and then attempting to determine the benefits derived. We approached the examination of benefits by choosing an area of technology and then looking back in the records to find contributions made by IR&D efforts. The major area we investigated was the contribution of IR&D to laser technology and laser applications. The laser was chosen since it is a relatively new technology which has been evolving over the past 15 years, is continuing to evolve and has diversified proven and anticipated applications. We believe the laser is a typical example in a broad spectrum of beneficial technologies which are continuing to draw upon IR&D in their evolution.

GENERAL FINDINGS

We found that IR&D in the case of lasers has led to contracts from the Department of Defense for the experimentation, component developments and a general advancement of the technologies directly applicable to laser weapons.

Beneficial offshoots with direct and indirect military applications, such as pointing and tracking systems and rangefinding, commercial applications, such as metal cutting, welding, distance measuring and surveying, have also been derived from military relevant IR&D. The combination of IR&D and relatively small high technology contracts for laser technology and laser military applications have provided a current industrial base with diversified approaches from which the DOD may draw new and innovative competitive conceptual designs for military systems and subsystems.

CURRENT MILITARY APPLICATIONS

One area in which there has been direct military application of work initiated under IR&D is in the improved rangefinders incorporated in the M–60 series of U.S. tanks and being incorporated in the XM–1 Main Battle Tanks of General Motors and Chrysler. Another area of direct military application has been the well-publicized use of lasers as target designators in conjunction with "smart" bombs and missiles. The increase in conventional munitions effectiveness due to to the introduction of lasers has been demonstrated repeatedly in combat.

HIGH ENERGY LASER PROGRESS

An evolving military application of lasers is in the high energy laser (HEL) weapons area. In the early 1960's, there was a general recognition that if lasers were to become a reality for destroying military targets, a high power beam would have to be produced by a system which was small enough and light enough to be carried in an aircraft, a ship or a tank. Thus, the HEL system characteristics for military weapons applications require high power, low volume or compact, and light weight. The technologies needed for such a system are high power density lasers and an accurate pointing and tracking mechanism.

In the late 1960's, two types of lasers were available, ruby lasers and static gas lasers. Neither one came close to providing the needed high power density beam. The critical problem that prevented these early lasers from operating at high power density was the buildup of heat. In 1963, one contractor with expertise in gas dynamics used IR & D funds to study the problem of rapid waste heat removal to solve that critical problem. Calculations showed that if a flowing gas could be used, the beam power density could potentially be increased by a factor of 100,000 (10^5). Although this potential improvement in power density was exciting, experimental proof was needed to convince the Defense Department that such an experimental development path could be worthwhile. Therefore, the contractor, using IR & D funds, set up a small pulsed nitrogen laser in the laboratory and demonstrated that even in a crude experiment the measured beam power could be increased 200 times by using a flowing gas to remove waste heat, thus providing evidence that it is feasible to achieve high power density.

This critical experiment was convincing and it was recognized that there were several development paths which could be taken utilizing this concept. The three main types of lasers to which these development paths lead are gas dynamic, scalable electric discharge and chemical reaction lasers. This same contractor and others pursued these several paths to develop high power density laser energy sources.

Working laboratory models of the first two were developed under IR & D funding. The third type was developed through a combination of IR & D efforts and a Department of Defense, Advanced Research Projects Agency (ARPA) contract. Now, after several years, a larger number of contractors have become involved in the development of these high power lasers. Some of the industrial organizations involved in the experimental development of each type are: Gas Dynamic Lasers-AVCO, Rocketdyne and United Technologies; Scalable Electric Discharge Lasers-AVCO, Boeing, Garrett, Hughes, Northrop, Rocketdyne and Westinghouse; and Chemical Lasers-AVCO, Hughes, Rocketdyne, TRW and United Technologies. From these types, scalable electric discharge lasers were chosen to be examined in greater detail.

The Advancement of Scalable Electric Laser Technology

Between 1964 and 1969, the flow cooling principle was experimentally established and an electric energy system called E-beam sustained discharge was invented and demonstrated using IR & D funds. The scalable electric laser uses an electron beam to sustain the electric discharge and thus "pump" the laser. In a low power laser, a discharge is used which spreads over the laser volume. If this discharge were increased in power enough to be useful for a high power density laser, an arc would form and the gas would not be uniformly affected as desired. Therefore, an electron beam is used to eliminate the arc.

The history of the scalable electric development began with the establishment of the energizing mechanism—the E-beam sustained discharges. Two different development paths were then followed. In 1970 and 1971, using IR&D funds, one contractor demonstrated a 10 kw continuous wave (CW) CO_2 laser and a pulsed CO_2 laser, both using the E-beam technology. From 1971 to 1975, a number of contractors followed both of these paths to develop High Average Power CW Lasers and High Average Power-High Energy Pulsed Lasers.

What are the applications of this new technology? The High Average Power Laser technology has been used for fabrication of metals and material processing—for welding, cutting and case hardening—as well as for military weapons. And, similarly, the High Pulsed Power-High Energy Laser is being used by ERDA in the energy field to study fusion by lasers as well as for military weapons applications.

Benefits of Wide Industrial Involvement in Laser IR&D

Each contractor involved used some IR&D funds to develop laser technology. It is often stated that IR&D funding is not efficient because contractors are duplicating the efforts of others working in the same area. This appeared to be true on the surface, but further investigation revealed in reality it was not so. The following typical efforts by a number of contractors, including AVCO, Boeing, Garrett, Hughes, Northrop, Mathematic Science North West, United Technologies, Westinghouse, and RCA, show that each contractor concentrated on a different phase of development:

Contractor No. 1: Basic Inventions; Reduction to Practice CW CO_2 10kw Laser Pulsed CO_2 Laser.
Contractor No. 2: High Power CW CO_2 Different Electric Methods for Pumping.
Contractor No. 3: Pulsed CO Laser, Very Efficient CO Laser.
Contractor No. 4: Fast Flow CO Laser.
Contractor No. 5: Fast Flow Pulsed CO Laser.
Contractor No. 6 & 7: Electrical Components.
Contractor No. 8 & 9: Flow System Components.

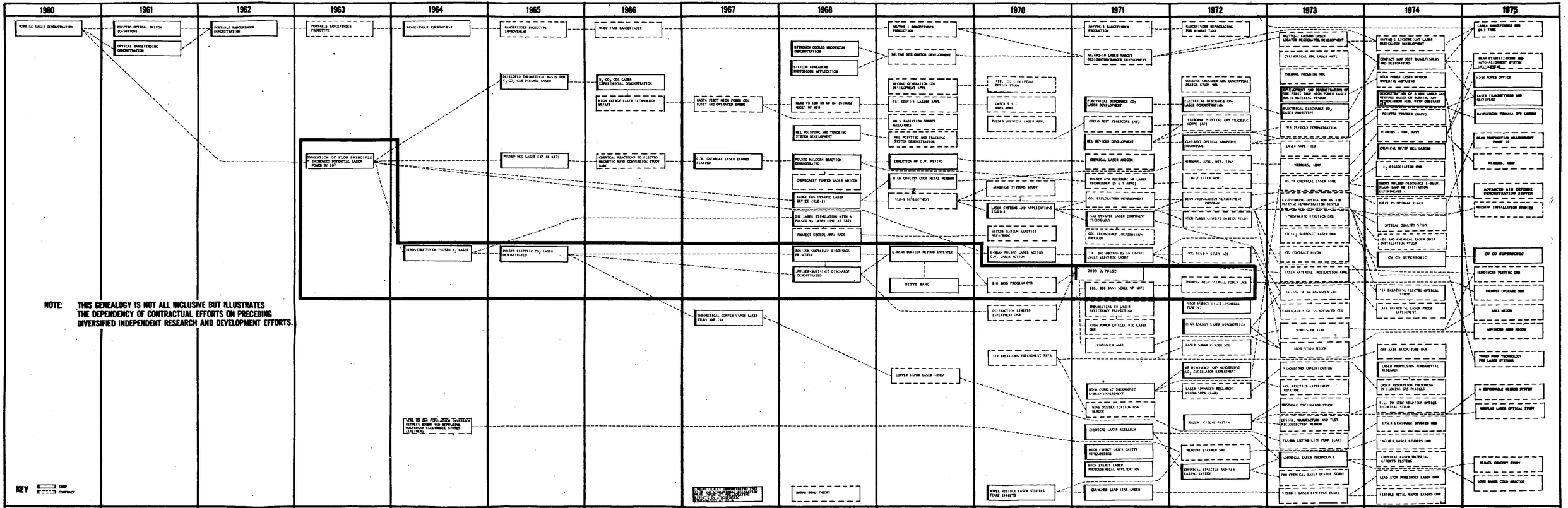
Contractor No. 1 made basic inventions which they reduced to practice as CW CO_2 10kw lasers and pulsed CO_2 lasers. Contractor No. 2 also developed a high power continuous wave CO_2 laser but used an entirely different electric method. Contractor No. 3 developed a very efficient pulsed CO laser; Contractor No. 4 developed a fast flow continuous wave laser. Contractor No. 5 developed a fast flow pulsed CO laser. Contractors No. 6 and No. 7 concentrated on development of the required electrical components and Contractors No. 8 and No. 9 worked on flow system components for all types of lasers. These specific efforts illustrate that each contractor contributed to the development of lasers by using the innovative ideas and concepts devised independently in the contractors' own laboratories using IR&D efforts.

The development for any one of these lasers is illustrated by a typical sequence highlighted in the attached flow diagram of the genealogy of lasers. It shows the first laser system called "Bitty Bang" developed on IR&D funds in 1969 by one contractor, followed by a scaled-up model in 1971 funded by the Advanced Research Projects Agency (ARPA) in a 1970 contract and called "Big Bang" and, finally, a larger laboratory model, currently being demonstrated, called "Big Big Bang" which was initially funded in 1971 by ARPA. It is the sum of the knowledge generated from work by all contractors that provides the options to DOD for development of new weapon systems utilizing lasers and provides a knowledgeable industrial base to ensure future competition in weapon systems procurements.

SUMMARY

This laser example demonstrates how Independent Research and Development (IR&D) effort provides an essential step in the innovative processes for new technology and new engineering concepts which are applicable to weapon systems. The example also shows how IR&D enhances the competitive procurement process.

GENEALOGY OF LASER AND LASER RELATED IR&D



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Further, the laser example shows that the basic laser technology which was developed has a much wider area of application than just to weapon systems alone. In this case, the technology has already provided new methods of welding and case hardening which are being used in the fabrication of reciprocating engines and rail car shells for high speed transportation, and that one of the high average power lasers is being used by ERDA to study fusion which could be our most important source of energy for the future.

[See chart: Geneaology of Laser and Laser Related IR&D]

Senator McINTYRE. In commenting on the enhancement of competition through I.R. & D., you say that overinvestment in I.R. & D. will hurt a contractor's competition pricewise. The competition for development of major weapon systems is generally based on technical qualifications. How would overinvestment in I.R. & D. be detrimental to a contractor's chances of winning the competition?

Mr. WITT. Overinvestment in I.R. & D./B. & P. by a contractor could be detrimental pricewise to his competitive position by such expenditures increasing the overhead allocated to all of his existing contracts and those for which he submits proposals.

For existing commercial or Government fixed-price contracts, an increase in contractors' overhead, due to high I.R. & D./B. & P. costs, would reduce his profits. For existing incentive contracts, the contractors' profits would be reduced by the share ratio prescribed in the incentive provisions. For existing cost-plus fixed-fee contracts, the allocated costs of the increased I.R. & D./B. & P. would be reimbursed without a change in the profit—fee—dollars.

On bids for commercial or Government-advertised contracts, a contractor that overinvested in I.R. & D./B. & P. could not be price competitive with a more prudent contractor.

In a technical competition, although not a prmairy consideration, cost is considered. For example, a contractor may lose by proposing an unrealistically high cost. When proposals are evaluated to be approximately technically equal, the contractor with the higher cost proposal usually loses. Finally, the contractor with the higher cost may lose if the proposed technical results are not sufficiently superior to withstand a cost-benefit analysis.

Senator McINTYRE. You say that technical review will be oriented to increase the technical information flow. How does this tie in to the I.R. & D. data bank operated by DOD?

Mr. WITT. It would seem to me that there is a direct tie-in. However, the data bank is just getting underway. I am not convinced after talking to people who have used it that the data bank has reached its full potential.

Senator McINTYRE. Will the data bank be limited to DOD or available to all agencies?

Mr. WITT. All agencies.

Senator McINTYRE. How would the number of technical reviews you consider compare with the present number of reviews?

Mr. WITT. I would not have any way of evaluating it. It would be more technical reviews but I could not give you an estimate with any sense of accuracy, sir.

Senator McINTYRE. If the number is greater, will it be worth the added effort and cost?

Mr. WITT. I think it will be worth the effort. I would propose that we try that course and if after giving it a good try we and the people working in this area find it is not worth the effort we would back off from it.

But I do feel that this effort has not been understood by everybody. I think that has been shown by the questioning and the data presented to you gentlemen here. I think the evaluation that I propose would give it a better credibility.

I think that is needed.

Senator McINTYRE. You say you are planning to provide public accountability to Congress on information that does not violate the proprietary nature of contractual competition information.

What are the alternatives you are considering?

Mr. WITT. What we are planning to do is to look at the data collected, the way it is presented to the Congress which is in pretty gross form now, sit down and talk with the companies to see whether or not there is some way that we can take their total amount of effort and present it in a way that can be made available to you gentlemen and the public.

Senator Proxmire said that all he is getting is gross data figures, by department. He certainly would like to see it by company. I don't think we have all fully explored ways we can make that data available to you gentlemen.

That is what I am going to look at. I can't guarantee what I will come up with.

Senator McINTYRE. How do you now intend to determine whether such information is proprietary?

Mr. WITT. That is what I will get into when I deal with the company people.

Senator McINTYRE. You are considering requiring contractors to certify that I.R. & D. and B. & P. efforts do not include costs required in performance of Government or commercial contracts. This apparently is in line with DOD plans on the *Pratt Whitney* case reported by GAO.

Mr. WITT. That is correct, sir. I would point out that the GAO said they only found one case where this happened.

Senator McINTYRE. If a contractor certified erroneously, how would the agency learn the true situation?

Mr. WITT. During audit this would come out. A good stiff audit of the books would bring this out.

There is always going to be a big discussion and there can always be a heated discussion over the amount involved. I understand that under the P. & W. case there is not full accord between the General Accounting Office and the Navy as to how bad the problem was.

Senator McINTYRE. I am informed that the Defense auditors now verify that the I.R. & D. and B. & P. efforts do not include costs required in performance of Government contracts. Will their scope of audit be changed?

Mr. WITT. I cannot answer that, sir. I don't know. Due to the publicity this has received the area will get closer scrutiny than it has had in the past.

Senator McINTYRE. Why not require contractors to agree, as a condition of the advance agreement, that commercial records will be made available when needed by the agency or GAO to assure that I.R. & D. and B. & P. efforts are appropriately recorded?

Mr. WITT. Over the years, Mr. Chairman, when you look at this program and the way it has been conducted, the fact that the GAO was only able to find one case and one case is the only instance that

I have known in my many years with the Defense Department, I don't think the program is that bad. I don't think the Government need have access to the commercial records.

This is a cost trade off, if you will. I don't believe that the industry is deliberately following that path.

Senator McINTYRE. Mr. Fine?

Mr. FINE. This would mean that under certain circumstances the Government would be able to make a determination through audit as to the va'idity of the contractor s allegations?

Mr. WITT. That is correct.

Mr. FINE. You don't feel that in that situation that the responsibilities of the Government are not adequately provided for?

Mr. WITT. I think really on balance and as I say after 25 years with the Defense Department and looking at literally hundreds of General Accounting Office reports and looking at the areas where they have been able to find an exceptionally bad case and compared with the cases where they have found many, many errors being made in a row, I think this is a very limited area to look at. I don't believe the payoff is worth it, considering the millions and millions of dollars involved here.

This is a very subjective viewpoint. I am sure people can disagree with me on that.

Senator McINTYRE. ERDA handles B. & P. differently than I.R. & D., unlike DOD and NASA. Do you plan to have a uniform policy? If so which approach?

Mr. WITT. I'm looking over ERDA's testimony and listening to the questions that you gentlemen placed on them, I think ERDA's position is that they are going to be a little schizophrenic in some ways; namely, in those areas such as nuclear oriented work that they inherited from the old line Atomic Energy Commission procedures and policies. I think that they plan to continue pretty much along that line.

On the other hand with the new responsibilities that they have picked up, they feel that there are a number of cases where the DOD–NASA approach is more appropriate.

They are after all a mixtureiof the old and the new.

Senator McINTYRE. Mr. Staats suggested that if financial support by the Government continues, the Congress could clarify the policy by establishing the following guidelines:

(1) The purpose for which the Government supports I.R. & D.;

(2) The appropriate amount of this financial support;

(3) The degree of control to be exercised by the Government over contractor's supported programs.

DOD does not concur with the second and third proposed guidelines because it feels these are executive management considerations for which flexibility of action must be retained to adapt to the many differences among contractors.

What are your views of the DOD disagreement?

Mr. WITT. I don't think legislation is needed in any of the three instances, sir. I would rather leave it up to the executive branch to do a better job. This new office that I now head was only created the first of this year.

I think you ought to give us a chance to come up with an executive branch position which will attach these problems. That is the reason

for Public Law 93–400. That is the reason that the Senate and the House both passed that bill and asked the President to set up this job.

I can assure you that we will devote every effort that we can to coming up with better accountability, a better program which is more creditable and I think that we can follow generally the procedures which are now in existence.

With some improvement, we can have a good, viable program.

Senator McINTYRE. You state that you agree with those unanimous views of the Commission on Government Procedure which:

1. Recognize that I.R. & D. and B. & P. expenditures are in the Nation's best interests to promote competition, advance technology and foster economic growth;

2. Establish a policy recognizing I.R. & D. and B. & P. efforts as necessary costs of doing business; and

3. Provide that I.R. & D. and B. & P. receive uniform Government-wide treatment with exceptions treated then by the Office of Federal Procurement Policy.

Should any or all of these be made part of existing law?

Mr. WITT. I don't think so. As I said earlier, I think we should be given a chance to move into this area and move ahead with improvements and report back to the Congress on what we are doing as required.

Senator McINTYRE. Considering that DOD, NASA, and ERDA account for practically all of the Government I.R. & D. and B. & P. expenditures why should a Government-wide policy be established? Why not continue with legislation that is unique to each agency?

Mr. WITT. I think individual legislation for each agency is confusing to the outside world and it is not too easy to keep track of this even within the executive branch itself.

I think it is appropriate that we determine where uniformity does make sense and that we advise you on the Hill where uniformity does not make sense in the areas, and the reasons for it and be prepared to defend our position.

Senator McINTYRE. When Mr. Staats, the Comptroller General, appeared before us he stated in very specific terms that he favors treatment of I.R. & D. and B. & P. as line item in the normal budgetary and appropriation process.

Do you agree with him?

Mr. WITT. I do not.

Senator McINTYRE. Why not?

Mr. WITT. I think the line item approach gives me a number of problems. The budgeting and funding problem is one of those that is outstanding. I think the idea of our trying along with industry to guess 2 or 3 years in advance what areas we are going to put I.R. & D. in and how much money should be appropriate and how to tie it to the level of spending 2 or 3 years in advance are areas I think that are very difficult administratively to handle.

I think, as GAO admitted in their earlier report, administratively, the line item approach is very difficult. I certainly agree with that. Also, the Commission on Government Procurement which consisted of a very distinguished group with a large staff and worked on the problem for a copule of years, concluded that line item funding was almost impossible.

That is the conclusion that I drew from their work. I think that I tend to agree with them, sir.

Senator McINTYRE. Can you discuss how the agencies would go about adopting the line item approach for submission of their next budgets if this was required?

Mr. WITT. After listening to all the problems of doing it, I can't imagine how they would do it. It would be a very rough cut. As soon as a line item came to you people over here and to the budget committees, I think they would have a very difficult time in treating it like any other line item. They would have to certainly go by the seat of their trousers to determine whether or not it was valid. They would not have sufficient detailed information and basic criteria that normally back up a budget line item. There would be requests for additional detailed back up. I believe the situation would be almost impossible.

Senator McINTYRE. Pages 56 and 57 of the GAO report of June 5, 1975, present unfavorable comments on the use of CWAS (Contractor's Weighted Average Share of Risk) system to minimize administration of I.R. & D. Will you comment on the use of CWAS? Will you review these and add your comments for the record?

Mr. WITT. Contractor's Weighted Average Share (CWAS) is a management concept designed to reduce, but not eliminate, controls over contractor costs.

Contractor overhead costs are normally audited to determine if they are: (1) allowable; (2) allocable; and (3) reasonable.

CWAS-qualification is intended only to relieve audit determination of reasonableness, on the premise that a contractor who has significant commercial and/or fixed price business has adequate incentive to control his costs. However, costs are still audited to determine allowability and allocability.

The concept of CWAS was initiated in 1964 and published in the Armed Services Procurement Regulation (ASPR) in 1965.

On May 5, 1975, the Department of Defense directed several changes to the ASPR to eliminate certain reviews with respect to CWAS-qualified contractors as follows:

Suspended the requirement for conducting employee compensation system reviews and insurance/pension reviews at contractor locations that are CWAS-qualified with a rating of 75 percent or more.

Eliminated subsequent reviews of contractor's purchasing systems at locations which have CWAS ratings of 75 percent or more.

Suspended estimating system reviews at contractor locations that are CWAS-rated 75 percent of more.

Provided that the contracting officer may waive the requirement for preaward field pricing support for all proposals under $1 million om contractors that are CWAS-qualified 75 percent of more.

Changed the requirement for an annual submission of the CWAS application. Contractor locations that were CWAS-rated with a rating of 65 percent or more in 1973 will be considered CWAS-qualified with the same rating for 1974.

Established a CWAS evaluation group to monitor performance during this next year and assess the results.

CWAS applies only to the DOD. We believe that it has some merit in minimizing the administration of I.R. & D. However, we plan to review the advantages and disadvantages of this technique and

determine if it could apply to other agencies. This subject will be one of the items that we will review.

Senator McINTYRE. Dr. Oshman, speaking for WEMA, contended that the current arrangement whereby DOD makes determinations on advance agreements is unfair. He feels this approach violates a principle of equitable negotiations and that the parties should have equal economic positions.

What is your position on this?

Mr. WITT. Does this deal with the contractors who do less than $2 million? Maybe I am missing a point.

Mr. FINE. This has to do with the advance agreements. Let me read the question again. He contended that the current arrangement whereby DOD makes determinations on advance agreements is unfair on the basis of equity.

The question was, what is your view on this?

Mr. WITT. I don't have any trouble with the advance agreement arrangement. I certainly can't off the top of my head come up with anything better that would serve the purpose. This gives the technical people a chance to sit down and go over what the programs are to be accomplished by the company and to determine what makes sense and what does not, based on our best technical knowledge.

I am not a technician, and that is one area where much of the detail has to be left up to the technicians.

Senator McINTYRE. You state that one cannot establish a precise cost-benefit relationship for each dollar spent in I.R. & D. accounts. And can you establish even a substantial cost-benefit relationship?

Mr. WITT. When I said precise, I was thinking of our efforts to take one specific area and dig into it. We were not able to take a precise case and come up with the dollar tradeoffs. If I can't do it after spending quite a few hours on one specific area, I am sure I can't do it on the overall total, Mr. Chairman.

Senator McINTYRE. What does your decision concerning if and when you will issue an OMB circular establishing an executive branch policy depend upon? Do you recommend that we take no action on section 203, Public Law 91–441, pending your decision?

Mr. WITT. My decision depends upon further discussions with the industry people and with the executive branch people. I plan to explore these areas that have been discussed in these hearings and determine to what extent I can come up with executive branch agreements and then determine to what extent I feel that we are going to have problems within the agencies on the question of uniformity. Then, I will make a decision as to whether or not it makes sense to go for a circular.

A lot of people said it would be impossible for this office to come up with a circular on major system acquisition. It has taken a few months, but we have come up with one.

Based on that, I think we can come up with a solid policy statement on I.R. & D.

Senator McINTYRE. Proceed.

Mr. WITT. Yes; I recommend that we take no action.

Senator McINTYRE. When do you anticipate making that decision?

Mr. WITT. Within the next 2 months.

Senator McINTYRE. Does section 10, Public Law 93–400, which established the Office of Federal Procurement Policy, mean that a

policy or regulation issued by the office concerning I.R. & D. and B. & P. would supersede section 203, Public Law 91–441?

Mr. WITT. I am not a lawyer, Mr. Chairman, but the way these words read, the authority of any executive agency under any other law to prescribe policies, regulations, procedures, and forms for procurement is subject to the authority referred in section 6 of this act.

I would translate that in this way. I would interpret that if I came up with a policy statement for the executive branch, under the ground rules of 93–400 I would probably have hearings on it to make sure everybody took a crack at the policy before we came up with it.

I would then send it to you people on the Hill, and then I would go ahead with the policy. I would say, if an executive agency did not follow that, they would be in violation of Public Law 93–400.

[Subsequent to the hearing, the following information was received:]

EXECUTIVE OFFICE OF THE PRESIDENT,
OFFICE OF MANAGEMENT AND BUDGET,
Washington, D.C., November 19, 1975.

FORCE OF ISSUANCES UNDER PUBLIC LAW 93–400, "OFFICE OF FEDERAL PROCUREMENT POLICY ACT"

MEMORANDUM FOR RECORD

In order to respond to an inquiry from Mr. Rubin, consultant to staff of Senate Armed Services Committee, regarding the legal force of issuances under the OFPP Act, met with Mr. Goodwin. The following examples appear to provide the necessary basic guidance for the response to Mr. Rubin and others that may raise similar questions:

OFPP issuances have precedence over directives and regulations within the executive branch which are issued at an agency's discretion; i.e., the agency's regulation is *not* issued to implement a requirement of law. For example, DODD 5000.1, "Acquisition of Major Defense Systems", is a discretionary issuance on the part of the DOD and is not implementing a requirement of law; therefore, procurement policies prescribed by our MSA circular would have precedence over the DOD directive. In contrast, ASPR 15–205.35, "IR&D Costs", implements Section 203 of the DOD Military Procurement Authorization Act of 1971 (P.L. 91–441). Any OFPP IR&D issuance must either be consistent with the requirements of that Act or recognize DOD's unique requirements. An OFPP issuance that might be inconsistent with applicable laws should contain an applicability qualifying statement such as: ". . . except as otherwise prescribed by statutes."

OFPP issuances would have precedence over the executive branch issuances which are based on statutes authorizing but not mandating requirements or other expressions of desire by congressional committees. An example reflecting this situation is the annual IR&D forecast required by Senate Report No. 94–446. This is a Senate Appropriations Committee directive that is not implemented by statute. Therefore, an OFPP issuance on IR&D would not be required to recognize or provide for such an annual forecast. This is not to suggest that it should inhibit such a forecast.

OFPP issuances would *not* have precedence over Cost Accounting Standards Board standards since the CASB is not an executive agency subject to OFPP and such standards when issued become law.

Section 9 of P.L. 93–400 permits OFPP to prescribe policies, regulations, procedures, and forms for procurement which have precedence over other laws providing for executive agencies to prescribe similar policies, etc. For example, although the ASPR is mandated by 10 U.S.C. 2202, P.L. 93–400 has precedence over that law. This permits OFPP issuances to have precedence over ASPR.

FRED H. DIETRICH,
Assistant Administrator for Systems Acquisition.

Senator MCINTYRE. You stress the importance of I.R. & D. for a variety of obvious reasons, but just as most other witnesses have.

But what reason do you have to believe that the importance is not fully appreciated and the issue essentially is then who pays the bill?

Mr. WITT. I feel on balance, Mr. Chairman, that the amount of money that goes into this program and for the benefits that we obtain from it, and I admit certainly that some of those benefits are intangible to the point that you can't attach dollars and cents to them, I still feel the tradeoff is worth it.

I still feel that for the money, trying to keep the amount of money in relationship to the total amount of money in the procurement programs and in the total R. & D. effort of the Government and industry, keeping all that in perspective, I think it is a very vital program or I would not be here testifying along those lines, sir.

Senator MCINTYRE. Can you explain why, in the case of one commercial aircraft company, you found that the Government was paying only about 10 cents on the dollar for military I.R. & D.?

Mr. WITT. Mr. Dietrich went into that in considerable detail.

Mr. DIETRICH. In the particular aircraft company we looked at, the amount of military or Government work was 10 percent of the total. It was 90 percent commercial, 10 percent Government.

In looking at the military relevancy of all of the I.R. & D. work across the company, 90 percent of it was judged to be relevant to the military. The Government was getting for the 10-percent investment in I.R. & D. visibility into all of the contractors' I.R. & D. work, 90 percent of which had military relevancy.

They were getting that for no additional cost. The things that were not relevant were, for example, the examination of large cargo aircraft for hauling some of our natural resources like coal, oil, and so on. For the 10 percent, we received a considerable return on our investment.

Senator MCINTYRE. You state that the difference between the allowable percentages and the actual expenditures equates to $289 million which cannot be included in either direct or overhead charges and, therefore, is taken out of profit.

Can the contractors recover any of this amount in prices charged to commercial customers?

Mr. WITT. I would say yes.

Senator MCINTYRE. What is your view of the possibility of allowing industry the option either of capitalizing or writing off the nonrecoverable costs of I.R. & D. and B. & P.?

Mr. WITT. Capitalize or write it off?

Senator MCINTYRE. What is your view of the possibility of allowing industry the option either of capitalizing or writing off the nonrecoverable costs of I.R. & D. and B. & P.?

Mr. WITT. I think we would be better off with the policy the way it stands now.

Senator MCINTYRE. What is your position on a legislative ceiling on I.R. & D./B. & P.?

Mr. WITT. That would be difficult first to establish and second to administer. That means that someone can sit here in Washington and take a rough cut at the totals without any basic evidence on which to make a good value judgment. I think that our people who are dealing with the contractors in these particular areas are in a much better position to determine what makes sense for the Government and what does not.

I think they are in a better position to say to their bosses, "Yes; we ought to approve this, and no; we ought to disapprove that."

I think that is the best way to go, sir.

Senator McIntyre. Mr. Kaufman representing Senator Proxmire may direct a few questions to the witness.

Mr. Kaufman. Mr. Witt, under the present system if someone in the Department of Defense decided to significantly increase the level of I.R. & D. reimbursements or to even double or triple present amounts over the next several years, would it be possible for this to be done without the prior express approval of Congress?

Mr. Witt. Without the prior express approval of Congress? First, I would say I doubt seriously if the agencies themselves would go for that, but technically I would say yes, that they could do that.

Mr. Kaufman. By the same token under the present system if someone in the Department of Defense wanted to eliminate the program entirely, that could also be done without the prior approval of Congress, could it not?

Mr. Witt. It is not a very practical assumption, Mr. Kaufman, frankly, but it could be done. Since it is an administrative action on the part of the executive branch, if the executive branch decided that we will not have any more I.R. & D., technically they could issue that statement.

On a practical basis, it would never fly.

Mr. Kaufman. It does ~~eliminate~~, however, the total absence of congressional control over this program, does it not?

Mr. Witt. I would speak to that this way, based on 25 years' experience in this town. Things don't really happen that way. The whole system is self-correcting in many ways.

I know that when the DOD issues policies and someone does not pay attention to it down the line, frequently somebody starts yelling.

In almost every case somebody picks it up and starts yelling about it. It is a part of checks and balances built into the system. The checks and balances through the system are such that I don't think an arbitrary decision would knock the whole program out; it would never fly.

Mr. Kaufman. On page 6 of your written statement you refer to the motivation to industry to contribute to the technological advancement and the contribution to the U.S. compatitive position in the world marketplace and the favorable influence on the balance of payments which all result from the I.R & D. program.

Mr. Witt. I say it contributes to the U.S. competitive position. I certainly don't know whether it is 50 percent, 10 percent or what the percentage is. I don't think there is any question when you look at the exports that are going out of this country that technology has really made this country great in many ways.

We have not had the natural resources. We have to bring them in. We have used our innovative technological advances to put us ahead. I think that I.R. & D. does make a difference, a definite contribution to that effort.

Mr. Kaufman. Do you see it as an intended or unintended result of I.R. & D?

Mr. Witt. Well, when the engineers are sitting there looking at some new concept, I can't say that they are saying 10 years from now I know darn well we will be shipping some of these overseas and getting money on it.

I don't see how they could be that omniscient. At the same time it all contributes.

Mr. KAUFMAN. Do you believe it is the function of the I.R. & D. program to contribute to the U.S. balance of payments and the export trade?

Mr. WITT. I don't think it is specifically written into the I.R. & D. program or I don't think it is a part of their job sheet, if you will. It is not part of their charter to automatically improve the export of items in this country.

At the same time when you look at many of the socioeconomic efforts laid on the Department of Defense, set asides, equal opportunity and everything else, many years ago a lot of those efforts would never have been considered as a part of the Department of Defense's job, but they have picked up a great number of socioeconomic jobs laid on them and have done a good job over the years.

I think the fact that we are able to ship a high number of products overseas which have come from the R. & D. arena is a tribute to the Department of Defense's efforts.

Mr. KAUFMAN. You believe some of those products come from the I.R. & D. arena?

Mr. WITT. I don't think there is any question about it.

Senator MCINTYRE. Mr. Fine has several questions on ceilings.

Mr. FINE. For the 5-year period 1970 through 1974, compared with the amounts authorized and appropriated for the total DOD R.D.T. & E. appropriations, the amounts of defense I.R. & D. and B. & P. payments reflect an increase in ratio from 8.87 percent in 1970 to 10 percent in 1973 and 1974.

Would you agree that if a ceiling on Government payments for I.R. & D. and B. & P. is considered for adoption it would be reasonable to relate it to annual appropriations for R.D.T. & E.?

Mr. WITT. As I indicated previously, I do not believe in arbitrary establishment of ceilings, but if you are asking me how I would go about setting a ceiling, I suppose tying it to the total R.D.T. & E. effort would be as good as anything else.

Mr. FINE. Wouldn't such an approach provide a measure of stability and equity to the Government as well as to industry assuming that a ceiling were established?

Mr. WITT. A ceiling would certainly establish stability as far as the total amount of dollars going to the program is concerned. It would not establish stability to the people trying to administer the program.

They would have to arbitrarily decide out of the total glob of money, how much would go to each agency, how much would go to each contractor within the agency.

I don't see how you could do this on any technically supportable basis.

Mr. FINE. Can you suggest any other means whereby Congress can exercise control over the total amount spent for I.R. & D. and B. & P. without damaging the free enterprise for industry.

Mr. WITT. This is back to the problem of first how important are these figures to industry's maintenance of a competitive position?

If we wanted to start with the proviso that the Goveenment is not in business of taking industry figures which are of a proprietary nature and handing them out to everybody else, then that narrows down your range of decision making pretty fast.

Let me put it this way, I frankly feel th t our going into a close scrutiny of these figures might very well turn up with some better

way of producing some accountability. We ought to take that as a first step.

Mr. FINE. If a decision were made regarding a ceiling, you are suggesting that such a determination be deferred until an opportunity has been provided to look further into the specifics of how this might be implemented.

Mr. WITT. That would be my recommendation, yes, sir.

Mr. FINE. The GAO report discusses on pages 65–67 the possibility of substituting for the present system a method of using a profit factor for I.R. & D. cost recovery. The reports point out that this approach received many favorable comments because it would eliminate the need for advance agreements and give contractors the incentive to eliminate unproductive engineering efforts, while permitting industry the opportunity for original thinking.

Conversely, this approach was criticized for possibly leading to reduced allowances, for I.R. & D. and loss of technical visibility. What are your views on this approach?

If a profit approach should be adopted, do you feel that the rate of profit should be computed on the basis of sales or on the company's invested capital? Should I.R. & D. be allowed as an element of cost?

Mr. WITT. There are many obstacles in the implementing of this approach. I feel that the people who went into this, the Commission on Government Procurement, gave it a pretty good scrub down. I would agree with them that consideration of any of the alternatives which use an arbitrary fixed percentage for a contractor against some base such as sales or investment capital, would be very, very difficult to administer.

Mr. FINE. You do not propose to relate it to the profit?

Mr. WITT. I would not.

Mr. FINE. If a profit approach would be adopted, nevertheless, do you feel the rate of profit should be computed on the basis of sales or on the company's vested capital?

Mr. WITT. There have been over the last number of years a lot of debate on this very subject. In fact the Department of Defense now as you may know is involved in a very deep and thorough study of the whole profit problem.

They are going into these very issues, Mr. Fine, and I certainly am not in a position to speak to that subject now. I have seen other studies. I know LMI made a study in the past pointing out the problems of establishing a fair and equitable profit percentage and so forth that would be reasonable.

I have heard people say, as you heard this morning from industry, discussion relating to the very low percentages of profit. I have also heard some arguments on the other side of that coin that when you consider the amount of invested capital on the part of some segments of industry, they are in a lot better shape than the others.

This gets to be a very difficult study to take on. The Department of Defense is contributing a terrific amount of people and effort to this subject. They are collecting data from the contractors.

They are going to have it handled by one specific CPA firm to collect all the data to make sure it is kept secret. It is a big, complicated area. I don't think I am qualified to speak to the details of it.

Mr. FINE. Would you surmise that the results of the study you identified will be anything but an upward increase in the profits if any change at all is proposed?

Mr. WITT. I better not try to secondguess them. It is coming out next spring, anyway. They will have put an awful lot of time and energy in on it. If you forced me to make a bet—are you going to force me to make a bet?

Mr. FINE. Not unless you wish.

Mr. WITT. I better not bet.

Mr. FINE. I can guess your answer.

Analysis of DOD reports of I.R. & D. and B. & P. expenditures for the past several years reveals that some of the major defense contractors receive between 85 and 100 percent of their expenditures for I.R. & D. and B. & P. In these cases little or none of the contractors' funds are invested in these programs although they will realize very substantial benefits.

Would it be a reasonable thing to establish a maximum of perhaps 75 percent as the Government's share of I. R. & D. and B. & P. costs?

Mr. WITT. I would resort to that only if the program were so threatened by some very strong pressures from the outside and it might be threatening the basic existence of the program. Under conditions of that type I would consider a maximum ceiling arrangement.

Mr. FINE. Can you envision a situation where the government puts up 75 percent of I.R. & D. and the contractor would be unwilling to come up with 25 percent? It is a pretty good deal.

Mr. WITT. We are at 78 percent now. I agree with you.

Mr. FINE. Should I.R. & D. be allowed as an element of cost?

Mr. WITT. Yes.

Mr. FINE. You believe that an alternative formula should be considered which would limit the government's share to 50 percent with a dollar ceiling for each contractor so that the principle of cost sharing would become a reality?

Mr. WITT. Is this for the contracts less than $2 million?

Mr. FINE. It would be for all of them.

Mr. WITT. No, I would say not.

Mr. FINE. Do you believe that the $2 million threshold now required for the negotiation of advance agreements should be revised?

Mr. WITT. I understand that WEMA argued that point considering the inflation and all.

At the same time I understand from the statistics I have seen it would have little impact. The figures we saw show that the difference between the $2 million and the $3 million level would have very little impact.

Mr. FINE. Do you have any specific data which would support what you have just said?

Mr. WITT. Yes.

Mr. FINE. Would you provide that for the record?

Mr. WITT. Yes.

[The information follows:]

Question. Would you provide data for the record that shows that little would be affected if the threshold ceiling was raised from $2 million to $3 million?

Answer. Defense Department data addressing the 90 companies having 236 advance agreements for 1974 indicates that the number of agreements would be decreased by 26 if the ceiling had been raised to $3 million from $2 million. Based on this data, we believe that the $2 million threshold is a valid level for administrative control over IR&D/B&P costs. Advance agreements are valuable in reaching an understanding of the maximum cost which may be recognized before

costs are incurred. There is believed to be reduced marginal utility in the expenditures of time and effort to negotiate and administer agreements under the $2 million threshold.

Senator McINTYRE. Mr. Woodfin speaking for NASA has suggested that contractors share in the cost of I.R. & D. and B. & P. from the first dollar. What is your position?

Mr. WITT. I have a certain amount of trouble with that. The Commission on Government Procurement had problems with that and I do, too. As I review the thrust of the OMB circular approach and as I get into the discussions with the agencies, I plan to take on this problem of cost-sharing at that time.

I will be glad to let you know how we make out.

Mr. FINE. There is a major difference in the policy of DOD, NASA and ERDA in that only ERDA and its predecessor agency AEC have required royalty free licenses and data rights based on a scale of cost participation in I.R. & D. recovery.

This is also recommended by GAO. Shouldn't there be a single Government policy on this matter?

Mr. WITT. I concur completely with that. The people who are writing the laws up here are issuing patent policy every time they write a law creating a new agency. There is a patent provision in ERDA which was not used in creating other agencies. We are getting a bit of a piecemeal legislation approach to the patent policy right now every time you gentlemen write a law.

My understanding is that ERDA does not require rights which may or may not reflect the latest opinion of the Hill.

I do know that the committee on patent policy is looking into the subject right now, as a matter of fact.

Mr. FINE. You would defer any significant position on this matter?

Mr. WITT. As far as a uniform approach across the whole government right now, it would be helpful if there was one, but there is not one right now. I would defer until the committee on patent policy produces its recommendations, sir.

Mr. FINE. Would you agree that the Government does have a special relationship as a customer, particularly with companies whose sales are primarily to the Government and whose major products are developed substantially under direct Government contract, and why shouldn't this entitle the Government to royalty free licenses and technical data resulting from I.R. & D?

Mr. WITT. There is a special relationship.

Mr. FINE. Proceed.

Mr. WITT. This is going back to the trade off. You can argue that as long as the Government is spending a large amount of money with the firm, then whatever comes out of that firm should be made available to the Government. I think a case can be made.

At the same time the offset is to what extent are you stifling the amount of innovative and creative thinking of the engineering staff and the technical people within that company.

How you arrive at that trade off I don't have any way of evaluating.

Mr. KAUFMAN. Mr. Witt, on page 14 of your written statement you you indicate you are looking into the question of burdening I.R. & D. with overhead and G. & A. Is I.R. & D. currently burdened with overhead and G. & A.?

Mr. WITT. It is currently burdened with overhead. I put this down as one of those which we will give consideration to. Some of the com-

mercial industry practice, as I understand it, does not tie in with the way we are now performing this. We think it is a good area to take a look at.

That is basically why we put it in there.

Mr. KAUFMAN. By the way, are you aware of what the average percentage of Government contract prices are allocated to G. & A.? Is it 5 percent or 10 percent?

Mr. WITT. I don't know. Mr. Dietrich says he feels it is in the 5 or 6 percent range.

Mr. KAUFMAN. We have had testimony to that fact the other day. But I noticed in Mr. DeLauer's testimony this morning that there were a couple of tables showing G. & A. as 15 percent of the typical contract pricing.

That is a figure that I have heard other accounting experts use before myself.

Mr. WITT. Mr. Dietrich?

Mr. DIETRICH. You have to look at the way a contractor sets up his accounts. There is a great variety, a great difference in the way contractors set up their accounts for G. & A., overhead and direct charges.

Trying to compare one company's G. & A. to another is like comparing apples and bananas. It is just like trying to compare overhead of one company with another. You just can't do it. You can't compare contractor to contractor.

Mr. KAUFMAN. In any event, some accounting experts including the Comptroller General have suggested that all overhead costs including G. & A. should be allocated to I.R. & D. Isn't that correct?

Mr. WITT. I believe that was in that report. I don't remember the exact wording.

Mr. KAUFMAN. You would also agree, would you not, that if G. & A. was allocated to I.R. & D. that the cost of I.R. & D., including B. & P., would be substantially higher than the $800 million reported by DCAA in its annual report?

Mr. WITT. I don't know how much higher but it certainly would be higher.

Mr. KAUFMAN. It could be anywhere from $100 million to $200 million higher, could it not?

Mr. WITT. That sounds a little steep to me. $40 million is 5 percent.

Mr. KAUFMAN. Well, if we followed Mr. DeLauer's——

Mr. WITT. You are talking about the 15 percent.

Mr. KAUFMAN. With the 15 percent it would be higher than that, would it not?

Mr. WITT. Yes.

Mr. KAUFMAN. Mr. Witt, as an official in the executive branch and within the Office of Management and Budget, are you concerned that some portion of the fund spent for I.R. & D., is not currently shown in the line item in budget documents for research and development?

Mr. WITT. No. Let me make clear, Mr. Kaufman, that I am not in the budget business within OMB. We do not get into the budget scrubdown that the budget examiners go into. I am not on that side of the business.

Mr. KAUFMAN. That is all I have.

Mr. FINE. Just one further question relating to your exchange with Mr. Kaufman. If you burden I.R. & D. with G. & A., although it might increase the cost of I.R. & D. in terms of the net Government outlays, would it increase or decrease the Government's expenditures?

Mr. WITT. We would just not pay it one place but we would pay it somewhere else.

Mr. FINE. If you burden I.R. & D. you wind up paying a part of it, whereas if you do not you burden your contractor to pay a larger percentage of I.R. & D., is that really true?

Mr. DIETRICH. You take it from Peter and give it to Paul and when you redistribute it, it comes out to be the same.

It changes the cosmetic effect of looking at I.R. & D. but it does not change the price of the contracts.

Mr. FINE. So the net expenditure would be the same in either case as far as Government outlays are concerned?

Mr. DIETRICH. That is right, sir.

Senator MCINTYRE. Thank you very much, Mr. Witt and your associate, Mr. Dietrich. There are many questions for the record that will be sent to you.

PREPARED QUESTIONS FROM SENATOR MCINTYRE

[Questions submitted by Senator McIntyre with responses by Mr. Hugh E. Witt]

Question. You indicate that separate projects will be established for costs of full-scale developments or new-production prototypes, and they will not be allowed in overhead acconuts. Will the costs of such projects be allowed as direct charges to the contract?

Answer. No; not unless a contract is awarded for such full-scale developments or preproduction prototypes. Any equipment so developed or prototypes that would be subsequently sold either commercially or to the Government would be expected to have some recoupment of the contractors' investment in the product selling price.

I would like to emphasize that this approach will be further examined in the evolution of the executive branch policy on I.R. & D./B. & P.

Question. The GAO report of March 8, 1971, on a line item budget for IR&D contains in Appendix III a commentary on the OSD letter, in effect a rebuttal of the OSD objections. I have set out below major points of dispute. I will read each and ask for your brief comments now which you may expand for the record later.

(a) DOD contended that Congress will require detailed information on the projects to be supported in order to approve the line item. GAO feels that such back-up support may not be as detailed as in normal for budget line items but would nevertheless be useful to the Congress.

(b) DOD also contended that it is inappropriate to compare an IR&D/B&P line item with the Defense procurement budget. GAO feels that too much emphasis is being placed on precise data whereas all that will be needed is the best information available, similar to data used for justifying other portions of the Defense budget.

(c) DOD anticipated problems due to the fact that contractors generally submit plans for the calendar year whereas the Government's fiscal year begins in July. GAO feels that contractors generally plan on a long-range basis and therefore should not have great difficulty in preparing a plan for the Government's fiscal year.

(d) DOD mentioned many problems in budgeting, negotiating ceilings, and segregating costs that would materialize if the GAO proposal were adopted. GAO agrees that there will be problems in converting the IR&D system, but feels they will be eliminated once the conversion is completed.

(e) DOD argued that contractors receiving direct payments of IR&D would have a competitive advantage over companies not getting such payments. GAO believes that the IR&D amount percentage-wise is small, and that the competitive advantage could be offset by adding a factor to enable equitable comparison of bids, as is presently done under certain conditions.

(f) DOD stated that because of the importance of IR&D no revolutionary change be made. GAO feels that a budget line-item method would not affect the contractor's independence in selecting work projects any more than the current advance agreement method.

Answer. My comments to your questions are provided in the same sequence as you presented them.

(*a*) We agree with DOD that because the data presented would and could not be sufficient to justify each project, the Congress would require additional detail. On the other hand, we would agree with the GAO that information should be provided on IR&D so that the Congress could have an overview of what's going on. We don't believe that line item budgeting is necessary to provide Congress with these data. We plan to explore the possibility of providing Congress information concerning each agency's forecast of IR&D/B&P expenditure in the overhead accounts where advance agreements are contemplated. Each agency's data might be categorized by estimates for research, applied research, development, product improvement, and conceptual studies. Such data might be made available during the budget review process based upon projections from historical data and current agreements. The data would not be identifiable by contractor or specific IR&D efforts since these efforts are not specifically defined in the lead time periods required for budget preparation and review. We would have to do much more research in this area before a proposed solution may be presented. We would also have to review the claims of proprietary rights involved. However, we do believe that more visibility in IR&D/B&P is achievable.

(*b*) The comparison of IR&D/B&P to the Defense procurement budget points out some of the problems and the difficulties which would have to be overcome if line budgeting were considered. From my experience, Congress requires greater details for R&D projects budget justification than would be available for IR&D/B&P efforts. As I pointed out, we would not be in favor of line item budgeting. Rather, we feel that visibility may be achieved and Congress given an overview of the general scope for IR&D by providing more information than has been available in the past.

(*c*) In this area, the GAO proposed "annual special contractual agreements" negotiated with the larger companies ". . . providing for direct payment (up to a ceiling) of the appropriate share of the contractors' IR&D." DOD, however, stated that due to the difference in the contractors' fiscal year (normally, the calendar year) and the Government's fiscal year, this would require ". . . agreements to be negotiated with two six-month ceilings." In addition, DOD indicated that these ". . . agreements would have to provide for after the fact negotiation to adjust for changes in the business mix between DOD and other customers since this can only be estimated at the outset" and would substantially increase the administrative efforts involved. The GAO commented on the DOD problems by stating that the special contractual agreements would be similar in many respects to the advance agreements presently negotiated except they would cover the contractors' IR&D programs to be conducted during the Government's fiscal year. They indicated that this should not cause great difficulty since the contractors plan for IR&D projects on a long-range basis.

In regard to the business mix problem, the GAO revised their ". . . suggested proposal to provide that once a special IR&D agreement has been negotiated, the contractor will be paid for the work performed using the proportionate share considered in negotiating the agreement. No adjustments of the above would be made of the mix of business changes during the year, but DOD should give consideration to the effects of such change in negotiating the agreement for the following year."

As for the problems created by the fiscal year change, DOD indicated that this would require investigation. I would have to review their analysis before I could evaluate it. In regard to the problems concerning the mix of business changes, I believe this situation would place the contractor and DOD in a precarious position of making up over- and under-payments in future periods which may be uncertain, due to the award, or lack of award, of contracts. This would cause additional administrative efforts for both parties which I believe are unnecessary. An additional point here is that IR&D efforts must have flexibility to start, stop and be reoriented as work progresses.

(*d*) DOD pointed out additional administrative problems of conversion of present contracts, negotiated under existing law and the ASPR, which would have to be phased out over a period of several years and would not be affected by the proposed line item approach. This would present problems in budgeting, negotiating ceilings and segregating of costs. They felt that the GAO had not considered these problems in their proposal. The GAO agreed that these problems

would exist, but could be minimized through "amendments to major contractors' current contracts eliminating amounts equivalent to the IR&D costs to be included in the special agreements." I agree with the DOD that this would require considerable effort, if line item budgeting were instituted, until present agreements and contracts are phased out. It would require, even if amendments were made, individualized accounting procedures for each contractor and would add to the confusion of portraying line item backup to the Congress. I would think that problems would be greater than indicated by the DOD considering the number of agreements presently in effect.

(*e*) I would agree that those contractors receiving direct payments for IR&D would have a competitive advantage over companies not receiving such payments. They would, in effect, be in a position to quote lower prices since they would not have to consider IR&D as an overhead expense as their competitors, not receiving direct IR&D funds, would have to do. One of the major benefits that the current IR&D policy provides is to stimulate competition among industry by encouraging their independent pursuit of new and improved technologies for Government needs. This approach of compensating a portion of their IR&D costs when relevant to Government needs enhances competition and enlarges the base of competition. I believe that line item control would discourage this process and reduce the competitive base. The GAO agreed that steps would have to be taken "to reduce or eliminate such advantage whenever possible." They propose an "added factor" to enable equitable comparisons of bids. These adjustments to offset such advantages would only add to the already identified administrative "nightmares" involved in line item budgeting.

(*f*) Line item budgeting would involve direct contracts or grants for IR&D. I strongly support the view expressed by the Commission on Government Procurement on this issue. They were against line item budgeting and direct contracting for IR&D. First, they thought that Congress would have an "impossible task in assessing" the literally thousands of individual IR&D projects. Second, the administrative costs of such an undertaking would be "grossly uneconomic." We would estimate that in excess of 10,000 additional contracts would have to be written and administered each year for IR&D with defense contractors. Third, the controls associated with line item budgeting or direct contracting would operate to constrain or discourage the very innovation which is sought in IR&D as the end result. I believe that we can provide visibility of these projects to Congress so that line item budgeting will not be necessary.

Question. Mr. Romatowski, speaking for ERDA, stated that in the construction and operating phases of large demonstration and pilot plants, the projects will be organizationally and geographically separate from the sponsor's home office, and ERDA would not expect to accept IR&D and B&P costs from the sponsor's other operations. Why would a pro-rata share of such costs, if they represented a contractor's general IR&D effort, not be an appropriate charge?

Answer. Of course, each situation must be evaluated on its own merit. There may be sufficient justification for not accepting IR&D costs from the sponsors' other operations as in the case cited by Mr. Romatowski in the construction and operating phases of large demonstration and pilot plant contracts where projects normally will be organizationally and geographically separate from the sponsors' home offices. Overall, however, I feel that a pro-rata share of such costs, representing the IR&D effort, may be an appropriate charge and should enable the Government to share in a large amount of technology for a small investment, providing such effort is considered to be relevant to the agency's function or operation. I will, however, look at this area in much greater detail in our study of IR&D and B&P.

Question. A basic argument in favor of allowing IR&D as a necessary business cost is to provide competitive sources for future procurements. Where a company has established a separate division for a unique system, such as the B–1, and direct research and development contracts are awarded to enable this division to develop and produce this system for a 10 to 15 year period, do you feel that the Government should pay for any IR&D performed by such division? If so, how would payment of such IR&D costs lead to competition for future business?

Answer. As designers and developers work on the B–1 program, they develop ideas for innovative or alternative ways of doing things. Some of these ideas may have nothing to do with building the B–1, or the state of the art may be insufficient to permit an engineering solution to be incorporated into the initial B–1 aircraft. As a result, such ideas are set aside and then given consideration under IR&D.

A few efforts being performed by the B–1 and Los Angeles Aircraft Divisions of Rockwell International, which have a common IR&D advance agreement, include:

Composite rather than metal bay doors for the B–1. (Such doors will be introduced on aircraft number 4.)

The use of composites for other primary and secondary aircraft structures.

Different bonding.

Plasma arc welding.

I understand, for the combined B–1 and Los Angeles Aircraft Divisions, that approximately 60% of the IR&D is oriented to the generic technology applicable to all aircraft. About 10% of the IR&D is oriented to conceptual aspects of strategic bombers which include: aircraft utilization, employment, effectiveness growth and the impact of new technology. The remainder of the effort is understood to be primarily focused toward a technological base from which to draw to be competitively responsive to anticipated Government needs; for example, specific new aircraft programs.

In summary, I believe that reimbursement of IR&D costs will provide the basis for technical competition through the acquisition of new innovative ideas and of the technological skills and capabilities of Rockwell International in particular and industry in general.

Question. You state that if a contractor invests too heavily in IR&D his competitive position wanes both technologically and price-wise and his business base shrinks. What do you mean by "too heavily"?

Answer. "Too heavily" in this context means more than a prudent businessman would invest. A "too heavy" IR&D investment would result in higher overhead rates on current contracts and higher bids on future contracts where such costs must be recovered. This in turn results in either less profit or a less competitive position in the market place.

Question. What criteria would you recommend as a basis for establishing a balance between designs coming from Government and private laboratories in the context of your quotation from Senator Proxmire's statement before Senator Chiles' Subcommittee on Federal Funding Practices?

Answer. We believe that our draft OMB circular on Major System Acquisitions has established a balance in the criteria for conceptual system designs to be produced by Government and private industry. In that draft circular, we require each agency to create and explore alternative system solutions within the broad agency "mission" context, with emphasis upon increased innovation, participation, and conceptual competition from industry as opposed to undue reliance upon agency internally developed concepts and/or preliminary designs.

The draft circular advocates soliciting system concept design alternatives from all competent qualified sources in order to achieve the optimum system through encouraging innovation and competition. Conceptual designs are also advocated to be primarily solicited from private industry, including smaller businesses. Federal laboratories, federally funded research and development centers, educational institutions, and other not-for-profit organizations are also considered as sources for conceptual system designs. Ideas, concepts, or technology, developed by Government laboratories or at Government expense for which Government rights have been established are advocated to be made available to private industry through the procurement process. Industry proposals may then be made on the basis of these ideas, concepts, or technology or on the basis of alternatives which industry considers superior.

The draft circular reflects the long standing general policy of the Government to rely on the private enterprise system to supply its needs. OMB Circular No. A–76 sets forth the general criteria entitled "Policies for acquiring commercial or industrial products and services for Government use."

Question. What range of fixed dollar thresholds are you considering for the purpose of accepting a contractor's certification that IR&D and B&P efforts do not include costs required in the performance of awarded contracts?

Answer. We believe that a continuation of $2 million threshold is appropriate. Examination shows that an increase of this level to $3 million at this time to reflect inflationary costs would have very little, if any, affect on the number of agreements now negotiated on DOD. The $2 million threshold level is considered valid for administrative control over IR&D and B&P costs. However, there is

reduced marginal utility in the expenditure of time and effort to negotiate and administer agreements for the smaller research efforts, amounting to less than $2 million.

Question. While the burdening of IR&D and B&P with overhead and G&A may lower the cost of IR&D and B&P, would it lower the overall expenditures by the Government?

Answer. The burdening of IR&D/B&P with overhead and G&A does *not* lower but *increases* the apparent cost of IR&D/B&P. The overall expenditures by the Government are *not* changed by adding or deleting overhead and G&A to IR&D/B&P.

IR&D/B&P costs are recovered by being allocated to contracts. When IR&D/B&P is burdened with overhead and G&A, the remaining overhead and G&A costs allocated to contracts are equivalently reduced. The net effect on Government expenditures is zero.

Question. The following question was asked of Dr. Currie when he appeared. Will you provide your own answer for the record: Assuming the Congress decides that the line item approach should be adopted, would it be practical, without any change in existing law, to do this on a trial basis based upon the following:

(*a*) Establish a line item for $100 million for FY 1977 in the DOD budget as a non-add item, the funds to be derived by transfer during the year, from the various other programs now proposed in the budget.

(*b*) Modify existing DOD procedures to accommodate this one-year trial period to cover the contractors who would be included.

(*c*) Report the results to the Congress, together with recommendations, as appropriate, in conjunction with the FY 1978 budget to provide a basis for congressional consideration of any further legislative action.

Answer. The establishment of the line item approach on a trial basis is possible but not practical. It would take substantial effort on the part of DOD to select the contractors to be used, set up the parameters or ground rules to follow and the administrative records, conduct the test and report the results to Congress. I don't believe that a test of this type would prove the case either way. As you are aware, IR&D costs today are composed of thousands of individual projects with thousands of contractors. To isolate a few of these projects for additional control for a short period of time under almost artifical conditions, where normal budget constraints do not apply, would, in my estimation, provide very inconclusive evidence. I don't believe that such a test would evaluate the main issue involved, that of independent versus controlled technical development.

If such a test were required, it would have to be a long term effort to determine the impact on the maintenance of a viable base for competitive procurements of new ideas, innovations and advanced technology. The real test is not the administration, which is feasible, but the long term impact on the quality and diversity of innovative ideas and technology from which the Government benefits in competitive R&D procurements.

CEILINGS AND FORMULAS

Question. DOD has used the CWAS (Contractors Weighted Average Share) concept as a means of eliminating the need for reviews and audits where they believe the contractor bears sufficient risk. Do you feel that contractors who qualify under CWAS should be exempted from the need for negotiation of advance agreements?

Answer. CWAS currently applies only to the DOD. We believe there is some value in its use. The entire subject of CWAS is going to be reviewed in depth by my office. However, I would like to note, the flow of technical information from contractors to the Government of their IR&D offorts and results should not be precluded by exemptions under CWAS.

Question.[1] What is the practicability of completely eliminating Department of Defense payments to contractors for IR&D and B&P as allowable costs under Department of Defense contracts?

Answer. If payments to contractors for IR&D and B&P are eliminated, we would anticipate a resultant decrease in capabilities of industrial firms to provide new, innovative systems and equipments to meet agency needs. Contractors would have to finance the cost of IR&D through profits. Since profits are uncer-

[1] Question originally transmitted to the GAO.

tain, the talents and resources for this effort would lack stability and continuity (periods of high profits would foster higher resource allocations than periods of low profit). To the extent that some firms would discontinue doing business with the Government, the competitive base of qualified contractors in the high technology fields would be reduced. Such a reduction in turn could result in increased sole source procurements. In addition, the Government would lose access to a significant portion of industries' technological output. In all likelihood, contracts on a "level of effort term" basis would be entered into with a select group of contractors. This type of contract obligates the contractor to devote a specific level of effort over a stated period of time for a fixed dollar amount. These awards would give them a competitive advantage over those not receiving such contracts.

Question.[1] Same as previous question, except establishing a separate program in each of the RDT&E appropriations for IR&D and B&P with an amount of funds to be distributed directly, by contract or grant, to industry. This distribution could be based upon such factors as the experience of negotiating teams, including technical review panels, and the same criteria presently used under the existing procedures.

Answer. Direct funding by contract or grant for IR&D and B&P is not considered practical. Direct distribution to the many contractors would substantially increase the negotiation, technical review and administrative workload. We would be opposed to such a move. In the Commission on Government Procurement report this issue was discussed as follows:

"It has been suggested that Congress could appropriate and control an annual sum of money commensurate with the national total of IR&D costs for Government contractors and that this money could then be allocated among the contractors involved by individual direct contracts. The problem involved in this approach appears to be awesome. First, it should be realized that the national total of IR&D costs is composed of literally thousands of individual IR&D projects. Congress would have an impossible task in assessing the merits of the total program. In addition, an equitable basis for allocating such a total sum among contractors is not obvious and the administrative costs of such an undertaking could be grossly uneconomic."

We would estimate that in excess of 10,000 contracts for IR&D would have to be written and administered each year.

Question.[1] What is the practicability of a combination of the present system, with an established dollar ceiling substantially lower than the $700 million level, and a separate, directly financed program as described under the previous question?

Answer. As indicated previously, I do not agree with direct funding by contract or grant. With respect to establishing a dollar ceiling substantially lower than a $700 million level, I am convinced that it would be difficult to allocate and administer. As indicated earlier, I think that Government officials who are dealing with the contractors in these particular areas are in the best position to determine what is reasonable.

Question.[1] What is the practicability of the continuation of the present system based upon a dollar ceiling which is reduced 10 percent each year with an equal increase in the directly financed program described under question 2., above?

Answer. Again, I cannot agree with direct funding by contract, with respect to establishing a dollar ceiling which is annually reduced by 10 percent, I feel that this is an arbitrary ceiling which would be impossible to defend. I do not know how we could establish or administer ceilings.

Question.[1] What is the practicability as well as the desirability of establishing a separate ceiling for IR&D as distinguished from B&P if the decision is made to establish a total ceiling in law?

Answer. A direct relationship exists between IR&D and B&P. B&P costs are those incurred in preparing, submitting, and supporting bids and proposals on potential contracts. Such costs include direct technical effort, including the costs of system and concept formulation studies and the development of engineering data. They also include administrative or non-technical efforts for the physical preparation of the technical proposal documents and technical and non-technical

[1] Question originally transmitted to the GAO.

efforts for the preparation and publication of the necessary supporting cost and other administrative data. Contractors use techniques and know-how acquired under IR&D to prepare technical proposals. Decisions regarding where IR&D differs from B&P are discretionary in many cases and do vary between contractors with different accounting systems. In this connection, the GAO in its June 5, 1975, report on *Contractors' Independent Research and Development Program—Issues and Alternatives,* concluded that separation of B&P and IR&D could not be enforced. This was due to the nature of the technical work and records kept by the performers which was such that the auditor could not responsibly determine whether a particular effort was IR&D or B&P. As such, I don't believe it would be practical or desirable to establish a separate ceiling for IR&D.

Question .[1] What is the practicability as well as the desirability of establishing an independent Government agency which will be responsible for the IR&D program on a Government-wide basis, as opposed to the present separate agency basis?

Answer. The concept of establishing an independent Government agency such as NSF, which would be responsible for the IR&D program on a Government-wide basis, may appear desirable on the surface but is impracticable. The NSF does not know the mission areas of each of the agencies as well as the agencies themselves. One of the main purposes of IR&D is to keep the cognizant Government technical personnel on the leading edge of the technology in his area of responsibility. One cannot readily divide the community of innovative high technology from the application engineering community. Each agency's active participation is necessary and would be lost if a separate independent agency were created to manage the IR&D program.

PATENTS AND TECHNICAL DATA

Question. Dr. Currie points out that data and patent rights of contractors with smaller IR&D program which are not subject to negotiation of advance agreements would not be available to DOD.

(*a*) How significant would this be?

(*b*) Why wouldn't it still be worthwhile to obtain these for contractors covered by advance agreements?

Answer. I really don't know how significant the data and patent rights from the smaller IR&D programs would be. To find out would require a comprehensive study.

As to the worth of obtaining these rights from contractors covered by advance agreements, I believe that the primary motivation for industry lies in the increased skills, technology, inventions and patents derived from IR&D; and I can think of nothing more calculated to discourage a contractor's interest in IR&D, and hence Government work, than for the Government to take away or share in his inventions and patent rights. That is not done in commercial practice. The buyer pays for the seller's IR&D without sharing in his patents. We think this sets the standard by which the Government should be guided. Any contrary policy would run counter to the basic purpose of the national patent policy to foster the marketing of inventions. It would also tend to force contractors to set up separate profit centers for Government and commercial work so as to protect any competitive advantage flowing from their commercial IR&D. In addition, because of the unstructured and multi-year nature of IR&D as compared with contract IR&D, it would be much more difficult for the Government to identify, segregate and deal with inventions flowing out of the Government's supported share of a contractor's IR&D. In my judgment, apart from discouraging contractors, the administrative costs and difficulties of pursuing a patent take-over policy would generally outweigh any possible benefits to the Government.

Data or patent rights, if desired by the Government, can be included in solicitations as a condition for award. Such a technique has been successfully employed by NASA, as I understand it, without imposing rights as a result of IR&D effort.

Senator MCINTYRE. Our next witness is Mr. D. G. Soergel, consultant, Public Policy Research.

We welcome you here today, Mr. Soergel.

[1] Question originally transmitted to the GAO.

STATEMENT OF D. G. SOERGEL CONSULTANT, PUBLIC POLICY RESEARCH

Mr. SOERGEL. Mr. Chairman, I am pleased to have been invited to testify on an important policy governing contractor indirect cost recovery on Government contracts. I would like to go back to the acquisition policy of the 1960's known as total package procurement (TPP), and to connect current I.R. & D. policies to it. I would also like to relate I.R. & D. to other R. & D. technical activities policies and then offer some conclusive statements.

You will recall that, during the sixties, an acquisition policy known as total package procurement was instituted. By a single Secretary of Defense decision, contractors were required to compete and the winner contractually commit to fixed prices for system's development, production, and support over extended periods of time, up to 10 years.

A highly detailed specification for a single undeveloped, untested system was used for competitive responses. The specification had oftentimes been 3 to 4 years in the making, using mainly analytical methods to verify its integrity.

For example, in the case of B–1, the procurement specification was approximately 8 years in the making.

Contractors would also support agency technical groups during these extended periods using I.R. & D. expense. Indirect technical expense increased over what it had been in the 1950's. Proposal cost also became an increased element of indirect cost.

Responsive proposals required thousands of people brought together for a few months to prepare proposals for major equipment and systems. For example, one contractor submitted 26,000 proposal pages and employed 1,600 people to prepare its proposal for the airborne warning and control system.

The total page count in the C–5 proposals submitted by airframe and engine contractors was 240,000 pages.

Taken together I.R. & D./B. & P. expense became a significant indirect cost element. Regulations for control and accountability of I.R. & D./B. & P. were needed and established to support the TPP acquisition policy. Essentially these are the same regulations in existence today.

The TPP acquisition policy did not work. Because the specification was so highly detailed, contractors had little latitude to distinguish themselves from competitors on technical, management, or other grounds—but they could on sales price.

This motivated price buy-ins which, when linked to technical problems unknown at the time prices were negotiated, caused severe contractual difficulties, reductions in planned force structure, increasing claims against government, corporation bailouts, and marginal quality equipment to be produced.

We are all familiar with these kinds of difficulties that arose in the F–111, C–5–A, and F–14 procurements.

In 1971, TPP was replaced by a sequential decision making process so that, at the secretarial level two instead of one, separate decisions would be made; the first for full scale development, and the second, for production.

Also competitive prototypes could be used in certain circumstances as a precursor to a full scale development decision. It was the latter policy which permitted an improved use of competition before a secretarial full scale development decision would be made.

For example, the A–10 and F–16 Air Force weapons are results of this process. In both cases the selected full scale weapon was a choice between two specifications each independently developed and verified by competitive testing.

The competitive prototype policy permits contractors to enter competition earlier in the system design process at a lower entry cost—represented by the I.R. & D. and B. & P. cost accumulation—than would be the case if competitions were delayed until the full scale development decision—the entry point for the now disbanded TPP acquisition policy.

This does not mean that a highly specified system does not come out of the process. It does. But the final production specification will have been shaped by competitive motivations during its development, and I.R. & D. indirect expenses replaced by R. & D. contracts at an earlier point in the system design cycle.

This has been the situation for the A–10 and F–16 which are each in final stages of development leading to production.

So current I.R. & D. policies were generated to support an acquisition policy which was significantly modified in 1971. Flowdown policy changes, such as those for I.R. & D., were not made to keep pace and consistency.

Mr. Chairman, I wish to stress that the totality of I.R. & D., B. & P. expenditures needed to qualify and compete in an agency program reduces as competitive entry is moved toward the start of an acquisition program.

As competitive entry is moved from competitive prototypes still further toward the start of an acquisition program, entry cost continues to reduce. The request for competitive designs, the first RFP, becomes less technically detailed until all predilections about which technologies to use and how they are to be put together are eliminated.

What is left at the inception of an acquisition program the earliest competitive entry point, is a statement of the agency mission problem, goals to achieve, and operating constraints.

This kind of RFP would permit maximum technological latitude in response, and the least I.R. & D. cost to qualify and compete. It would permit independent designers to distinguish themselves through submission of innovative ideas and system concepts rather than through prototype or final design competitions which are expensive to prepare for and compete in, and which are essentially technologically constrained.

Senator Proxmire, during your testimony before a Senate subcommittee examining the Procurement Commission's major system recommendations, you said that competition would be far more effective if it were opened up at an earlier stage.

I also believe competition would be more effective with the taxpayer gaining its benefits. But perhaps most important of all, the mission problem RFP has promise of permitting small and medium sized firms to challenge large ones.

This is because entry cost represented by accumulated I.R. & D. expenses needed to qualify and compete, is reduced to its lowest level.

What I have just sketched is the sense and thrust of the Procurement Commission's system recommendations. As you can see implementation will directly connect to I.R. & D./B. & P. policy issues as your previous witness has stated. Mr. Hugh Witt, Administrator for Federal Procurement Policy, said in his opening statement:

> Management features to be contained in an OMB (IR&D/B&P) policy circular should include:—Compatibility with the OMB policy circular on Major System Acquisition which is currently being circulated for formal comments. The circular emphasizes the early exploration of alternative system solutions with special emphasis on increasing technological innovation and conceptual design competition. We believe the approach contained in the circular will drive IR&D expenditures toward the areas of research, applied research, advanced technology and conceptual studies; and away from full-scale hardware developments and prototypes that require large IR&D and B&P expenditures.

There are some other points I would like to make. The TPP policy of the sixties permitted contractors to carry conceptual designs further into the product development cycle using I.R. & D. expenses. In fact complete product development cost can be recovered on indirect expense according to current regulations.

This is where the "D" in I.R. & D. comes from. The "R" in I.R. & D. generally is allocated to nonapplied extensions in technology, ideas and concepts for product improvements and cost reductions, and the creation of conceptual new equipment and system designs. In my own experience the "R" part has true benefit to the agency, which has a problem to solve, and to the taxpayer, who has to pay the bill.

This area of technical activity is where the "I" (independent) really counts.

But most of the I.R. & D. is spent on the "D" part. It is perhaps 90 percent of the total expenditure. The purpose of the money spent for the "D" part during the sixties was to develop early hardware test data from which the Government program advocate could pick and choose to verify his specification without relying principally on R. & D. contracts.

Since the Government spec writer refined only one system all contractors interested in the system would spend "D" money on very similar technologies and design approaches.

This meant that technical span between contractors converged very rapidly after the agencies selection of the conceptual design. The "I" (independent) in "ID" was not achieved. And while it is true that competition was maintained, it was maintained only for the few large contractors who could afford to put such expenses into the price of their products over the several years before a competition was held.

Smaller companies simply could not enter and keep up.

It is this part of the 1960 I.R. & D. policies, the D part, which has survived and is still with us in the seventies. It is the part which I believe should be done on R. & D. contracts, with each independent designer clearly contractually responsible to prove out his own spec in competition with others.

Eliminating the D part of I.R. & D. and using direct R. & D. contracts will provide improved relevance to agency mission problems and control of a major portion of current I.R. & D. expenditures. Again contracting for the D matches to the thrust and intent of the Procurement Commission's system recommendations.

My final comment has to do with another outcome of the TPP policies of the sixties. In order to implement such policies an enhanced technical expertise had to be brought within Government.

Agency technical expertise was needed to check and balance contractor technical activity when I.R. & D. results were fed into the system.

But for an agency technical employee to be an effective judge, he would also have to perform R. & D.

As a consequence, the flow down from the overall TPP policy caused agency laboratory and OSD and military service technical staffs to expand—some agency organizations even performing the total product development cycle within their own laboratories without effective competition to the approach they took. These agency design teams were essentially sole source.

Today there are five R. & D. resources methods variously used by agency problem solvers. They are:

In house laboratories.

Federally funded research and development centers (FFRDC's) and other nonprofits.

Grants.

R. & D. contracts.

I.R. & B./B. & P.

Some agencies use more of one than others, and even within agencies there can be found relative differences in the use of them.

These five R. & D. methods make it difficult to answer how much it costs the taxpayer to define a solution to an agency mission problem, as well as make contractually clear who, which organization, has design responsibility to solve the problem.

The Defense Science Board in its report "An Analysis of I.R. & D./B. & P.", dated March 1975, recommended:

> CTE [IR&D/B&P] must be considered in conjunction with direct contract/grant R&D and in house R&D, each has a role to play in maintaining the nation's technological base and capability.

I endorse the DSB's recommendation and would only add technical work done by FFRDC's and other nonprofits to the list.

I.R. & D. policy issues are not disconnected from overall R. & D. policies nor from overall acquisitions policies. Without such considerations we will always be in the dark as to costs to solve agency mission problems, and for maintaining an internationally competitive technological base.

These clear separations in the purposes of R. & D. are not made today, but need to be.

In conclusion I.R. & D. issues are coupled to other R. & D. methods used to solve problems and to the acquisition process as a whole.

Effective implementation of the Procurement Commission system's recommendations will cause institutional changes in acquisition policy, particularly in R. & D. policies, including I.R. & D.

I believe such changes will lead to a reduction in the amount of I.R. & D. currently allowed, with R. & D. contracts taking its place.

But contractor independence is needed at least to the conceptual design phase and in the nonapplied sciences and technologies. This means that I.R. & D. expenses will not go away, but only get smaller. Relevance of technical work to agency needs and control improvements will come about through use of direct R. & D. contracts to

finance what is now the D part of the I.R. & D., the major part of all I.R. & D. expenditures.

This concludes my statement.

Mr. FINE. Thank you, Mr. Soergel.

Mr. Soergel, will you state briefly what your professional experience has been as relates to the issue before the hearing?

Mr. SOERGEL. From 1960 to 1964 I was corporate director of programs for the North American Aviation Corp. We had over a billion in annual Government contracts during that time period.

One of my responsibilities was to staff bid and proposal expense for all expected expenditures over $10,000. I would have to staff those moneys with regard to interdivisional relationships and review strategy for the marketing activity. I would report my assessments to a senior vice president who had approval authority.

The amount of B. & P. money involved was around $20 million. I.R. & D. at that time was about another $20 million and the manager of that activity was just down the hall.

We had to have, and did have a very close relationship in order to relate these two kinds of indirect costs. I also have consulted with the Cost Accounting Standards Board doing research in support of I.R. & D./B. & P. cost standards.

Mr. FINE. Would you say that looking back on your experience that I.R. & D. today represents a larger percentage than it did when working with that company?

Mr. SOERGEL. The 1960–64 time period was the start up of the TPP policy. I would say the amounts spent then were roughly comparable to those spent now.

But indirect technical and proposal expense during the 1950's was significantly less. We used an engineering change proposal (ECP) procedure during the Fifty's which added contract money if the engineering idea or design concept was acceptable to the program office, and the contracting officer approved. The increasingly expensive part of product development was therefore covered as a contract charge.

Unlike the current AEC approach to I.A. & D., the proposed ECP did not have to directly bear on, or add to, the main contract activity but only be broadly relevant. In this way we created a star tracker inertial guidance system as an add-on to the Navajo cruise missile contract even though the Navajo didn't need a star tracker.

I am not advocating a return to the Fifty's, but proof-out of early conceptual designs was handled on contracts with indirect expense much lower than it is today.

Mr. FINE. You state that one contractor provided or employed over 1,000 people to prepare a submittal?

Mr. SOERGEL. Yes.

Mr. FINE. Could you identify the contractor?

Mr. SOERGEL. The data comes from a citation in the Procurement Commission's report on major system Acquisition, volume 2, part C, page 137. The citation in full is:

One program proposal to the Air Force for the Airborne Warning and Control System contained 26,000 pages and involved 1,600 people in its preparation. A proposal on the Navy's Harpoon program was 35,000 pages long. Printed proposal material submitted by three airframe and two engine contractors in the C–5A competition totalled 240,000 pages. To evaluate these proposals, Gov-

ernment source selection review teams of 200–300 men were not uncommon. Study Group 12 (Major Systems Acquisition), Final Report, Jan. 1971, Vol. 1, p. 398.

The contractors were not identified, nor were other details of the accrued B. & P. expense.

Senator McINTYRE. Where would you draw the line between the use of competitive prototypes and the selection of a single design from a design competition for advanced or engineering development leading to production?

Mr. SOERGEL. The competitive prototype policy——

Senator McINTYRE. Where would you draw the line?

Mr. SOERGEL. I think in some cases acceptable conceptual designs obtained at the outset of some acquisition programs will describe designs that one contractor on its own cannot handle.

Centralized coordination of public and private resources may be needed to carry through on the design which is most acceptable.

This would be an Apollo-type program. The Procurement Commission recognized this kind of situation developing from time to time and recommended that the Congress be informed of the single early choice with the understanding that systems' competition will have been eliminated at the earliest point in the program.

As soon as a single early choice is made, competition, at least for the system, would be eliminated. That is one kind of program. More generally, systems' competition could be carried beyond the conceptual design, into a competitive prototype phase, or even further into engineering design and production. When the costs of competition start to exceed its benefits is very judgmental, depending on such situations as availability of resources to finance competition with hopes of netting out least cost for the overall program, and yet obtain an adequate system for an updated need.

It is my opinion that effective systems competition at the start of a program, during the R. & D. phase, will gain taxpayer benefits in production, maintenance, and operations costs far exceeding the cost to finance it for most programs.

Mr. FINE. Would you say that it is the magnitude of the dollars involved in a particular program which should dictate whether it is a prototype competition or a design competition?

Mr. SOERGEL. Yes, sir, and also the ability of one company to carry out is design through the full cycle and be responsible for it.

Senator McINTYRE. You state that the mission problem RFP has promise of permitting small and medium-sized firms to challenge large ones because entry cost represented by accumulated I.R. & D. expenses is reduced to its lowest level.

What types of weapon systems do you have in mind?

Mr. SOERGEL. Well, I am thinking of the kind of work actually done to create a conceptual design. This is the kind of design a small or medium-sized company can come up with. During our Procurement Commission studies, we were told that the number of people required to create the conceptual design of the F–14 was small—around 10 advanced-design specialists. Of course, many hundreds, perhaps thousands, were required to prove it out.

In my own experience, there are very few people involved in the first cut of a new design, maybe a handful. These designs are very uncertain as to what they actually will yield with regard to production price, schedule, and performance.

But these earliest designs are very inexpensive.

Senator McINTYRE. Can you give an example of a small company which could compete with a large company for a major weapons system?

Mr. SOERGEL. No small company can compete with a large one if competitive entry remains at the prototype or engineering design phase. But it is possible they could if competitive entry were, at an earlier point in design, the conceptual design point. Most small companies of today work on components or research studies. This is because acquisition policies don't afford an opportunity for a small firm to compete on the basis of low cost conceptual designs. I believe that if policies were changed there would be a movement toward setting up qualified creative-design companies. There is no private sector motivation to do that now. So, I doubt one exists today fully capable to enter a major acquisition at the conceptual-design phase.

Senator McINTYRE. What is the basis for your estimate that perhaps 90 percent of I.R. & D. expenditures are for development, the "D" in I.R. & D.?

Mr. SOERGEL. Proving out conceptual designs is obviously more expensive than creating them. If much of the proof-out work is done on indirect expense the amounts will increase at an increasing rate as proof-out continues. But because of current acquisition policies, contractors are required to go further on indirect expense than conceptual designs.

The agency procedural aspects are such that while several companies may initially come up with quite different designs, the agency advocates, those responsible to satisfy the military mission need, are free to pick and choose among these alternatives and start to form their own internal program.

Internal agency procedures require that the Government program advocate lay out a technical development plan of his own. He must show how he expects to get performed some critical areas of R. & D. He must show technical milestones and financing for them as his program develops internally. He has to go to higher headquarters and receive approval for it.

What happens is that a single technical plan gets formed out of these initially very wide span ideas and conceptual designs.

All companies interested in a possible large-scale downstream procurement, which might occur 3 or 4 years later, use that plan as the basis for programing their heavy expenditure in the "D" part of I.R. & D. They use the output of such expenditures to assist the agency advocate in proof-out of his conceptual design and to capture whatever seed R. & D. contracts occur along the way.

As I pointed out in my opening statement, this causes technical convergence of the contractors indirect D. activity. It only makes sense to be doing the kind of technical work that looks like it may pay off later. The common technical plan is a common standard for all. As far as "D" being 90 percent of total I.R. & D. expenditures, that is only an estimate on my part based on my own direct experience. I know of no research that has been done, or is planned to be done, relating competitive entry cost to design phases.

Senator McINTYRE. What do you mean by the statement "The effective implementation of the Procurement Commission systems' recommendation will cause institutional changes in acquisition policy, particularly in R. & D. policies, including I.R. & D."?

Mr. SOERGEL. There are many interconnected issues involving implementation of the Commission's major system recommendations. I know the Office of Federal Procurement Policy is well aware of them. Some of the institutional policy issues that might arise in addition to I.R. & D. ones, involve whether a technical work statement should be done by a private or a public laboratory. Some people might say that if we use comparative cost as a standard, Federal laboratories might be motivated to buy in as private contractors are alleged to do. I don't think that would be in the taxpayers' interest. There is more involved in Government make-or-buy policy than comparative cost when R. & D. performance is needed.

Another one is the use of mission RFP's to solicit conceptual designs. This is recommendation C–4 in the Commissions' MSA report. The mission RFP is advocated to contain the agency mission problem, but not the solution. I use the term "mission RFP" quite glibly, as have others, but I don't believe there is an acceptable common understanding as to what would be contained in such an RFP, or whether it would be meaningful to advanced design teams.

Senator MCINTYRE. Do you believe that I.R. & D./B. & P. should be budgeted and funded as a separate line item instead of being a recoverable cost under R. & D. and production contracts?

Mr. SOERGEL. No, sir.

Senator MCINTYRE. Do you favor continuation of section 203, Public Law 91–441?

Mr. SOERGEL. If the mission RFP approach is used to solicit designs and the D in I.R.&D. replaced by R.&D. contracts to prove them out, obviously the major technical work will be relevant. What remains, the IR, I feel will be a relatively small amount. For those amounts I think section 203 would not be worth its administrative costs.

Senator MCINTYRE. You list five R. & D. methods used by agency problem solvers, and aren't you mixing apples and oranges since two of these are types of organizations while three are types of procurements?

Mr. SOERGEL. You are right in that in-house laboratories and FFRDC's are organizations and I.R. & D., R. & D. contracts, and grants are procurement activities. I had in mind interrelating technical activities done by both private and public resources, particularly those activities which could be attached to agency mission problem solving.

There are generally accepted differences as to which kind of technical activity is done by each resource. But these lines of difference are obscurely drawn. For example, the Senate passed S. 1437 to distinguish Federal grants and cooperative relationships from Federal procurement relationships.

I suggest that obscurity exists also as to technical responsibilities of Federal labs and private labs, or advanced design responsibilities between FFRDC's and private advanced design teams. For agency problem solving, these interrelationships have not been clearly drawn.

Without such clarity those will always be disputed as to which group, or organization, is responsible for the total design process. Severe contractual difficulties can and have resulted.

Senator MCINTYRE. Mr. Kaufman?

Mr. KAUFMAN. To try to understand your statement, I want to clarify what you are saying on pages 6 and 7 where you begin by saying that most I.R. & D. is spent on the D part.

You estimate roughly 90 percent.

Mr. SOERGEL. I estimate that. I have no data to support the estimate. It is my judgment based on my own direct experience.

Mr. KAUFMAN. The vast bulk would go into development rather than research. You go on to say, "It is the part that I believe should be done on R. & D. contracts with each independent designer clearly responsible to prove out his own specifications in competition with others."

Are you saying that for the estimated 90 percent that goes into that, whatever that proportion might be, that the Government should contract directly for R. & D. contracts?

Mr. SOERGEL. Yes, I believe R. & D. contracts should be used.

Mr. KAUFMAN. Generally those contracts would be R. & D. contracts and the amounts and cost would show up on the R. & D. side of the budget?

Mr. SOERGEL. Yes. I don't see much change there. As a further comment, I should point out that the planning, programing, budgeting system for R.D.T. & E. is organized according to kinds of technical activity and kinds of research.

As a matter of well established practice, when the product goes through its product development cycle, the money is not managed according to kind of technical activity.

It is managed according to the position in design that the product or service has reached.

The conceptual design review is one of the most important and has the most leverage on the outcome. The next important review is the preliminary design, the next, the engineering design, then preproduction and production design reviews.

For example, the X–15 basic research vehicle to explore the upper atmosphere was a basic research program worth over $100 million. It was clearly a basic research activity. But because of the magnitude of expenditures involved, it was placed in 6.3 money, advanced development.

Or, if an F–14 problem shows up in engineering development, you can be back in applied research real fast.

The planning, programing, budgeting system of Defense R. & D. does not bear reality to acquisition program management. R. & D. would be much better understood if it were organized and allocated according to mission problems you people and OSD policymakers can focus on and relate the R. & D. budget to.

Another part of technical and scientific activity (S. & T.) is the nonapplied gaining of knowledge which I think is equally important to problem-solving R. & D.

Mr. KAUFMAN. If your approach was followed we would be left with an I.R. & D. program of a very small fraction of the present size?

Mr. SOERGEL. It would take some research and data gathering to find out how much smaller, but it would be smaller.

Mr. KAUFMAN. It could be as little as 10 percent of the present program.

Mr. SOERGEL. Possibly. The remaining amounts recoverable on Government contracts would be distributed independent of the size of the company.

I believe you would get a sliding scale of percent of Government sales recovery rather than the current policy of about 4 percent of sales regardless of size of company.

This would allow an equitable treatment of companies independent of their size. The amount allowable would be related to a particular product type, such as manned aircraft, but not according to size of company.

Mr. KAUFMAN. Thank you, Mr. Chairman.

Senator MCINTYRE. Thank you, Mr. Soergel.

PREPARED QUESTIONS FROM SENATOR MCINTYRE

[Questions submitted by Senator McIntyre. Answers supplied by Mr. D. G. Soergel]

Question. What is your definition of the Development part of IR&D and what does it include with the program categories of advanced development and engineering development?

Answer. The development part of IR&D is all technical activity needed to prove out a conceptual design. Conceptual designs are based on the experience of the design group and awareness of knowledge generated by other groups. It is a subjective design, and no two independent design teams will come up with identical conceptual designs to solve a common problem. The conceptual design is largely based on analysis rather than hard test data. Because of this, it's actual price, performance, and schedule are highly uncertain. The D part is the money needed to start, continue, and conclude proof-out by generating hard test data.

Categories of advanced and engineering development have no relationship to the product design cycle, as I previously pointed out. This is because, at any point in the design process, several different kinds of technical activity may be simultaneously employed to meet the next design review point.

Question. Who would you include under the category Federally Funded R&D centers and other non-profits?

Answer. I would include under FFRDC'S the Aerospace Corp. of Los Angeles, the Lincoln Laboratories of Bedford Mass., the Sandia Corp. and Livermore Laboratories, plus several others. Non-profits would be exemplified by Battelle Memorial Institute, Stanford Research Institute and several others.

Question. You use the term agency mission problem. What does it mean?

Answer. Essentially a statement of an agency mission problem, not the solution, or even a preferred technical approach towards gaining a solution. It would contain a statement of the agency mission problem in mission language. For example, out-year projected mission costs for currently approved programs may be judged too expensive. So even though a mission capability deficiency may not be perceived as a problem, out-year mission cost could be. This would be a perceived agency problem.

Independent designers would then be challenged to use technology to reduce mission cost below preset standards holding mission capability relatively constant.

A schedule goal would be included as well as a section describing the new solutions' interface with other equipments and systems and environmental and operating constraints expected in the out-years.

Question. How will changes lead to a reduction in the amount of IR&D currently allowed, with R&D contracts taking its place?

Answer. As I have previously stated, the D part of IR&D is, perhaps, 90% of the total allowable expense. This is the money contractors use to start and continue proof-out of conceptual equipment and system designs. By current policy, contractors can continue through the total creative design process, including pre-production pilot runs, if they so choose, using indirect expense rather than direct contract charges.

If allowable indirect expense is shut off at the conceptual design phase then proof-out will be done on R&D contracts. This would mean that technical span and competition between contractors to solve a common problem would become visible and controllable.

My guess is that allowable amounts would significantly reduce through these reforms and a more equitable distribution of indirect technical expense take place. But research needs to be done to determine a more accurate level of allowability than my guess of 10% of current expenditures. I know of no research currently underway, or planned to be taken, to refine an appropriate level.

Senator McIntyre. We will recess this committee subject to the call of the cochairmen.

(Whereupon, at 4:35 p.m., the subcommittees adjourned subject to call of the cochairmen.)

APPENDIX

U.S. SENATE,
Washington, D.C., December 31, 1975.

Hon. DONALD RUMSFELD,
Secretary of Defense,
Washington, D.C.

DEAR MR. SECRETARY: Enclosed is a copy of the Comptroller General's reply dated December 10, 1975,[1] to our letter of September 30, 1975,[2] concerning line item control of contractors independent research and development (IR&D) and bid and proposal (B&P) costs.

The Comptroller General agrees that there should be full disclosure to the Congress of the agency's requirement for IR&D/B&P and the general areas it wants to emphasize; an advance agreement by the Congress as it considers the budget; and an opportunity for the Congress to establish limitations or give directions. The Comptroller General states that he prefers the use of a line item to accomplish this objective but he sees no need or the feasibility for requiring the same detailed justification as is now provided with project authorizations. He points out also that the Government could contract directly for the IR&D it wants.

To provide the Congress with a basis for considering the line item approach we request you provide a detailed plan for implementation of budgetary estimates for IR&D/B&P, including but not limited to the following information:

1. The total amount you estimate DOD will actually spend in fiscal year 1977 for IR&D/B&P regardless of when the funds were appropriated.

2. The amount included in the FY 1977 defense appropriation request to fund IR&D/B&P throughout the life of the appropriation. Identify the estimated amounts by individual appropriation.

3. Of 2. above, how much funding would be required in the FY 1977 appropriation to cover only those IR&D/B&P expenditures to be incurred in FY 1977? Identify the estimated amounts by individual appropriation.

4. Identify the contractors who are expected to receive over $2 million in IR&D/B&P funds from DOD in FY 1977 from FY 1977 and prior year appropriations, and the amounts each is expected to receive.

For the purpose of calculating the above figures, assume that a decision to convert to line item budgeting would not be applied retroactively to prior year contracts or appropriations. What would be the effect for items 1 through 4 if, for the budget year and subsequent years, IR&D/B&P would be unallowed except to the extent it was funded by direct contracts charged to the IR&D/B&P budget line item?

The detailed plan for implementation also should include methods and procedures for development of budget estimates, presentation and justification to the Congress and Administration of the program following Congressional approval. Specific answers and comments also should be provided as follows:

5. How was the amount estimated for a line item determined?

6. How would a line item be reflected in the annual budget submitted to the Congress?

7. How would an agency or department determine at the time of budget submission to the Congress the specific amounts, the specific programs and program elements, and the specific appropriations from which funds should be reduced to aggregate the IR&D/B&P line item?

8. How the previous step would be done to reflect the fact that IR&D/B&P payments during the current year will be made from prior year contracts as old as five years or more?

9. What specific detail should be furnished to support the line item?

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[1] See p. 150.
[2] See p. 802.

10. Following enactment of appropriations including the IR&D/B&P line item, the specific details of how this would be administered within DOD consistent with the ASPRs, and with regulations governing contract administration, and financial management including accounting and reporting. This should include the identification and explanation of any necessary changes to such regulations and procedures.

11. Adoption of a cost sharing arrangement which would require each contractor to absorb a portion (up to 25 percent) of the allowable costs approved by the Government for each IR&D and B&P project.

The information requested should be coordinated with OMB and GAO.

Your reply should reach this office no later than April 1, 1976, to enable its consideration in conjunction with the FY 1977 authorization request.

Sincerely,

THOMAS J. MCINTYRE, *U.S. Senator,*
Chairman, Subcommittee on Research and Development.
WILLIAM PROXMIRE, *U.S. Senator,*
Chairman, Subcommittee on Priorities and Economy in Government.

Enclosure.

U.S. SENATE,
COMMITTEE ON ARMED SERVICES,
Washington, D.C., September 30, 1975.

DEAR MR. STAATS: During your appearance before the joint hearings on IR&D you supported the concept of line item control of this program. At that time, you were asked to provide for the record specific details on implementation.

The purpose of this letter is to emphasize our interest in your recommendation and to identify specific details of what should be furnished. Your response should include the following:

1. How would a line item be reflected in the annual budget submitted to the Congress?

2. How would DOD or other Government Agencies determine at the time of budget submission to the Congress the specific amounts, the specific programs and program elements, and the specific appropriations from which funds should be reduced to aggregate the IR&D/B&P line item?

3. How the previous step would be done to reflect the fact that IR&D/B&P payments during the current year will be made from prior year contracts as old as five years or more?

4. What specific detail should be furnished to support the line item?

5. Following enactment of appropriations including the IR&D/B&P line item, the specific details of how this would be administered within DOD consistent with the ASPRs, and with regulations governing contract administration, and financial management including accounting and reporting. This should include the identification and explanation of any necessary changes to such regulations and procedures.

You are encouraged to work closely with DOD, OFPP, OMB, CBO, Cost Accounting Standards Board, and any other Federal agencies and industry to ensure that all interests are taken into account. By copy of this letter, the various Government agencies are requested to cooperate if called upon by the General Accounting Office.

Will you provide this information by December 1, 1975, so that it will be available for consideration, including possible action, by the next Congress.

Sincerely,

THOMAS J. MCINTYRE, *U.S. Senator,*
Chairman, Research and Development Subcommittee.
WILLIAM PROXMIRE, *U.S. Senator,*
Chairman, Subcommittee on Priorities and Economy in Government.

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