4 90

ECONOMIC ANALYSIS AND THE EFFICIENCY OF GOVERNMENT

HEARINGS

BEFORE THE

SUBCOMMITTEE ON ECONOMY IN GOVERNMENT

OF THE

JOINT ECONOMIC COMMITTEE

CONGRESS OF THE UNITED STATES

NINETY-FIRST CONGRESS

SECOND SESSION

PART 4—Supersonic Transport Development

MAY 7, 11, AND 12, 1970

Printed for the use of the Joint Economic Committee

U.S. GOVERNMENT PRINTING OFFICE

30 125 WASHINGTON : 1970

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price 60 cents

JOINT ECONOMIC COMMITTEE

[Created pursuant to sec. 5(a) of Public Law 304, 79th Cong.]

WRIGHT PATMAN, Texas, *Chairman*
WILLIAM PROXMIRE, Wisconsin, *Vice Chairman*

HOUSE OF REPRESENTATIVES	SENATE
RICHARD BOLLING, Missouri	JOHN SPARKMAN, Alabama
HALE BOGGS, Louisiana	J. W. FULBRIGHT, Arkansas
HENRY S. REUSS, Wisconsin	HERMAN E. TALMADGE, Georgia
MARTHA W. GRIFFITHS, Michigan	STUART SYMINGTON, Missouri
WILLIAM S. MOORHEAD, Pennsylvania	ABRAHAM RIBICOFF, Connecticut
WILLIAM S. WIDNALL, New Jersey	JACOB K. JAVITS, New York
W. E. BROCK 3D, Tennessee	JACK MILLER, Iowa
BARBER B. CONABLE, JR., New York	LEN B. JORDAN, Idaho
CLARENCE J. BROWN, Ohio	CHARLES H. PERCY, Illinois

JOHN R. STARK, *Executive Director*
JAMES W. KNOWLES, *Director of Research*

ECONOMISTS

LOUGHLIN F. McHUGH JOHN R. KARLIK RICHARD F. KAUFMAN
COURTENAY M. SLATER
Minority: DOUGLAS C. FRECHTLING GEORGE D. KRUMBHAAR

SUBCOMMITTEE ON ECONOMY IN GOVERNMENT

WILLIAM PROXMIRE, Wisconsin, *Chairman*

SENATE	HOUSE OF REPRESENTATIVES
JOHN SPARKMAN, Alabama	WRIGHT PATMAN, Texas
STUART SYMINGTON, Missouri	MARTHA W. GRIFFITHS, Michigan
LEN B. JORDAN, Idaho	WILLIAM S. MOORHEAD, Pennsylvania
CHARLES H. PERCY, Illinois	BARBER B. CONABLE, JR., New York
	CLARENCE J. BROWN, Ohio

CONTENTS

WITNESSES AND STATEMENTS

THURSDAY, MAY 7, 1970

MONDAY, MAY 11, 1970

TUESDAY, MAY 12, 1970

SUBMISSIONS

THURSDAY, MAY 7, 1970

MONDAY, MAY 11, 1970

TUESDAY, MAY 12, 1970

APPENDIX

ECONOMIC ANALYSIS AND THE EFFICIENCY OF GOVERNMENT

THURSDAY, MAY 7, 1970

CONGRESS OF THE UNITED STATES,
SUBCOMMITTEE ON ECONOMY IN GOVERNMENT
OF THE JOINT ECONOMIC COMMITTEE,
Washington, D.C.

The Subcommittee on Economy in Government met, pursuant to recess, at 10:05 a.m., in room 1202, New Senate Office Building, Senator William Proxmire (chairman of the subcommittee) presiding.

Present: Senator Proxmire.

Also present: John R. Stark, executive director; Loughlin F. McHugh, senior economist; Courtenay M. Slater, economist; and Douglas C. Frechtling, economist for the minority.

Chairman PROXMIRE. The subcommittee will come to order.

This morning we turn our attention to the supersonic transport program. Today is the fourth day in our current series of hearings on Federal transportation policy. The one conclusion which has emerged most strikingly from the testimony we have heard in the past 3 days is the continued failure of the Federal Government to measure the public costs and benefits of different types of transportation investment and to allocate funds to those areas promising the highest social rate of return.

The supersonic transport is intended to be a commercial transport vehicle. The public interest demands that it be subjected to rigorous cost and benefit analysis, and that public funds be spent on this project only if it can be shown that the ratio of benefits to costs is greater for the SST than it is for alternative uses of these public funds or that the SST program will be of particular benefit to disadvantaged or low-income groups.

The costs of the SST are clearly very large. The actual dollar cost to the Federal Government through the prototype phase is estimated at $1.3 billion. I feel certain this estimate is far too low, and this is one question I want to explore thoroughly with our witnesses.

In addition to the large dollar cost of this program, there are very, very serious environmental costs—sonic boom, ground noise, possible climatic influences, and serious safety hazards to the passengers and crew.

What are the public benefits which justify these huge costs? Strengthening our balance of payments? Both the Treasury and the State Department have emphatically concluded that the balance of payments will be hurt, not helped, by the SST.

To be sure that I was not out-of-date, I recently requested Under

Secretary of the Treasury Paul Volcker to give me his latest estimate on this balance-of-payments question.[1] I want to quote from his reply, dated May 1, 1970:

> * * * we have no reason to alter our view that the potentially adverse impact on our travel account from development of a U.S. SST could equal or outweigh the positive impact on the aircraft sales account.

If the SST will not help the balance of payments, what will it do for us? Provide employment? Unemployment is rising at the current time. I am a strong advocate of Federal programs to contain this rise and to restore full employment. Therefore, I recently requested Assistant Secretary of Labor Arnold Weber to give me his latest evaluation on the employment situation in the aerospace industry.[2] In his reply, he does indeed identify some employment problems and some public policy steps which should be taken to ameliorate this situation. I heartily support these measures.

With respect to the SST, however, Mr. Weber concludes:

> * * * although the overall employment situation in the country has certainly shifted since last year, we would still conclude that the net employment increase from the SST would be negligible.

Will the SST be of particular benefit to low-income groups? The question is absurd. The income strata from which SST passengers will be drawn is obvious.

I remain mystified concerning the public benefits of the SST. I will turn to our witnesses today and next Monday for possible enlightenment.

We have an extremely distinguished group of witnesses this morning. Our first witness is Representative Henry Reuss. All of us in the Congress, and especially those of us who are his colleagues on the Joint Economic Committee respect and admire Mr. Reuss' understanding of public expenditure economics as well as his knowledge of our environmental problems. We are honored to have him appear before us this morning. And I might say as a colleague of his from Wisconsin that I am very proud of the splendid representation that Mr. Reuss has given us for many years.

Following Mr. Reuss' statement, we will hear from Dr. Richard L. Garwin of the IBM Watson Laboratory at Columbia University. Dr. Garwin has more than 20 years experience as a consultant to Government and industry on large technical development programs. He has recently served as chairman of a consultative group which reviewed the SST program for the President's Office of Science and Technology. Since that office has so far refused to release the report of this group, despite repeated requests by Representative Reuss, Dr. Garwin testifies today only in his personal capacity as a concerned citizen.

Our third witness will be Miss Mary Goldring, Business Editor of the London Economist. Miss Goldring has followed the British-French Concorde program since its inception. We are indeed fortunate that she was willing to come to Washington to share her knowledge of the Concorde with this committee.

Our final witness this morning will be General Elwood Quesada. General Quesada was the first Administrator of the Federal Aviation

---

[1] See appendix, p. 1024, for entire text of letter.
[2] See appendix, p. 1025, for entire text of letter.

Agency. He has been familiar with the SST program since its inception. We place great value on his testimony.

We invited other witnesses to this hearing. Mr. H. W. Withington, vice president of the Boeing Co., has unfortunately declined our invitation on the grounds that his "personal presence" would "add little to the already published documentation available." Mr. Withington is too modest. His personal presence would have added a great deal to our proceedings. Mr. Withington has, however, supplied written answers to certain questions I raised in my letter of invitation. At this time I would like to submit our correspondence for the record.

(The correspondence referred to by Chairman Proxmire for inclusion in the record follows:)

APRIL 3, 1970.

MR. HOLDEN W. WITHINGTON,
Vice President, Boeing Aircraft Corp.,
Seattle, Wash.

DEAR MR. WITHINGTON: During the first week of May the Subcommittee on Economy in Government of the Joint Economic Committee will be holding hearings on Federal transportation policy. The particular focus of these hearings will be the appropriate level of direct Federal investment in transportation and the best allocation of this investment among the different modes of transport, including aircraft.

On behalf of the Subcommittee, I would like to invite you to testify at our hearing on Thursday, May 7, 1970 to discuss the supersonic transport program. The Subcommittee is particularly interested in such questions as the anticipated total cost of the program, the potential demand for SST travel, the relative costs of operation of the SST and of the 747, and the nature and magnitude of the competition anticipated from the Concorde. We are, of course, also interested in the current status of the program, the expected time required for completion of the remaining stages, and the prospective financing arrangements for the production stage of the program.

If you have any questions concerning the format or subject matter of these hearings or if the date suggested above is not feasible, please contact Mrs. Courtenay Slater at the Joint Economic Committee (225–5171).

Sincerely,

WILLIAM PROXMIRE,
Chairman, Subcommittee on Economy in Government.

THE BOEING CO.,
SUPERSONIC TRANSPORT BRANCH,
COMMERCIAL AIRPLANE DIVISION,
Seattle, Wash., April 30, 1970.

HON. WILLIAM PROXMIRE,
U.S. Senate,
Washington, D.C.

DEAR SENATOR PROXMIRE: Following considerable thought and deliberation, I am respectfully declining your invitation to testify before the Subcommittee on Economy in Government of the Joint Economic Committee. The overall subject matter to be covered is of great interest to me, both as a taxpayer and as an official of The Boeing Company. However, my personal presence to answer questions and discuss the civil supersonic transport program would, in my view, add little to the already published documentation available on the program.

While I might possibly add some personal insight and perspective on certain details of the program, my views are fundamentally in accord with those officials of the Department of Transportation who have been presenting and justifying funding requirements for the program to the Congress. In last year's fiscal '70 Congressional appropriations. hearings, for example. both House and Senate subcommittees covered in extraordinary depth, all aspects of the civil supersonic aircraft development program. Further, the House Subcommittee of the Committee on Appropriations recently completed fiscal '71 hearings on the supersonic transport program, providing updated information in all areas of the

program. As you are aware, much of this data is provided by Boeing and General Electric in the form of progress reports and scheduled data items submittals as called for in the contracts between the manufacturers and the Government.

To assist you in the conduct of these hearings, I am enclosing or referencing available documentation which will provide answers to the questions stated in your letter of invitation as well as much broader information on other questions that may arise about the program. I am hopeful this information will help clear up any misunderstandings or misgivings that may exist with respect to the merits of the supersonic transport program. In conclusion, I wish to comment that in my view, the civil supersonic transport—

1. is a vital and timely component of our long-term national transportation goals;

2. will be a significant, if not the single, contributor to advanced aeronautical technology requirements for large aircraft for the coming decades;

3. is a product that is an absolute necessity to continued American aviation leadership in the world marketplace, particularly in view of the Concorde and TU–144 programs;

4. will provide a transportation system that is compatible, not competitive, with National social and environmental goals;

5. and lastly, if not most importantly, is a unique partnership/investment relationship on the part of the Federal Government and private industry, designed to return the Government's investment plus interest through the sale of production supersonic transport aircraft.

If I can be of any further service on this particular subject, please contact me.

Sincerely yours,

H. W. WITHINGTON,
Vice President, Division Manager.

Enclosure.

Answers to questions of interest to Subcommittee on Economy in Government of the Joint Economic Committee as set forth in Senator William Proxmire's letter to Mr. H. W. Withington, Vice President, The Boeing Company, dated April 3, 1970, follow:

Question 1. Anticipated total cost of the program.

Answer. The Boeing Company portion of the Phase III program is estimated to cost $785 million. In addition—

Refer to fiscal year 1971 Hearings on civil supersonic aircraft development before a Subcommittee of the Committee on Appropriations—House of Representatives the week of April 13–17, 1970 for total Phase III costs.

Question 2. The potential demand for SST travel.

Answer. The SST is to be classed initially as an airplane for long ranges, where its time-saving advantage becomes dramatic. It will triple present jet speeds. The predicted growth of air travel based on population and economic trends requires a six-fold increase in transportation capacity between the years 1968 and 1990. The percentage of Americans utilizing air transportation is likewise increasing. Twenty percent of the U.S. adult population had flown in 1955; 39 percent in 1964, and a projection of trends indicates that more than 60 percent will have experienced air travel by 1980. The flying public is not a "jet set" but is becoming the majority of Americans. In addition—

(a) Refer to the reports of fiscal year 1970 House (Pages 188 and 189) and Senate (Pages 591 and 592) Subcommittee Hearings on Department of Transportation and Related Agencies Appropriations—Civil Supersonic Aircraft Development.

(b) Refer to fiscal year 1971 House Subcommittee Hearings mentioned in paragraph 1. above.

(c) Refer to Boeing Company document D6A11788–1 entitled, "The SST in Commercial Operation," dated January 30, 1970 (enclosed).

Question 3. Relative costs of operation of the SST and of the 747.

Answer. The U.S. SST, without surcharge, can be competitive with the latest economy jets during the time period of the SST's operation. There are a number of elements of ground and overhead costs which gain the advantage of the SST's greater productivity in terms of seat-miles flown per hour. Although the SST has 30 percent fewer seats than the 747, it flies three itmes as fast, thereby providing a 75 percent increase in airplane productivity. Further, the economic effect of the SST's speed advantage becomes greater with the passage of time.

and significantly greater in the time period in which large numbers of production models would be in airline service. Each year there is a percentage increase in both flight crew costs and applicable ground support labor costs, which can be applied to the number of seat-miles provided per hour. Because of the difference in miles per hour, this incremental cost increase becomes substantially greater for the slower equipment. The SST will approximate the total operating cost of the 747 airplane in its 440-seat economy version by the mid-80's. In addition—

See references in paragraph 2(*a*), the House Report (Pages 202, 233, 235) and the Senate Report (Pages 593 and 795), (*b*) and (*c*) above.

Question 4. The nature and magnitude of the competition anticipated from Concorde.

Answer. Orders for delivery positions in the Concorde production program have been announced by 16 airlines for 74 airplanes. Preparations are underway to offer firm specifications and guarantees to the airlines this year. With our competitors in this advanced position, the SST marketing competition is a present reality. It threatens the long-held position of the United States as the predominant supplier of commercial aircraft to the world. In addition—

(*a*) See references in paragraph 2(*a*), House Report (Pages 70, 74, 80, 88, 116, 186 and 187), and Senate Report (Pages 600, 655 and 660), (*b*), and (*c*) above.

(*b*) Refer to Boeing document D6A10606–3, Section IV (enclosed).

Question 5. Current status of the program.

Answer. A major fiscal year 1970 objective—the design and construction of the full scale Class II structures mock-up is being completed well within schedule and budget estimates. All contracts for the major subcontractors will be negotiated by mid-year 1970. Engineering releases for construction of the two prototype airplanes is underway. For more complete information, refer to the enclosed Status Report dated April 1970 and—

Refer to fiscal year 1971 House Subcommittee Hearings mentioned in paragraph 1. above (this also includes a silent film showing progress of the U.S. program as well as the Concorde and TU–144).

Question 6. Expected time required for completion of the remaining stages.

Answer. Boeing estimates the first prototype will fly in late 1972 or early 1973 and complete 100 hours of flight test in mid-to-late 1973. In addition—

Refer to fiscal year 1971 House Subcommittee Hearings mentioned in paragraph 1. above.

Question 7. Prospective financing arrangements for the production state of the program.

Answer. The Boeing Company is required by contract to submit a production financing plan to the DOT for review and approval by mid-1972. Alternative financing prospects will be covered in this report. In addition—

See references in paragraph 2(a) House Report (Pages 152, 205 and 236) and Senate Report (Pages 651 and 654), and 2(b).

Chairman PROXMIRE. Mr. Najeeb Halaby, president of Pan American World Airways, also had to decline an invitation to appear, due to the press of other business.

Congressman Reuss, we are glad to have you. Go right ahead.

STATEMENT OF HON. HENRY S. REUSS, A REPRESENTATIVE IN CONGRESS FROM THE FIFTH CONGRESSIONAL DISTRICT OF THE STATE OF WISCONSIN

Representative REUSS. Thank you, Mr. Chairman.

I have a prepared statement which I would like to submit for the record and then proceed briefly to summarize it.

Chairman PROXMIRE. Your entire prepared statement will be printed in the record in full.

Representative REUSS. I applaud the chairman for scheduling these important hearings.

While this is the Joint Economic Committee, I am going to talk

not economics but ecology this morning. I have gone into the economics of the SST before our House Appropriations Committee during the last few weeks, and other witnesses will pay particular attention to that. But the point I want to make is that in my judgment, considering increased airport noise, sonic booms, air pollution and potentially harmful weather changes, the SST, for which the American public is being compelled to pay, is an environmental outrage.

I am glad that my opinion seems to be shared by the three distinguished men who make up the President's Council on Environmental Quality. Judge Russell Train, speaking a year ago before he was appointed Chairman of the Council, said that the adverse environmental impact of the SST is such that "the program should not be pursued in the absence of overwhelming evidence of positive advantages." It is no wonder that the administration suppressed that Train report for many months last year, and that it was only exploded out when the House Committee on Freedom of Information got after it.

Mr. Train's views are shared by his two colleagues on the Council. Mr. MacDonald, formerly of the University of California, says he does not see, in his own words, "in the near future the technology to get around these problems."

Mr. Robert Cahn, formerly of the Christian Science Monitor, also deplores its environmental effects.

Yet despite this universal view of the environmental consequences by the body that was set up just a few months ago to act on these matters, the administration is going right ahead and asking $290 million in this year's budget for the SST.

So let us look briefly at each of the four great enviornmental hazards.

First, the sonic boom. Of course, the FAA is proposing an administrative rule saying that the SST should not be allowed to fly over populated areas. But it is interesting to note, as the Wall Street Journal reports, that the FAA does not want a law on this, just a regulation, because, in the words of an FAA official, "It's much easier to change a regulation."

FAA Administrator John Shaffer in his testimony before the Senate Transportation Appropriations Subcommittee last November had this to say:

"I believe that this airplane may be dragged into the domestic market by the beneficial economic performance some time after initial introduction, and it is quite possible that pressures from the people who want to use this airplane for the profit it will generate in the world transportation market may drag it into that market"—meaning the domestic market.

Now, translated into English that means that there will be people who will say, well, it is going to be so nice to fly from New York to San Francisco at supersonic speeds that we had better amend this regulation.

Therefore the sonic boom protection really does not mean a thing, because the alleged guardians of the public interest there oppose a law, because they think it is perfectly possible to change their tentative regulation.

An air pollution expert, Russell Train, Chairman of the President's

Council on Environmental Quality, has said that if you are going to operate this thing as the FAA regulation would require—at subsonic speeds, "inefficient fuel combustion"—and these are Mr. Train's words—"with a resulting heavy discharge of pollutants into the atmosphere" is likely to result in atmospheric pollution.

To trade off freedom from the sonic boom for a very high degree of air pollution seems to me to be a bad trade. We can well do without both of them.

On weather changes, the environmental panel of the ad hoc task force reported last year that the SST may have very widespread weather effects by increasing cirrus cloudiness. Scientists differ on the effects of increased cloudiness, whether it is going to melt the polar icecap and cause flooding or whether it is going to result in a new ice age. One Stanford University biologist has written me suggesting that the SST exhaust will speed up the destruction of the ozone that now serves as a shield against incoming ultraviolet rays.

Whatever the scientific truth of the matter is, Mr. Chairman, what disturbs me is the cavalier manner in which all of this has been dismissed by the Department of Transportation, relying on 4- and 5-year-old tentative studies.

The Department now washes its hands of it, whereas actually what is needed is a high level study by the Council on Environmental Quality to determine the long-range weather effects.

But the fourth and most serious environmental hazard is straight old-fashioned airport noise. And there the indications are clear that both the SST and particularly the Concorde are going to be above the noise criteria which the FAA is about to set for subsonic craft.

The SST is probably not going to be able to meet its noise requirements under its contract. And both the SST and the Concorde will be a whole lot noisier than any other plane flying.

The testimony of Dr. Bisplinghoff, who is dean of the School of Engineering at MIT and chairman of the SST Technical Evaluation Committee, is to the effect that the sideline noise from the SST will be appreciably greater than from any present plane.

As to the Concorde, as Business Week reported in its February 21 issue:

> Last spring, above the din of the Concorde engines at the Paris Airport Show, a New York airport official could be heard shouting that the plane would never be allowed near New York unless the production model was substantially quieter.

The SST is simply not going to meet minimum takeoff, community, and approach noise requirements. It is going to be some 10, or in one case, 16 PNdb above the contract requirement. And it should be noted that that makes it more than twice as loud as the contract had in mind.

Indeed, FAA Administrator, Mr. Shaffer, almost admitted this last year in the House Appropriations hearings when he said: "The Concorde will be comparable in noise level to some of the worst of our current subsonic jets."

What does the Department of Transportation propose to do about this? All they have is a wishy-washy proposal to build more airports away from our cities. If we build them further away from our cities that is going to use up all the alleged speed advantage of the SST.

Furthermore, as Congressional Quarterly reported in its April 17 issue, Miami, Los Angeles, New York, New Orleans, and San Fran-

cisco, all the SST airports—are facing determined opposition to new air facilities.

So why not postpone certification of the Concorde and the SST until the Department of Transportation tell us just where it is going to build the new nuisance free airports?

Which brings me down to the crux of my testimony, which is this. I believe that the FAA should forthwith issue its supersonic noise certification rules which, if they are at all comparable to the subsonic rules, will ban the Concorde and the SST from this country. With the Concorde banned from this country because it is an environmental outrage, and just too noisy, it could no longer be considered any threat to the U.S. aircraft industry or to the U.S. balance of payments—though I am delighted to hear, Mr. Chairman, that Under Secretary of the Treasury Volcker has just reaffirmed the Treasury's puncturing of that balance-of-payments argument.

A ban on the Concorde would perhaps bring forth cries of anguish from the British and the French. But they have been on notice since at least July 1968 that the Concorde had to meet U.S. noise standards.

Furthermore, according to a recent press story, Transportation Secretary Volpe last July suggested to the builders of the Concorde that we agree to a deescalation of the supersonic race, and the builders of the Concorde showed no interest. So I don't think that we would be guilty of the slightest bad faith if we told the French and the British and the Russians and the Americans that we don't propose to ruin our American environment in order to enable a tiny fraction of our people to get to Europe or other overseas destinations a few hours faster.

Stopping the American SST, which would inevitably flow from action to keep out all environmentally degrading planes from this country, would be a blow to Boeing and some of its subcontractors. And Boeing does need help. I would suggest that we take all or part of the $700 million in Government money that Boeing would lose by cancellation from here on out of the SST and give the Boeing company Government contracts to improve our environment rather than destroy it—contracts for nonpolluting mass transit vehicles, for air and water pollution control, for new housing technologies, and in other areas where their great technical and labor and managerial resources could be put to good use.

These breakthroughs would add far more to American prestige than any environment-despoiling superplane for the jet set.

If you compare this year's budget request for fighting air pollution, $106 million, with the budget request—$290 million—for the SST, you get one of the best examples of cockeyed priorities in our national budget.

Something is wrong here. If it be said that the people of the United States want the SST, I can point out that of the only two opinion polls that I know of, one nationally by the public television network showed that 86-percent of the more than 4,000 people who responded from 46 States opposed spending the taxpayer's money on the SST.

Chairman PROXMIRE. Would you repeat that?

Representative REUSS. The poll conducted by The Advocates, a program on the national public education television network, showed that 86 percent of the more than 4,000 respondents to their poll from 46 States opposed the SST.

Recently, in the city of Milwaukee, I conducted an opinion poll in which I had some 15,000 responses. And there again almost an identical figure, 88 percent of the people replying, opposed further Government spending on the SST.

So this thing is one of the biggest con games in history. The people do not want it. The people have much more intelligence than the gobbledygook operators in Washington who are trying to put this thing across give them credit for.

Let the President submit his case for the SST to the people. Let him go on nationwide television and explain why this plane is worth billions of dollars of the hard-pressed taxpayer's money. I am sure that the letters to the White House would quickly reveal that there is no kind of a majority, silent or otherwise, for the SST.

(The prepared statement of Representative Reuss follows:)

PREPARED STATEMENT OF REPRESENTATIVE HENRY S. REUSS

Mr. Chairman, I appreciate this opportunity to testify on the SST.

I discussed the economics of the SST before the House Transportation Appropriations Subcommittee two weeks ago. Today I would like to concentrate on the environmental aspects of the SST.

Mr. Chairman, the SST is an environmental outrage.

We are being asked to spend $1.3 billion of the public's money, and more likely $3 or $4 billion before we are through, on a plane that will serve only a minute fraction of American taxpayers, while millions of others pay the penalty for this folly in the form of increased airport noise, sonic booms, air pollution, and potentially harmful weather changes.

Russell E. Train, Chairman of the President's Council on Environmental Quality, participated last year in the interdepartmental Ad Hoc Task Force review of the SST. Speaking then for the Interior Department, he said that the SST should not proceed.

"We consider the environmental disadvantages to be of extreme significance . . . We believe that the probable adverse environmental impact of the SST is such that the program should not be pursued in the absence of overwhelming evidence of positive advantages."

Is it any wonder that the Administration attempted to conceal this report from the public!

More recently, on February 5, Mr. Train told a breakfast meeting of reporters that "The environmental problems posed by the SST are exceedingly serious and have not been solved yet."

In that same February 5 meeting, the other members of the Council on Environmental Quality joined in Train's criticism of the SST. As reported in the New York Times the next day:

"[Council member Dr. Gordon] MacDonald, formerly vice chancellor for research and graduate affairs at the University of California, said that he had been associated with some of the problems, and that he shared Mr. Train's views.

"Specifically Dr. MacDonald mentioned the large quantities of water vapor introduced into the stratosphere by the SST in flight.

" 'I don't see in the near future the technology to get around these problems,' he said.

"[Council member Robert] Cahn, former environmental reporter for the Christian Science Monitor, said that while the SST would fly at subsonic speeds over populated areas, 'we don't know the effects on wildlife (of supersonic speeds) in nonpopulated areas.' "

Yet, President Nixon, despite the unanimous opposition of his Council on Environmental Quality, despite the overwhelming disapproval last year of his Ad Hoc Task Force on the SST, and despite strong criticism of the SST in a still-secret report from a panel of his own Science Advisory Committee, recommended a go-ahead on the SST last September and has come to Congress this year asking more than three times as much money for the SST as was appropriated last year.

It boggles the mind.

The Administration has provided soothing assurances that the SST will present no serious environmental problems, but the evidence points the other way.

Let us look briefly at each of the major problem areas: sonic boom, air pollution, possible weather changes, and airport noise.

Sonic Boom

The Federal Aviation Administration proposed a rule on April 10 which they say would prohibit the operation of any civil aircraft within the United States at a speed that would cause a sonic boom to reach any part of the surface of the United States, except the surface of the territorial waters.

This is nice, but I don't find it very comforting. The SST won't be flying until 1978, and if it begins to look as if both the aircraft industry and the Government are going to lose a lot of money unless the SST is allowed to fly supersonically over land, what guarantee do we have that the ban will hold firm?

It is instructive to look at the FAA's argument for embodying this ban in a regulation rather than a law. Testifying before the Senate Transportation Appropriations Subcommittee last November 25, FAA Administrator John Shaffer said he preferred the regulation because—

"I believe that this airplane may be dragged into the [domestic] market by the beneficial economic performance sometime after initial introduction and it is quite possible that pressures from the people who want to use * * * this airplane for the profit that it will generate in the world transportation market may drag it into that market, which one might identify as east to west or west to east over populated areas." (Senate Hearings, p. 792)

A pro-SST official in the Department of Transportation has put it somewhat more succinctly. As quoted in the April 30, 1970, Wall Street Journal, this unnamed official said the Transportation Department prefers the proposed FAA rule to a law banning supersonic flights over the U.S. because, in his words, "It's much easier to change a regulation."

Air Pollution

Russell Train emphasized the problem of air pollution during the Ad Hoc Task Force review of the SST last year. Train, then Under Secretary of the Interior, wrote Transportation Under Secretary James Beggs on March 21, 1969, that pollution resulting from SST engine discharges was a "significant environmental problem."

"It is my understanding [Mr. Train wrote] that operation at subsonic speeds, including takeoff and landing, results in inefficient fuel combustion with a resulting heavy discharge of pollutants into the atmosphere. Both atmospheric pollution and ground contamination seem likely to result."

This problem could be more serious than Mr. Train anticipated if the ban on supersonic flights over populated areas holds firm. The SST would then be forced to fly subsonically to serve inland cities such as Chicago, spewing forth pollutants the whole way. We would be, in effect, exchanging sonic booms for air pollution. That's not an especially good trade, and it would be immeasurably better to have neither.

Weather Changes

The Environmental Panel of the Ad Hoc Task Force on the SST reported last year that the widespread use of SSTs will introduce large quantities of water vapor into the stratosphere. This water vapor, the Panel said, could produce two important effects. In their words:

> "(1) Persistent contrails might form to such an extent that there would be a significant increase in cirrus clouds;
>
> "(2) There could be a significant increase in the relative humidity of the stratosphere even if there were no significant increase in the extent of cirrus cloudiness."

The Panel said that both effects would alter the radiation balance of the earth and thereby possibly affect the general circulation of atmospheric components.

Some scientists have warned that this increase in cloudiness could reflect away enough sunlight to significantly lower the temperature of the earth, ushering in a new ice age. Others have said that the potential atmospheric changes from SST flights might lead to an increase in the earth's temperature, melting the polar ice caps and leading to extensive flooding.

One scientist has written to me from the Stanford University Department of Biological Sciences suggesting that the exhaust from the SST will speed up the catalysis and destruction of the ozone in the stratosphere that now serves as a

shield against incoming ultraviolet rays. The destruction of the ozone, he said, could create a permanent "window" in the atmosphere, resulting in all life under these windows being killed by the ultraviolet rays.

Mr. Chairman, I have no idea how much weight these predictions deserve. What disturbs me, however, is the cavalier manner in which they have been dismissed by the Department of Transportation.

When DOT was asked in the course of Senate Appropriations Subcommittee hearings last year to comment on the issues raised by the Ad Hoc Task Force Report, their prepared response on the "Water Vapor Hazard" showed clearly how inadequate their attention to this issue has been.

Their response begins by stating flatly that the Task Force's concern over this problem "is not shared by the scientific community." Their sole evidence for this statement, however, is a report by the National Research Council of the National Academy of Sciences which is now more than four years old and which says only that it is its "tentative" conclusion that water vapor will not be a problem (Senate Hearings, p. 706).

At another point, DOT reaches back even further to come up with still more modest support for its pooh-poohing of the water vapor hazard. This time it is a memorandum to the FAA Administrator from the Environmental Science Services Administration, dated October 4, 1965. The memorandum states:

"It is the view of the Office of Meteorological Research, that although an unequivocal answer cannot be offered, the general opinion of a large group of scientists almost unanimously rejects any significant threat to modification of the weather."

Perhaps these outdated, tentative, and equivocal assurances are enough for the Department of Transportation, but I think Congress has a right to expect something more, especially now that the National Environmental Policy Act requires a "detailed statement" on the environment impact of programs such as the SST.

Airport Noise

The problem that most concerns me, however, and the one which I would like to focus on, is the airport noise which the SST will generate.

I think three points are worth making:

(1) The SST, judging from present indications, may not be able to meet the noise criteria for supersonic aircraft to be issued early next year by the FAA, and the Concorde, which is considerably louder than the SST, almost surely will not be able to.

(2) The SST probably will not be able to meet the noise requirements specified in the program contract.

(3) Both the SST and the Concorde will be significantly louder than any other plane flying at the time they come into service.

FAA Supersonic Noise Rules

The FAA rule on supersonic noise is scheduled to be issued in the first quarter of 1971, and will be preceded by preliminary notices in the first and third quarters of this year. Indications now are that the U.S. SST will have trouble meeting this rule, and that the Concorde probably will not meet it at all.

The biggest problem with the U.S. plane is the so-called sideline or airport noise, Dr. Raymond L. Bisplinghoff, Dean of the School of Engineering at MIT and Chairman of the SST Technical Evaluation Committee formed last year by FAA to review the plane, put it this way:

"Although the community noise generated by the SST is no greater than contemporary subsonic transport airplanes, the sideline noise is appreciably greater. There is very little prospect of bringing the sideline noise down to subsonic transport levels by any practical methods known at the present time." (Memorandum to the FAA, February 7, 1969.)

The January 5, 1970, issue of *Aviation Week*, which is devoted entirely to the SST, confirms Dr. Bisplighoff's view. Currently, the industry journal points out, "there are no proved technological methods of substantially cutting the noise without severely reducing engine performance." The SST's sideline noise during takeoff, they note, will be about 2.5 times as severe as that from a 707, noisiest of the current aircraft.

In an article on the General Electric engine, the *Aviation Week* author says that GE engineers and scientists "doubt that the GE4 can meet airport noise requirments." Going on, the article says:

"Some GE and FAA officials believe that 'correct airport usage' will offer the only solution to the airport noise problem of the supersonic transport . . .

"GE engineers concede there is a strong possibility the engine will not be able to meet the near-field noise standards—airport noise—that the FAA is expected to establish this year for supersonic transports . . .

"Other than going to what they refer to as 'correct airport usage,' they do not know how they can solve the airport noise problem."

But if the SST's prospects are clouded, those of the Concorde are positively gloomy. Again from *Aviation Week:*

"Although FAA officials concede the [SST] will have unfavorable sideline noise characteristics, they say they are not serious when compared with the Anglo/French Concorde, which will precede the U.S. supersonic transport by at least four years."

And in an article on the Concorde from the February 21, 1970, issue of *Business Week*, it is reported that:

"Last spring, above the din of the Concorde engines at the Paris Air Show, a New York airport official could be heard shouting that the plane would never be allowed near New York unless the production model was substantially quieter."

SST CONTRACT NOISE REQUIREMENTS

The SST contract between Boeing and the FAA specifies certain "minimum prototype airplane requirements." Among these are:

(1) "Takeoff runway sideline noise . . . not to exceed 118 PNdb."

(2) "Community noise . . . not to exceed 94 PNdb."

(3) "Approach noise . . . not to exceed 108 PNdb."

If *Aviation Week* is to be believed, however, the SST is nowhere near these contract noise requirements. According to that journal, sideline noise is now around 122–129 PNdb, as opposed to the contract requirement of 118 PNdb. The community noise is 110 PNdb, as opposed to the 94 PNdb required in the contract. And approach noise is 112 PNdb, well over the 108 PNdb required in the contract.

It should be kept in mind that airplane noise is measured on a logarithmic scale so that a noise measure at 10 PNdb more than another noise is actually twice as loud, rather than 10 percent louder.

MORE NOISE COMING

As the Subcommittee knows, the FAA has set maximum noise limits for all new aircraft that require noise levels significantly below those of existing aircraft. Over the next few years, the FAA will require the operators of existing aircraft to install noise suppression devices to reduce the noise from these current planes to the level of the newer and quieter planes. At this point those living in the vicinity of airports might well expect a little relief from airport noise. Not so, however, if the Concorde and the SST are allowed to land. They are both louder than the 707, which is the noisiest civil aircraft now flying. And remember that the 707 will be fitted with noise suppressors by then, so it will be a good deal quieter then than it is now. This means that there is going to be a huge jump in airport noise if the Concorde and the SST are allowed to land in this country.

Aviation Week lends confirmation to this noise comparison. They say that the SST "will produce more perceived noise than the 707 during every phase of takeoff until both aircraft reduce power to begin noise abatement procedures." The sideline noise from the SST will be "2.5 times as severe" as that from the 707. And the Concorde, they say, will be even worse.

FAA Administrator John Shaffer almost admitted this last year in the House Appropriations hearings when he said:

"The Concorde will be comparable in noise level to some of the worst of our current subsonic jets." (p. 74)

The Department of Transportation says that the solution to this problem is simply to build more airports, and to build them big enough so that no one will be near enough to the runways to be bothered by the sideline noise. Perhaps this is the answer, but the difficulties many cities have encountered in finding a place to put new airports suggest that it is not quite that easy. *Congressional Quarterly* reported on April 17, for example, that "Miami, Los Angeles, New York, New Orleans and San Francisco are all facing determined opposition to new air facilities." Furthermore, if airports for the SST must be located

at great distances from population centers, what becomes of the time saving which is the SST's only selling point? Who will choose to fly on an SST rather than a subsonic plane if the time saved in the air will be dissipated in getting to the airport?

Why not postpone certification until DOT tells us just where it proposes to build these no-nuisance airports?

BAN THE CONCORDE AND STOP THE SST

This discussion of SST airport noise brings me to the crux of my statement.

The FAA, I suggest, should forthwith issue its supersonic noise certification rules, which, if they are at all comparable to the subsonic noise rules, will ban the Concorde from this country. With the Concorde effectively banned from the profitable trans-Atlantic market, it could no longer be considered a threat to the U.S. aircraft industry or to the U.S. balance of payments. And with the Concorde out of the competitive picture, the way is clear to call a halt to the SST.

A U.S. ban on the Concorde will, of course, bring forth cries of anguish from the British and French. But they have been on notice since at least July 1968 (when Congress passed airport noise and sonic boom control legislation) that the Concorde had to meet U.S. noise standards. Furthermore, it's not as if we're singling out the British and the French— or the Russians, for that matter. American airplanes are going to have to meet these airport noise standards too, and it's going to cost them a substantial amount of money to do so.

It's worth noting that we gave the British and French an opportunity to negotiate a mutual slowdown of the SST race in the summer of 1969, and they turned it down. As the Washington Post reported on April 1, 1970, in an account of a Transportation Department press conference:

"[Transportation Secretary John A.] Volpe said that last July he suggested to builders of the Concorde, the French-British combine building a slower supersonic plane, that the Europeans and the Americans might agree to a de-escalation of their supersonic race. He said the builders of the Concorde showed no interest."

Stopping the American SST would be a blow to Boeing, and perhaps to some of its subcontractors. Boeing does need help. But why not take all or part of the $700 million in Government money that Boeing would lose by cancellation of the SST, and instead give Boeing Government contracts to improve our environment, rather than destroy it—contracts for work on non-polluting mass transit, on air and water pollution control equipment, on new housing technologies, and in other areas where their great technical and managerial resources can be put to good use.

Some breakthroughs here would add far more to American prestige than an environment-despoiling superplane for the jet set.

The budget for the next fiscal year contains only $106 million for an air pollution control program that can benefit everyone, but $290 million for an SST that can benefit only a few. The Administration's mass transit program contemplates spending only $500 million over the next 12 years for research and development on new modes of mass transit to help millions of people get to their destination faster with *less* harm to the environment, while the SST program contemplates expenditures many times in excess of that for a plane to get only a few people to their destination faster with *far greater* harm to the environment.

Something is wrong here. In my recent opinion poll in Milwaukee, 88 percent of those responding opposed further Government spending on the SST. And in a poll of those who viewed a public television broadcast last October in which the pros and cons of the SST were debated 86 percent of the more than 4000 who responded from 46 states opposed the SST.

The President should submit his case for the SST to the people. Let him go on nation-wide television and explain why this plane is worth billions of dollars of the taxpayer's money. The letters to the White House will then reveal whether there is some kind of heretofore silent majority for the SST.

Chairman PROXMIRE. Congressman Reuss, thank you for a most helpful statement. I think it is particularly useful, because we have gone over the SST for years, as you know, debating it in the House

and Senate. But I think that almost every element that you raised was new.

The airport noise, for example, was something that has not been discussed or appreciated or documented. And I think that your contribution is most helpful here.

Your suggestion that the Concorde be banned from using our airports, I would like to think about that. It is a very, very interesting proposal. It does make sense in terms of the environment. It would solve our problems in terms of aviation competition. It does raise some other questions. But I think it is a very, very interesting suggestion, and one that I think deserves real consideration by the Congress.

Your suggestion of contracts with Boeing on constructive antipollution measures is also ingenious, because, to be frank about this, the real press and power and push in the Senate comes from two of the most popular and powerful Senators, very able and very fine men who command great respect and admiration from other Senators, Senator Jackson and Senator Magnuson.

And there isn't any question that they have a lot of influence, and for a good reason. I think they should do their best to champion the economic interests of their State.

Incidentally, it is interesting that that poll you referred to, as I recall, had a breakdown by States. And it showed even in the State of Washington, the location of Boeing, the vote was more than two to one against the SST.

And then the final point you make, that $290 million is in the budget for the SST to create air pollution, contrasted with $106 million to reduce air pollution, I think that is a most compelling and interesting contrast.

Let me ask, the real payoff routes, not the glamor routes, but as I understand it the payoff routes in commercial avitaion are within this country one way or another, coast to coast, Chicago to the Pacific coast within the great commercial centers of our country. Isn't it true that a benefit-cost study by the Defense Department of the supersonic transport showed that the SST can only pay off, can only give a reasonable commercial run if it is permitted to fly over the land, that is, over populated territory?

Representative Reuss. Yes; that seems inevitable, that restricting the SST to over-water flight is going to make it an uneconomic instrument, which may account for the atrocious use of the English language by some of the Department of Transportation people.

What they are trying to say in all that gobbledygook is, "look, we may want to do some fudging on our directive that the SST not fly over land." In other words, in a few years, if the thing goes through, I feel very certain that they would be around saying, "well, this isn't working over water, but in order to save our investment and make a few people happy domestically, let us fly it over land." And then we really would be in the window-cracking sonic boom stage.

I would point out in this connection that if all you did with the SST or the Concorde is to fly it over water, transatlantic rate structures being as they are, it is going to mean that the SST flights have to be subsidized by the fares on economy subsonic flights, and the schoolteacher who has scrimped and saved to go abroad for the summer is going to find that she has to pay more so that a few jet setters can ride on the SST.

So quite apart from the environment, this SST and the Concorde is going to be one of the most regressive, anti-average person vehicles in history. This point has not been made. But as the chairman knows, transatlantic air travel structures are something that are set on a very monopolistic basis, and the U.S. Government has been notoriously lax in trying to interfere in behalf of the average person to get those fares down.

So you can imagine what will happen if you get the SST uneconomic structure geared in.

Chairman PROXMIRE. Many of our existing airports will not accommodate the SST because of the noise it will make. We are going to have to build new airports to land these planes. They will have to be big airports. A witness who follows you charges that the runways will have to be over 2 miles long. A mile or two will have to be allowed on each side of the plane—the noise, as I understand it, surrounds the plane in all directions. No one will want to live near these airports.

These airports will cost a lot of money. They will irritate a lot of people. The costs are not being included in the SST cost estimates. But these costs should be included in the social cost and benefit calculation. Would you agree?

Representative REUSS. Absolutely. That is the real Achilles' heel of the program. The fact is that tolerable airports for the SST can only be built out in the desert, and the desert is not close to New York, Chicago, or the other places where these are supposed to land.

Chairman PROXMIRE. This program has been studied and reviewed over and over again. The dangers, the problems, the costs are clearly enormous. Nobody, as far as I can see, has discovered any real benefits. There have been repeated recommendations to halt the program.

Is the SST the modern version of a public works program? Is our real objective to transfer income to the aerospace sector of the economy?

Representative REUSS. No, I do not think so. The old public works programs, wasteful though they may have been, and lampooned though they may have been, did provide jobs for hungry and needy people in the depression of the thirties. The SST will not have any such effect. It is not going to take care of our structural——

Chairman PROXMIRE. It is not even a very good public works program in view of the enormous cost for each job it is providing, is it? If you design a program that will provide jobs at the lowest possible cost it would seem that this is one of the last programs that you would select.

Representative REUSS. The best public works program that this country could embark upon in my judgment would be a massive use of our systems analysis technology in the great domestic problems of housing, air and water pollution, mass transit, a better environment. That is where American technological know-how can best make people happy and provide jobs for people. Why we don't do that I do not know.

Chairman PROXMIRE. Let me ask finally, why in the light of the virtually unanimous recommendations of President Nixon's ad hoc committee last year—I don't recall any person who was appointed to that committee or any agency that was represented that was not negative on the supersonic transport—why do you believe that the President chose to go ahead with it?

Representative REUSS. The political power of Boeing and General Electric, and their wide use of subcontracting, the absence of any representative on the scene of the public interest, the fact that our budgetary tightness and our inflation had not then become as pronounced as it is now, which in my judgment makes these hearings of tremendous value and not necessarily quixotic in nature.

Chairman PROXMIRE. Thank you very, very much, Congressman Reuss.

I would like to ask if the next three witnesses could come to the table together. We would like to have Mr. Richard L. Garwin, of the IBM Watson Laboratory, Mary Goldring, business editor of The Economist, and General Quesada, vice president, chairman of the board, L'Enfant Plaza Corp., formerly Administrator, Federal Aviation Agency.

Mr. Garwin, will you please proceed?

STATEMENT OF RICHARD L. GARWIN, PHYSICIST, IBM WATSON LABORATORY

Mr. GARWIN. Yes. Thank you very much.

I will speak briefly so that there will be time for questions.

I want to reemphasize that I am speaking for myself alone and not for any group, organization, company, or establishment with which I am or have been associated.

Chairman PROXMIRE. We will place your entire prepared statement in the record, Mr. Garwin.

Mr. GARWIN. Thank you.

Regardless of the benefits or lack thereof of the supersonic transport program, there is a question of the adequacy of the procedure by which the administration and the Congress decide to proceed with such a program.

One of the main points which I want to present is my belief that there has been less than adequate, and in many cases distorted, information available for this decision process, both within the administration and the presentations to the Congress.

My prepared statement shows that the aircraft which is now under development is quite different from, and inferior to, the aircraft which was endorsed by the Congress in the earlier days, when the President's phase III development program was begun. Furthermore, the contract under which the aircraft is being developed has had serious modifications, and affords substantially less assurance that the production supersonic transport will have desirable characteristics.

Neither of these points in my opinion has been candidly stated to the Congress. And I believe that for the Congress to exercise its responsibility in this matter, it should have the current information, which I have obtained from publicly available reports.

Since the congressional action authorizing proceeding on phase III, the present development phase of the supersonic transport—which I will remind you is for the manufacture of two identical prototypes of the SST with a maximum gross weight of 635,000 pounds, and the conduct of a 100-hour flight test altogether, with only a few hours, perhaps as little as seven or less, at maximum supersonic speed; the phase

IV and phase V of the program in this phased approach being respectively the certification phase which would extend the flying to several thousand hours and result in certification of the aircraft at an estimated cost of some $600 to $700 million in 1967 dollars, and the phase V of the program being the production phase itself, up to the delivery of the first commercial SST—since phase III was authorized by the Congress, the economic environment and the ecological environment has changed substantially. The air traffic growth in the last year has been minimal. The airline profits have in some cases been negative. The ability of the airlines to pay for the supersonic transport, in part because of the removal of the investment credit, in part because of the lower profitability, is far different.

The FAA under Public Law 90–411 has implemented certification requirements on the noise from subsonic transports. These requirements are in the range of 108 decibel perceived noise level for approach noise, for takeoff noise, and for sideline noise. There used to be no noise requirements at all imposed by the Federal Government for certification of aircraft. The supersonic transport, then, when it appears, if it exceeds by far these accepted noise levels for subsonic aircraft, will be very poorly accepted by the neighbors of the airport. For this reason, among others, the program has a degree of uncertainty which will result in difficulty or the lack of availability of private financing for the phases IV or V.

I would remind you that the proponents of the supersonic transport have either "hoped" or stated or "wished" or promised that phase III will be the end of the Government involvement in the program, and that phases IV and V will be privately financed.

I do not think that there is a chance in the world of all-private-financing in the sense in which one ordinarily uses this word. In fact if one goes to Wall Street and asks about the possibility of private financing, indeed the magnitude of the investment required to finance phases IV and V of the SST is not a bar. In 1975 dollars this will be between $5 billion and $7 billion, although it is stated as $3 billion to $5 billion in the publicity, that is, 1967 dollars. We must escalate those dollars, because current dollars are what Congress appropriates and what the contractors spend.

But it is not the magnitude, not the billions of dollars which is the problem in obtaining private financing, it is the risk associated with that investment in the case of lack of success, and the low return on investment in case of success. The program is not attractive from either of those points of view, although you can get statements that, "Yes, if the program has minimal risk, and if the rate of return on private investment is made adequate by the provision of other funds by loans from the Government at a low interest rate, then private investment may be forthcoming."

But, I believe that private investment will be forthcoming only if there is a Government guarantee against loss to the private investors, and if there is Government supply of funds—and a very low maximum rate of return to the Government in case of success—which will increase the return on investment to the private investor.

I point out that many of the original reasons advanced for the Government's involvement at the time at which Congress agreed to

the conduct of the SST program have been examined by those in the Government responsible for those individual implications, and have been found wanting. Those are, for instance, the defense implications of the SST. The Defense Department not only has not expressed a requirement for the SST, as was agreed by the FAA in their presentation to Congress last October, but if one actually looks at the facts of the use of the SST for air mobility, it is neither needed nor adequate.

In addition, in connection with the presentation by the SST proponents to the ad hoc committee appointed about a year ago by the President to review the SST, in the words of Mr. Russel Train, published in the Congressional Record last fall—I have them in the document—"my own notes of the discussion indicate that the Defense Department does not expect significant military applications of the SST."

"Technological fallout" was reviewed by personnel from the Defense Department and from other agencies on that same ad hoc committee, who found that systems similar to those going into the supersonic transport are already under development for military and commercial applications. In some cases they are absolutely necessary to the success, even to the limited success of the SST, whereas they only increase the benefits in these other systems. But they are under development. The specific benefits to the labor force have been discussed by the Labor Department and found negligible.

The balance-of-payments question has also been addressed—there has been a good deal of controversy as to when one wants to stop counting the return in the balance-of-payments account. However, the three consultants whom the FAA brought in to challenge the report by the Institute for Defense Analysis—which said that the balance-of-payments contribution would be negative rather than desirable—in some cases did not challenge, and in one case supported, the IDA position. But if one reads this full report they said as follows, Dr. Colm said:

"I doubt that the SST program should be regarded as the best way to cure current and foreseeable balance-of-payments difficulties."

Dr. Kindleberger was quoted in the hearings last fall as concluding "that the IDA report generally gave a good answer to the balance-of-payments question, but expressed the belief that the Government should not decide major issues of resource allocation on balance-of-payments grounds."

A third consultant concluded that a successful SST program—and that is a successful SST program, not necessarily the program that we are pursuing—"would be beneficial to the balance-of-payments only if work on the SST did not impair the United States competitive position in the market for subsonic planes."

Now, if the international fare structure is not allowed to seek its lowest level, as could otherwise occur with the increasing use of the 747 by U.S. and foreign airlines, but is maintained artificially high in order that the SST should be able to compete, the future market for subsonic aircraft and for air travel will be depressed, with consequent damage to the manufacturers and to the individuals who would otherwise travel.

Now, as for "leadership in aviation," such leadership has at least

two aspects, technological and commercial. In technology, we have long ago demonstrated leadership in supersonic aviation by the construction, deployment, and continuing operation of a fleet of supersonic mach 3, SR–71 reconnaissance aircraft.

In commercial aviation, I can conceive of no better way to obtain leadership than to take those actions by individuals and by the Government which would result in a great expansion of the market for travel, so that our citizens and the citizens of foreign countries will be able to travel more freely from one country to another, for whatever purpose.

Now, I just want to read my recommendations, and then I will answer questions.

RECOMMENDATIONS

1. The needs of the public for environmental protection and the costs to our large, important, and beneficial air transport industry have already been brought to some compromise by the introduction of noise certification requirements for large subsonic jet aircraft. The needs of the public for protection against the similar aspects of operation of supersonic transports seem to me to require a similar level of protection, which is by no means the ultimate limitation which will eventually be imposed. I recommend that noise certification criteria immediately be established for SST aircraft which are the same as standards applied under Public Law 90–411 to subsonic aircraft of equivalent gross weight.

That means, I think, that the neighbors of the airport should not be required to accept an SST whose noise is equivalent to that of some 50 747's taking off simultaneously, in a period when they have been used for 6 years to the noise level of the 747.

2. I recommend the immediate termination of the U.S. Government's direct or indirect support of the SST program. When the conditions are ripe for a commercial program which can be accommodated without severe environmental penalties, U.S. industry and finance will rise to the occasion. Government support before that time seems to result in great pressure to continue an uneconomic program, in warping of the environmental protection regulations to suit the machines and not the people, and may well lead to an increase in all air fares if the airlines and passengers are expected to bear some or part of the cost of procurement or operation of the SST.

3. I recommend the study of new mechanisms whereby programs can be given greater continuing visibility outside the department concerned. In the case of the SST, changes in program goals as indicated by the evolution of the contract should be of major concern to the Bureau of the Budget, the Council on Environmental Quality, the Department of the Interior, and to the Congress. It is important that these other concerned parties not interfere with or participate in the actual management of the program, but since the program is in the nature of a contract between an operating department and an outside organization, one must consider the interests of the "third party" to the contract. that is, the rest of the administration and the Congress which has given its approval. Such a study might consider the desira-

bility of having standards for full and accurate disclosure, as are required in nongovernmental affairs by the Securities and Exchange Commission.

4. I recommend that attention be given to the possible benefits and penalties associated with continued support of the mechanism by which the International Air Transport Association (IATA) establishes fares. If lower fares or price competition could be introduced in international travel, the travel would benefit, more aircraft would be sold, and the more efficient airlines and manufacturers could then produce economic benefits for themselves, the consumer, and the economy.

5. I recommend that Congress take the initiative in supporting basic and applied research, development, and demonstration programs toward the solution of the present problems of air transport, as well as toward the solution of other problems of modern life, such as the provision of justice, of health care, et cetera.

To oppose a particular development program because of its lack of justification, its poor probability of success, and its environmental impact is not to oppose all development. In fact, I believe that we are starved for properly chosen development not only toward the solutions of the problems of society but also toward those of national defense. Congress can and should insist on improved mechanisms for choice of programs, but it is necessary also to have money with which to pursue these goals.

(The prepared statement of Mr. Garwin follows:)

PREPARED STATEMENT OF RICHARD L. GARWIN

INTRODUCTION

In connection with the hearings on Federal Transportation Policy, I am pleased to be able to respond to your invitation to testify on the supersonic transport, especially as regards its public costs and benefits. First, I want to emphasize that the views presented are mine alone, and that they do not necessarily reflect the views, past or current, of any organization or group with which I am or have been associated.

In connection with work in industry and government, I have always had a strong interest in the eventual benefits to be derived from a program, as contrasted with the desires or pressures to conduct the program itself. In addition, I have always tried to emphasize total costs, not only those normally included, but also social costs involved in pollution, support, benefits foregone, etc. This concern is evident in reports of the President's Science Advisory Committee, for instance "Insecticides and Pesticides"—1963, and "Restoring the Quality of the Environment" 1965. Some of the important questions of the interaction of economics and technology, and of economics and the environment, will appear in my discussion of the SST.

A brief history of the SST program is contained in the "Justification Material" to be found on pages 2 through 8 of reference 1, (Bureau of the Budget) and on pp. 217–330 of that same reference (GAO). Space limitations forbid the attachment of all reference material, but various statements will be documented by reference to a bibliography at the end.

When the United States involvement in a commercial SST program was proposed in 1963, it was by no means clearly recognized by the Government that the SST would be unable to fly at supersonic speeds over land. Even so late as January 1, 1967, the date of the actual development contract between the FAA and the Boeing Company, much of the economic analysis was done on the basis of permitted supersonic overflight of land masses. In addition, the Contract (reference 2) contains some very specific "minimum production airplane performance objectives" which I partially reproduce as Column 1 in Table I.

TABLE I.—CHANGE WITH TIME OF PERFORMANCE REQUIREMENTS

Characteristics	January 1, 1967 [1]	July 23, 1969 [2]	October 9, 1969 [3]	January 5 1970 [4]
	(1)	(2)	(3)	(4)
Takeoff field length (feet)	6,800+700	7,400	10,300	([a]) 10,300
Liftoff speed (knots)	162	----------	197	([a]) 197
Approach speed (knots)	135	146	158	----------
Landing field length (feet)	6,200+600	7,700	8,250	----------
Airport noise [5] PNdB	116	118	----------	([b]) 122–129
Takeoff noise [5] PNdB	93	94	----------	([b]) 110
Approach noise [5] PNdB	109	103	----------	([b]) 112

[1] Reference 2, page A–6. "Minimum production airplane performance objectives" for operation from 15 specified international airports, 10,500-foot runways.

[2] Reference 2.34, page A–7. Here the production airplane performance objectives have been deleted; these are "specific prototype airplane requirements," but note the contract provisions: "* * * in the event the Government determines at any time that its best interests and the SST program goals will be adversely affected by continuing to require the contractor's compliance with any one or more of the requirements for the prototype set out in paragraph E2 below, the Government in its sole discretion may redirect the contractor's efforts by specifying a new, and less stringent, requirement for attainment." (This would be done by written notice of the contracting officer.)

[3] Reference 1, page 65.

[4] Data from Aviation Week of that date:

([a]) Page 34, ([b]) page 80. This reference states, "The FAA is reporting the following noise levels for the GE4/J5P running without noise suppressors * * * But production aircraft and engines will be heavier than the prototypes so will not have the altitude attenuation advantages of the prototypes."

[5] Compare these specifications and projections with the ICAO (International Civil Aviation Organization) certification standards for large subsonic aircraft of 108 effective PNdB. The specifications in table I are for a rate of climb on takeoff of 500 feet per minute, and for a 3° glide slope approach.

Noise and Takeoff Characteristics

I include this table because one of the difficult and costly aspects of airplane design and operation is provision for takeoff and landing. This is the region of greatest traffic congestion now. It is the source of greatest adverse interaction between the airlines and the public because of airport noise. It is an aspect in which military aircraft often fall far short of planned performance, by takeoff and landing field length substantially above that of design. Most fatal accidents occur in the takeoff or landing phase. In the case of the SST, this is a particularly critical area, because the after-burning jet engines are tremendously noisy and because the high flame temperature, sofar as is now known to engine manufacturers, precludes the use of conventional noise suppressors with a full after-burning engine. Thus, although the last two columns of the table indicate a 10,300 foot certificated takeoff field length, an engine *with noise suppression* would have a substantial loss in thrust due first of all to the loss from the suppressor and second to the fact that full after-burning could not be used with suppressors as presently envisioned for the production aircraft. The takeoff field length would thus become 12,000 to 12,500 feet, well beyond even the 11,000 foot length to which the principal international airports are expected to build their runways. Even with this long runway requirement, the imagined noise suppressor will barely meet the 118 PNdB airport noise specification, and, of course, it is far from meeting the 94 PNdB takeoff noise specified in the contract modification 34 of July 23, 1969.

Since the SST and its foreign competitors will takeoff and land at subsonic speeds from ordinary airfields just like subsonic jet transports, and since at considerable expense and pain the ICAO, the governments, the airplane and engine manufacturers, and the airlines are agreeing on 108 PNdB as a standard for the airport noise, the takeoff noise, and the approach noise generated by individual heavy subsonic jet transports, and since the noise damages to the community and to the airport are the same at 108 PNdB from a supersonic transport as from a subsonic transport, it seems to me that strong consideration should be given to identical certification standards from the point of view of noise for SST's as for subsonic jets.

It should be emphasized that at 125 PNdB of airport noise, the SST will produce as much noise as the simultaneous takeoff of 50 jumbo jets satisfying the 108 PNdB subsonic requirement. The argument is sometimes made that the SST commercial operation does not yet exist. and so there is no need yet to regulate it. The problem is that once it does exist, it will be an accomplished fact, and there will be great economic penalty to the operators and to the manufacturers to attempt to force it to comply with regulations which have been found desirable in order to minimize the economic damages to society. If the SST were to be

allowed to operate at airport noise levels far exceeding those of subsonic transports, it would be taking advantage of a reduction in capital and operating cost and an increase in productivity which has been denied to the subsonic fleet by forcing them to conform to the certification noise requirements found necessary to allow continued airline operations from existing airports.

This is an important point, because the possibility of private financing and the economic viability of the SST depend upon its being permitted to operate from the airports which exist at the time the SST or the Concorde or the TU-144 is expected to enter service.

Although the Administrator of the FAA said in October, 1969 (reference 1, p 27) ". . . the noise rule on the supersonics possibly will be published before the end of this calendar year" none has yet appeared.

The Evolution of the FAA Contract With Time

In reference 2, page A-4, we read:

"d. Airplane Performance Criteria

"1. General.

"The prototype airplane shall be a four-engine land-based supersonic transport airplane with a variable sweep wing, a maximum design taxi weight of 635,000 pounds and shall be constructed primarily of titanium. The prototype air planes shall constitute the basis, without construction of any intermediate models, for a safe and economically profitable production version of the supersonic transport. To provide a representative test airplane, the prototype shall be designed to have the *same aerodynamic configuration* as the basic production airplane." (Italics mine.)

In reference 2.34, the July 23, 1969, modification of the FAA contract, page A-5 we read:

"*Prototype Airplane Requirements*

1. General.

"(*a*) The prototype airplanes shall constitute the basis without construction of any intermediate models, for a safe, superior, and economically profitable production version of the supersonic transport. They shall provide direct evidence that a program *could* emerge sufficiently profitable to attract financing for the certification and production programs. (Italics mine.)

"(*b*) The prototype airplane shall demonstrate (in accordance with paragraph F.1.b. below) the capability of achieving, in the production configuration, all of the production aircraft objectives specified in paragraph D above. It is contemplated by the parties that, assuming a successful development program, production supersonic transports of a variety of configurations will ultimately be built. For the purpose of the demonstration requirement in this paragraph, however, 'the production configuration' shall mean a single configuration of the production supersonic transport which can be directly derived from the prototype without any intermediate models and corresponds closely enough to the prototype in its structural design and aerodynamic configuration so that the prototype test results are representative of the production airplane characteristics."

The paragraph F.1 b referred to states that the substantiation of performance—

"shall to the extent practicable, be obtained, in order of preference, from (i) flight. test (ii) ground test (iii) simulation, and (iv) analysis."

The modified contract thus requires not that there be evidence that a program will emerge but that a program "could" emerge which would attract financing. Not necessarily *private* financing, but financing. Nor does the prototype have to be of the same aerodynamic configuration as the production aircraft any more. Nor is it clear how much it really has to fly in order to "demonstrate" the capability of achieving all the objectives.

Indeed, preceding modification 34 of the contract (July 23, 1969) there was the important modification 15 (March 29, 1968). Modification 15 is sufficiently important that I reproduce it in its entirety.

CONTRACT AMENDMENT	EFFECTIVE DATE	PAGE NO.	NO. OF PAGES
	3-29-68	1	3

PROCUREMENT REQUEST NO.	CONTRACT (Order) NO.	MODIFICATION NO.
WA-SS-68-54	FA-SS-67-3	15

TO: (Contractor's name and address)	ISSUED BY
The Boeing Company Commercial Airplane Division Supersonic Transport Branch P. O. Box 3733 Seattle, Washington 98124	Federal Aviation Administration Office of Supersonic Transport Development 800 Independence Avenue, S. W. Washington, D. C. 20590
ACCOUNTING AND APPROPRIATION DATA CSAD 69X1358	

The above-numbered contract is modified as follows:

1. The parties agree that it is essential for the Contractor to accomplish further design efforts to meet contract requirements and to insure that the prototype airplane, without construction of any intermediate models, can demonstrate the contract objectives for a safe and economically profitable production version of the Supersonic Transport Aircraft. To achieve this purpose, the Contractor shall submit to the Government on or before January 15, 1969, a completely integrated design, fully substantiated by physical tests and detailed engineering analyses (as distinguished from estimates, approximations, or parametric analyses). The physical tests shall be conducted on models, specimens, etc., which shall be representative of the specific design submitted by the Contractor. The design will clearly and satisfactorily demonstrate, in the judgment of the Administrator of the FAA, that a prototype airplane manufactured in accordance with such design will meet the criteria and requirements for the prototype airplane specified in Exhibit A, Part I, Section D.

2. **Notwithstanding any other provision hereof, in the event the Contractor** fails to submit such a design by such date, the Government may within 90 days after receipt thereof, terminate the contract for default without allowing the Contractor to cure any such default and without furnishing a thirty-day notice thereof.

3. **Notwithstanding any other provision hereof, in the event the contract is terminated for default by the Government because of the Contractor's failure to furnish a satisfactory design as required above:**

Except as hereby modified, all terms and conditions of said contract as heretofore modified remain unchanged and in full force and effect.

The Boeing Company (NAME OF CONTRACTOR)	UNITED STATES OF AMERICA FEDERAL AVIATION AGENCY
BY [signature] (SIGNATURE) 25 Apr 68 (DATE)	BY [signature] (SIGNATURE OF CONTRACTING OFFICER) 25 April 68 (DATE)
~~The Boeing Company~~ (TYPED NAME) Robert J. Murphy, Jr. ~~Vice President,~~ (TITLE) ~~Washington Representative~~	J. C. Maxwell, Major General, USAF (TYPED NAME OF CONTRACTING OFFICER)

AFM 3351-1A (7-63) (44551)

a. The Government shall not be liable for the payment of, and to the extent the Government has reimbursed the Contractor shall be repaid by the Contractor for, the costs of any work performed under the contract, on and after the effective date of this Modification until the date of termination for default or until a date thirty (30) days after submission of the Contractor's design, whichever date first occurs; such costs shall include, but not be limited to, costs for work during this period of time which are included in termination or other claims of subcontractors or suppliers and amounts paid by the Government as free credit in accordance with Article IV.A.2, but shall not include amounts paid as a credit in accordance with Article IV.A.5; provided that the Contractor shall be reimbursed for, and shall not be required to pay back, any otherwise allowable costs to the extent that such costs have been, or can be, paid from Airline Contributions received by the Contractor including interest thereon; and

b. The terms of the clause of the contract entitled "Disputes" shall not apply to any decision by the Government (1) that the design submitted by the Contractor is not satisfactory as required above, (2) to terminate

the contract for default, (3) as to amounts due to the Contractor or the Government under the contract arising out of the termination of the contract for default or with respect to an event occurring during the period of time described in Paragraph 3.a. above, or (4) made in accordance with the clause of the contract entitled "Excusable Delays", and all such decisions shall be final and not reviewable by any person, board or court; provided, however, that to the extent any such decision involves a question of law or is fraudulent or capricious or arbitrary or so grossly erroneous as necessarily to imply bad faith or is not supported by substantial evidence, such decision may be reviewed by a court of competent jurisdiction.

4. The program milestone dates in Exhibit A, Part I, Section C.1. are deleted. After submission of a satisfactory design as required above, the parties agree to negotiate in good faith for inclusion in the contract of new and reasonable program milestone dates compatible with the goals of the SST Program and the satisfactory prototype design; provided that, unless otherwise agreed to in writing by the Contracting Officer, the Number One Prototype First Flight shall be no later than March 31, 1972. The parties do not anticipate that the Contractor's new program milestone dates or further design efforts as contemplated hereunder will result in any claim by the General Electric Company for an increase in its cost overrun point under Contract FA–SS–67–7. However, if the General Electric Company does make such a claim, the Boeing Company will negotiate such claim with the General Electric Company. In the event The Boeing Company is unable to resolve such claim by negotiation with the General Electric Company without an increase in the cost overrun point in Contract FA–SS–67–7, the cost overrun point in this contract (FA–SS–67–3) will be decreased by a fair and reasonable amount not to exceed the amount that the cost overrun point in Contract FA–SS–67–7 is increased as a result of such claim by the General Electric Company; provided that any determination by the Government as to the amount of such decrease in the cost overrun point of this contract shall be subject to the "Disputes" clause of the contract.

5. The Contractor may proceed to accomplish the requirements of this Modification No. 15 generally as set forth in the Contractor's "Integrated Configuration Development Plan," D6A11274–1 submitted by the Contractor's letter dated March 15, 1968, however, except as may be expressly provided in the preceding paragraphs, the foregoing shall not be deemed to release the Contractor from any of its obligations under the contract.

6. This Modification does not result in an adjustment in the cost overrun point nor in the estimated cost of the contract.

Modification 15 arose because the swing-wing version of the SST showed no promise of meeting the contract requirements. Unless the design—

"clearly and satisfactorily demonstrate (d), in the judgment of the Administrator of the FAA, that a prototype airplane manufactured in accordance with such design will meet the criteria and requirements for the prototype airplanes specified in Exhibit A, part 1, section d," (of reference 2).

the government could terminate the contract for default without paying the contractor its contribution and without recourse, except—

"to the extent any such decision involves a question of law or is fraudulent or capricious or arbitrary or so grossly erroneous as necessarily to imply bad faith or is not supported by substantial evidence,"

in which case such decision might be—

"reviewed by a court of competent jurisdiction."

Modification 34 (reference 2.34) (July 23, 1969) contains the paragraph:

"2. The requirements of modification 15 having been satisfied, said modification is hereby superseded and deemed to have no further force or effect."

At that time, the new specifications were stated as indicated in column 2 of Table I not as specific requirements on the 750.000 lb production aircraft, but as requirements (similar numerically to the original ones) applying to the 635,-000 lb prototype. These requirements implied production specifications like those of columns 3 and 4, Table I, or a field of 12,000 foot length or greater if noise suppressors were carried. Certainly the characteristics presented to the Congress on October 9, 1969, do not fulfill the requirements of modification 15. If the design validated by the SST Program Integration Board February 13, 1969, met the column 1 specifications of Table I, what disaster intervened by October 9 to change the performance to column 3? On the other hand, if column 3 reflects the design characteristics as of February 1969, how can this design be said to

satisfy the requirements of column 1 and so fulfill the requirements of modification 15?

To recapitulate, the US SST program was initiated in 1963 by President Kennedy, who said—

"In no event will the government investment be permitted to exceed $750 million."

According to reference 1, page 142, the total government investment in development cost through Phase 3 will amount to $1,285 million, but as will be discussed, the actual government involvement may very well be much higher. The development contract won by Boeing on the basis of the swing-wing design and requiring the prototype to be very close to the actual production version, as well as to have outstanding takeoff and landing characteristics, has been successively modified to the point at which it is problematical whether the SST will fit on existing airfields, and to a point at which the airport noise is far beyond the maximum considered acceptable for jet aircraft now. Finally, the contract now states as noted in the footnote to my Table I, that if the "Government's" best interests and the SST program goals are adversely affected by continuing to require the contractor's compliance with any one of the requirements for the prototype, then the government may specify a less stringent requirement. It is fair to ask for the mechanism by which the SST Program Office determines the Government's best interests, which are not identical with the interests of the Program Office. Had the original aircraft been successful as proposed, all kinds of economically and socially beneficial tradeoffs could have been made by allowing the takeoff run to grow, the noise level to increase, the fuel reserves to be diminished, etc. I wish to point out that the aircraft as it is specified now, without any assurance that *these* specifications will hold, is far less attractive (if only because it has far less margin) than the one which was originally supported by the Congress.

The Question of Default

In accepting Contract Modification 15, Boeing gambled that it could submit and substantiate by January 15, 1969, a new design which the Administrator of the FAA would judge to lead to a prototype satisfying the original contract requirements. The then Acting Director of the FAA for SST Development has stated about the earlier design (reference 1, page 68) :

"It would have been safe, but it would not have met the requirements of our contract and we stopped it."

He said further about the possibility of the FAA's terminating the Boeing Contract for default (reference 1, page 108) :

"The proof of default is what concerned us, Sir. We were not sure we could prove in fact that they defaulted unless we had proceeded to build the aircraft. . . ."

However, the contract with its Modification 15 provided that in case of a judgment of default by April 15, 1969, the Government would not be liable for the Contractor's sharing of the cost and its decision would be final, except to respond in court to the Contractor's possible suit claiming the decision to be "fraudulent, capricious, arbitrary or so grossly erroneous . . . or without substantial evidence."

As we have seen, the new design, *even after refinement* to the status of October 9, 1969 (column 3 of Table I) by no means satisfied the contract requirement of column 1. I believe that the contract should have been terminated for default before April 15, 1969, accepting the possibility that the Government might have been found by a competent court to have terminated instead "for convenience."

On July 23, 1969, Contract Modification 34 became effective, in which the FAA specified and Boeing accepted specifications which, although similar numerically to the *Production* Aircraft specifications of the Contract, implied much poorer takeoff and landing characteristics for the Production Aircraft. To the extent that the numerical similarity between the (Prototype) requirements of Reference 2.34 and the original Requirements (Production) was taken to signify that the new design complied with the requirements of the Contract, The Administration and the Congress were misled.

The Economics of SST Operation

Whatever the future may hold for supersonic flight, the SST being developed under the FAA contract will have a sonic boom far in excess of that which would

be acceptable over populated areas. The SST, the Concorde, and the TU–144, so far as the United States is concerned, are over-water and not over-land vehicles. The FAA-expected market has thus dropped from some 1200 for the "boom unrestricted case" to some 500 for the "boom restricted case," but the market, depending upon the cost of the airplane and its efficiency, may be quite different from 500, as indicated by the following example: The FAA projects a market of 497 SST's at a price of $40 million if the competing subsonic aircraft have a fare equal to the average of the Boeing 707 and the Boeing 747 and if the passengers' response to faster flight at a surcharge is as if they value their time at 1.5 times their hourly earning rates. With a valuation of time at 1 times the hourly earnings and with a subsonic fare appropriate to the 747 operating cost, the expected market is 279. If, further, the price of the SST aircraft is $50 million (1967 dollars), under these same assumptions the two projections would be 333 aircraft or 155 aircraft.

The value of time has been a subject of considerable debate and not much study. It was proposed in 1966 that the Department of Transportation conduct a one million dollar experiment to settle this question, but this was never accomplished.

The problem is further complicated as indicated by the report of the Economics Panel to the SST Ad Hoc Review Committee established by President Nixon in February 1969, which states:

"It should be noted that by the terms of the FAA-Boeing contract, Boeing establishes the price of the plane. Given the demand model specified, Boeing . . . could make more money at a price of $40 million than at a price of $37 million. In fact, Boeing could maximize its profits if it charged about $48 million. Such a price would reduce sales of planes to something under 350. This would in turn reduce government royalties to the point that the government barely got its money back."

On this working panel were representatives from the Council of Economic Advisers, Department of Labor, and Department of Commerce. I personally have little doubt that the Boeing Corporation, in carrying out its responsibilities to its investors, will set the prices of the aircraft so as to maximize the return on investment. According to the FAA's own methods for calculating demand, the number of aircraft sold will thus fall to about 350.

The Draft Report distributed March 19, 1969 by the Chairman of the SST Ad Hoc Committee reflected the above quotation as—

"It should be noted, however, that provisions in the contract permit the government to set the price if it so desires."

The labor Department representative objected to the Draft as a "possibly misleading summary of the subcommittee reports." He emphasized (Ref. 1, p. 341):

"The present contract with Boeing affords the Government no real protection against a higher price than is currently contemplated, which could result in a substantial decrease in government return on investment."

The Acting Director of SST Development testified in October of 1969 that the government's right to influence the price would require the passage of "Legislation against Boeing," not quite the same as contracted provisions which "permit the Government to set the price. . . ."!

These demand numbers are all determined, of course, by the surcharge which will exist on the supersonic transport when it is introduced. Unfortunately, the vast majority of the supersonic aircraft sold will be for international travel, and international fares are set at present not on the basis of price competition but are fixed arbitrarily and unanimously by the IATA (International Air Transport Association). The Concorde will presumably be in service at that time, with higher costs than the SST, although with approximately the same travel time, and it is perfectly reasonable to expect that a substantial surcharge will be imposed by the IATA on all supersonic fares in order to maintain profitability of the Concorde operations. The *minimum* surcharge required would be that to maintain profitability of the SST itself several years after introduction, at which time its load factor would not be extraordinarily high, but would fall to what is reasonable for day-to-day airline operation, presumably 50 to 60%.

Private Financing for Phases 4 and 5?

Phase 3 takes the development through the manufacture of two flying prototype aircraft and 100 hours of flight test. As we have seen, though, the proto-

type will be substantially farther from the production aircraft than was originally specified in reference 2, and the degree to which it will actually perform like a production version is not specified. Between the end of phase 3 and actual airline operations, there occur phases 4 and 5, the certification phase and the pre-production phase respectively. According to the FAA, some $600 million will have to be supplied by the contractors for Phase 4, and according to reference 1, page 148, some $3.2 billion additional will be required to finance initial production through first delivery. Thus, some $3.8 billion beyond that supplied for Phase 3 will need to be raised, even in the unlikely event of a successful, on-time, on-cost, development program. Attachment 1 states:

"It has been the government's intent that the private sector finance the follow-on phase of the program, phase 4, 'Aircraft Certification and Initial Production' to the maximum extent possible. The phase 3 contracts include a requirement that both Boeing and General Electric submit to FAA a proposed financing plan for these future phases.

It should be noted that the proposed financing plan was due June 30, 1968, and was replaced by a report on the development of a financial plan. The second date for its submission December 31, 1969, also slipped, and, to my knowledge, there is no proposal from the contractors for financing future phases of the program. Nor is there any reason to be confident that all-private financing can be obtained at the conclusion of Phase 3. After all, the prototype will not have demonstrated the actual capability of the production aircraft, nor does it need to any more. There will remain, in my opinion, very major uncertainties about the acceptability of the aircraft and the performance of the production version. I am quite convinced that the government will be asked to provide some part of the funds for phase 4 and phase 5 of the program. Indeed, it is likely that not only will the government be asked to provide the funds, but it will be asked to provide them at a low maximum rate of return, in order to increase the rate of return to private investors in case of success. The issuance of government guaranteed bonds, does not change the assumption of risk by the government and a very low maximum return in case of success.

In any case, it should be carefully noted that all of the figures quoted by the FAA for the future needs of the SST program are in 1967 dollars. Thus, when the FAA quotes a selling price of $40 million for the SST, assuming no development difficulties they really estimate $52 million sale price in 1978 dollars. Similarly, a need for $3.5 billion in financing in 1975 or 1976 would correspond, if the program goes entirely as planned, to some $4.6 billion required in 1976 dollars. Should the cash needs for Phase 5 be $5 billion in 1967 dollars, this would correspond to more than $7 billion in then current dollars.

National-Defense Implications of the SST

It should be stressed that the excruciatingly-detailed analysis and design required of a particular commercial SST has little spill-over into the defense field. The Mach 3 SR–71 reconnaissance aircraft has been flying for five years in a fleet of substantial size. The advanced techniques which will be required to make the SST productive are already under development for military uses as well. In fact, the transferability of the SST effort is of the same nature as the transferability of the effort required to balance one's household budget in particularly difficult times.

The FAA presentation of October 9, 1969, (reference 1, page 63) stated:

"There is also a national defense aspect to the program. Three other countries including the Soviet Union are moving ahead with SST's. The United States if it were not to do so would be dropping behind in an important area of technology, and would have inferior air mobility capability in case of an emergency. Although the Department of Defense has not indicated a military requirement for the SST, rapid movement of high priority personnel and equipment represents a strong military potential application."

This statement really does not hold water. The military airlift command and the civil reserve airfleet will have the capability to transport men and equipment to distant theatres. If a force of some substantial size is to be transported over a period of two weeks, the fact that the first man arrives four hours earlier has very little impact. The question of air mobility to distant theatres is one which I looked at extensively some years ago, and I am quite sure that the Department of Defense would not regard SST's as a big improvement for this purpose. In fact, Mr. Russell E. Train, now Chairman of the Council on

Environmental Quality and at the time Undersecretary of Interior, wrote in connection with his service on the SST Ad Hoc Review Committee appointed by the President (reference 4, H–10440):

"My own notes of the discussion indicate that DoD does not expect significant military applications of the SST."

How Will the SST Do in Competition?

The competitive behavior of the SST has, to my knowledge, been analyzed only against aircraft as they exist in 1969 or 1970, and against the first-generation Concorde. On the other hand, successful aircraft undergo continuing improvement, with retrofit of engines to provide increased economy and with improvements in attractiveness. Further, if the Concorde is introduced and has any success at all, a second-generation Concorde is likely to be flying in 1978. Although the paper SST of 1963 and the paper SST of 1966 were clearly superior to the first-generation Concorde, the current SST of 1978 is by no means so relatively attractive. In fact, while the original contract specifications of 7,500 feet takeoff field length and 162 knots are far superior to the 10,900 feet and 201 knots of the Concorde (reference 1, page 60), the current 10,300 feet and 197 knots are not significantly different from the Concorde.

Although I have the gravest doubts about the economic viability of the SST, even given an on-cost development which I further doubt, I do not challenge the statement that there will be room for a few supersonic transports at whatever fare, providing that they can be accommodated at existing airports. The US SST program is not directed toward producing a few airplanes. In fact, it is possible that the government would receive no return at all until the 101'th commercial aircraft produced.

Validity of These Criticisms

Dr. Raymond L. Bisplinghoff, Dean of the School of Engineering at MIT, was Chairman of the SST Technical Evaluation Committee for the Department of Transportation to advise on the technical readiness for proceeding with the development of the fixed-wing aircraft. He had also been Chief Scientific Adviser to the FAA Administrator in 1966. That committee endorsed the evaluation carried out by the government teams. I quote some material from the individual letters prepared by Dr. Bisplinghoff and Dr. A. E. Raymond (RAND Corporation) to state their personal views. (Reference 1, pages 314 and 316.)

"Dr. Bisplinghoff: Finally, noise and sonic boom are characteristics of the supersonic transport for which there are no satisfactory solutions in sight. Although the community noise generated by SST is no greater than *contemporary* subsonic transport airplanes, the sideline noise is appreciably greater. There is very little prospect of bringing the sideline noise down to subsonic transport levels by any practical methods known at the present time. . . ."

"A very useful public statement at the present time would be one indicating that the B–2707–300 design was conceived from the very beginning as an over-water machine and that under no circumstances could it *ever* be operated over populated land areas. . . ."

"Dr. Raymond: The eventual size and character of the market for this airplane is much less certain. Its operations will be heavily constrained because of the sonic boom and because of sideline noise in the airport areas. It is not likely to be able to compete effectively with the subsonic jets in the low-cost, high-mass travel market. Nor will it be a contender over long routes beyond its maximum range. Medium- to short-range operation is, of course, also out, particularly over land. It is primarily a premium-fare prestige airplane for long over-water routes, within its range limitations. . . .

"I concur that, viewing the program as a whole, noise presents the greatest problem. Unless the Concorde runs into some insurmountable technical or financial difficulty, the FAA will *doubtless certificate it. Having done so, the Agency* will hardly be in a position to refuse certification on noise grounds to an American SST with similar characteristics. But operation of the Concorde will crystallize and clarify public opinion regarding noise limits and flight restrictions and set these for the Boeing SST in advance of its certification. In the end, the public will prove more influential than any government agency, so this subject will demand prime attention in the months ahead."

In the preceding quotations the italics are mine. Why should the FAA certificate the Concorde, rather than automatically extend to all large supersonic aircraft the noise certification requirements which have been introduced for new subsonic jet aircraft? Although the community noise of the SST is comparable with that from the *present generation* of jets, the subsonic jet aircraft operating in 1978+ era can be substantially quieter. And the airport noise from the SST is agreed to be very much beyond even the present subsonic values.

THE ORIGIN OF SUPPORT FOR THE SST

The Boeing Company is working under contract from the Department of Transportation. The view of a typical responsible contractor is that its effective work on a contract is provided by the Administration with the approval of Congress is obviously in the public interest. The Contractor cannot be expected to question the Government's decision to do this work.

The airlines contributed some $58.5 million to the development program at a time when the production aircraft appeared much more attractive than it does now. The airlines will lose this contribution if the development program is terminated, the deposits will apply as a reduction on the purchase price. Since the airlines have no obligation to supply more money if the development continues, and since they will surely lose the deposit if it terminates (unless they can recover by suit), should one wonder that their recommendations of February 1969 (reference 4, pp 10444–10446) were to proceed with the prototype program? Why abandon a possibility (however remote) of some return on their prior deposits? The flavor of the recommendations, however, may be inferred from one letter which I reproduce in full:

"AIRLINES REPORT ON SST
"FEBRUARY 18, 1969.

"Mr. DAVID D. THOMAS,
"*Acting Administrator,*
"*Federal Aviation Administration,*
"*Washington, D.C.*

"DEAR DAVE: I have just completed a review of the redesign features as well as the operating economics of the Boeing SST with ———. This review has resulted in some alteration of ——— position relative to the SST development program. You are aware that throughout the initial years of development ——— has taken a positive approach to this new technology and has participated fully with the airlines committee. However, the recent SST review along with an assessment of the environment in which we are currently operating has led us to take a different posture than has been the case to date. The factors influencing this change are:

"First, the operating economics of the presently proposed SST indicate that a substantial fare premium undoubtedly will be required to match the economic performance of the present generation of subsonic jets.

"Second, there appears to be serious doubt that the proposed SST can meet existing or proposed airport noise criteria.

"Third, the SST undoubtedly will be limited to overwater operation because of the sonic boom problem.

"Fourth, the final cost per airplane will undoubtly fall in the $40–50 million area representing an enormous risk per single vehicle.

"Fifth, important and costly improvements are immediately required to bring both our airways and airports up to a capacity compatible with the current and future traffic demand.

"There are other factors which weigh against unqualified commitment to the SST development schedule, but the above are the most important ones in my view. In light of the somewhat negative aspects bearing upon the SST program as of now and our existing capital commitments, I would be unwilling to recommend to Board of Directors the venturing of any additional risk capital beyond the $— million we have already contributed, in addition to our $— mililon deposit for delivery positions.

"If our government's assessment of this program indicates that the United States must retain its dominant position in the aircraft manufacturing industry for national reasons, then it is my opinion that the development cost risks must be assumed by the government. Finally, if our country must make a choice between appropriations for improvements of our airways-airport systems or fur-

thering the development of the SST, then there is no question that airways-airports must be the choice.

"In summation, the provision of completely adequate airways and airports in this country must take precedence over any other consideration if the vigor of our economy is to be maintained. If there are funds available after the above need is satisfied, then these funds should go toward the orderly development of an SST at whatever rate of progress is possible.

"I hope that the above may be helpful to Secretary Volpe in arriving at a sound decision on the future of the program.

"Best personal regards.

"Sincerely,

_____ _____."

I agree with the assessment of the urgency for improvement of the airways-airport systems for subsonic aircraft, which I hope will be financed eventually from user charges. If the Congress wanted to spend funds in the air transport field, certain experimental services in Vertical and Automatic Takeoff and Landing Aircraft could induce the development and possible production of a new aircraft with substantial contribution to improved transportation domestically and with a possible market abroad. There are many and far more beneficial opportunities for advanced R&D in the air transport field than the SST, opportunities which have far more significance, in my opinion, for "leadership in aviation" than does the SST program with its present promise. For instance, do *we* have leadership in aviation when a French airline lands its jets *automatically*, without pilot intervention, every day under all weather conditions?

The airlines in general do not support an SST because of a need for supersonic flight. Nor will they be out of business if the Concorde is built (and operable) and not the SST. They can surely compete by operating Concordes in competition with foreign carriers. If the US SST were to be as productive and as easy to accommodate as was originally claimed, flexibly used in supersonic flight over land as well as over water, etc., and if the claimed "supersonic stimulation" of air travel existed, then the airlines would have seen the SST as a way to expand the market and to compete on more than even terms with foreign carriers. The airlines will certainly not regard it as an economic disaster to them if the SST is not built and the Concorde does somehow become a commercial airliner, available to the US as well as to foreign carriers. Even less would they cry disaster if *neither* the Concorde nor the SST, nor the Soviet TU–144 were acceptable in airline service.

I believe that a major portion of the continued support for the SST program is simply momentum—the in-being program organization, the contracting for and selecting of documents supporting the program (by the responsibile department), the desire of the organizations and localities receiving funds from a given program to see that program continue rather than to have the same funds spent on another program of whatever value, the less-than-candid identification of the current program status with the initial optimistic objectives, the desire not to admit the errors of the past.

The present management of the Department of Defense has frankly recognized and is doing something about the tendency of contractors, and, even more strongly, program offices, to "buy-in" to a program at attractive specifications and costs, and then as optimism is replaced by hard-won facts in the course of the program, either to relax the specifications (and the value of the product), or to allow very large increases in program costs, neither of which is necessarily reported promptly or candidly to the Administration or to the Congress.

It might be argued that we are half-way through the SST prototype development program, that there would be some costs associated with immediate termination, and that we might as well see the program through. I am absolutely convinced, however, that a meaningful development and flight test program adequate for the original program goals will not be conducted on the estimated funds. I further note an effective general-purpose argument for continued support of *any* program: at the time that funds are needed, one emphasizes that one is most of the way through the current phase and that the money already spent will be wasted if the phase is not completed, even if the probability of success is not very high. At the end of the current phase, the argument could shift to the recognition that Phase 3 and Phase 4 of extensive flight testing, production airplane design and certification (although I don't know how one could certify as a commercial airplane a vehicle which will be as far from a production airplane as the proto-

types are likely to be), should be regarded as a single effort and that the money spent so far will be wasted unless the funds are provided for Phase 4. And so on. I believe that in the case of the SST, we must face openly the likelihood that *much* more Government money will be necessary, in deciding whether to continue the current program.

Much was made in the earlier presentations to Congress of the balance of payments argument for government investment in the supersonic transport. The Institute for Defense Analyses under contract to the FAA maintained that a proper treatment of the balance of payments question showed that a successful supersonic transport, whether the Concorde is successful or not, would result in a *deterioration* of the balance of payments. The FAA contracted with three independent consultants to refute this position, but in addition to their specific answers they noted:

"Dr. Colm: I doubt that the SST program should be regarded as the best way to cure current and foreseeable balance of payments difficulties." (Reference 1, page 192.)

"Dr. Kindleberger concluded that the IDA report generally gave a good answer to the balance of payments question, but expressed the belief that the government should not decide major issues of resource allocation on balance of payments grounds." (Reference 1, page 229.)

The third consultant (Dr. Lederer) concluded that a successful SST—

"would be beneficial to the balance of payments only if work on the SST did not impair the US competitive position in the market for subsonic planes." (Reference 1, page 229.)

Thus we see the reasons for supporting the SST program have continually weakened as the aircraft has continually become less attractive and less obviously "superior" to the Concorde. Other arguments have fallen of their own weight, e.g., defense applications and technology fall-out. The continued support for the SST can be maintained only to a limited extent by substantially misleading documents, such as the draft report of March 19, 1969, to which many of the members of the SST Ad Hoc Review Committee objected as misrepresentative, or contract modification 34 (reference 2.34), in which the parties agreed to "*specific prototype airplane requirements*" rather than to a candid change in "*minimum production airplane performance objectives.*" Such actions appear to serve neither the overall interests of the Administration nor of the Congress.

General Remarks on Government Support of Development Programs

I think that there is a real place for Government support of development programs of at least 4 types:

1. To improve the effectiveness or the economy of Government operations such as the postal service, education, national defense, health care.
2. Where private initiative is inadequate to bring important new products or services to the market place because an organization or person cannot reap the full benefits of his development effort. If restrictive codes, regulations, and policies prevent rapid commercial exploitation, or if others can copy the innovation without contributing to the costs of development, private efforts will not be forthcoming.
3. Where the probability of success is very low, but the benefit in case of success would be enormous. If the size of the required investment is very large, Government support seems in order, *if* the expected return is high enough to compensate for the risk. Government support of nuclear power reactors and of controlled thermonuclear power is in this category.
4. Finally, if simultaneous decisions are needed by several factions, including regulatory bodies, for equipment and techniques to reach the market. In the aviation industry, VTOL for civil aviation, advanced air-traffic-surveillance and navigation systems, and automatic-flight-control equipment will provide substantial combined benefits, but government leadership and, to some extent, development support will be needed to have all parties involved moving in the same direction on an appropriate time scale.

The SST development, in my opinion, does not fit any of the four categories suggested for extensive governmental support. If continued (even if it were successful), it would create a new precedent for the support of large development projects leading to a single product, of limited benefit, of a single manufacturer.

RECOMMENDATIONS

1. The needs of the public for environmental protection and the costs to our large, important, and beneficial air transport industry have already been brought to some compromise by the introduction of noise certification requirements for large subsonic jet aircraft. The needs of the public for protection against the similar aspects of operation of supersonic transports seem to me to require a similar level of protection, which is by no means the ultimate limitation which will eventually be imposed. I *recommend* that noise certification criteria immediately be established for SST aircraft which are the same as standards applied under Public Law 90-411 to subsonic aircraft of equivalent gross weight.

2. I *recommend* the immediate termination of the U.S. government's direct or indirect support of the SST program. When the conditions are ripe for a commercial program which can be accommodated without severe environmental penalties. U.S. industry and finance will rise to the occasion. Government support before that time seems to result in great pressure to continue an uneconomic program, in warping of the environmental protection regulations to suit the machines and not the people, and may well lead to an increase in all air fares if the airlines and passengers are expected to bear some or part of the cost of procurement or operation of the SST.

3. I *recommend* the study of new mechanisms whereby programs can be given greater continuing visibility outside the department concerned. In the case of the SST, changes in program goals as indicated by the evolution of the contract should be of major concern to the Bureau of the Budget, the Council on Environmental Quality, the Department of the Interior, and to the Congress. It is important that these other concerned parties not interfere with or paricipate in the actual management of the program, but since the program is in the nature of a contract between an operating department and an outside organization, one must consider the interests of the "third party" to the contract, i.e., the rest of the Administration and the Congress which has given its approval. Such a study might consider the desirability of having standards for full and accurate disclosure, as are required in non-governmental affairs by the Securities and Exchange Commission.

4. I *recommend* that attention be given to the possible benefits and penalties associated with continued support of the mechanism by which the International Air Transport Association (IATA) establishes fares. If lower fares or price competition could be introduced in international travel, the traveler would benefit, more aircraft would be sold, and the more efficient airlines and manufacturers could then produce economic benefits for themselves, the consumer, and the economy.

5. I *recommend* that Congress take the initiative in supporting basic and applied, research, development, and demonstration programs toward the solution of the present problems of air transport, as well as toward the solution of other problems of modern life, such as the provision of justice, of health care, etc. To oppose a particular development program because of its lack of justification, its poor probability of success, and its environmental impact is not to oppose all development. In fact, I believe that we are starved for properly-chosen development not only toward the solutions of the problems of society but also toward those of national defense. Congress can and should insist on improved mechanisms for choice of program, but it is necessary also to have money.

BIBLIOGRAPHY

1. "Department of Transportation and Related Agencies Appropriations for 1970—Part 3" (Civil Supersonic Aircraft Development)—Hearings October 9, 1969, before a subcommittee of the Committee on Appropriations, House of Representatives, Ninety-First Congress.

2. Federal Aviation Agency Contract with the Boeing Company, Contract Number FA-SS-67-3 (January 1, 1967). Its various modifications will be cited as "2.15" (i.e., Modification 15 of Reference 2).

3. *Aviation Week*, January 5, 1970.

4. Congressional Record—House; October 31, 1969.

Chairman PROXMIRE. Thank you.

Before I question any of the witnesses I would like to have all the statements.

Miss Goldring, we are delighted to have you here in America, and we welcome you.

STATEMENT OF MARY GOLDRING, BUSINESS EDITOR, THE ECONOMIST, LONDON, ENGLAND

Miss GOLDRING. Thank you, Mr. Chairman. I am glad to be here.

I think I want to preface what I want to say by saying that I will confine my remarks to the Concorde. And I would like to explain that the status of the Concorde project at any given moment is not always easy to discover. Progress reports are made at irregular intervals in the British and French Parliaments but as these have to be agreed by both governments before publication, and because there is no machinery for regular updating, official sources of information can be as much as 18 months out of date. But the facts that we have got on record are these:

The British and French Governments signed a treaty in November 1962 to share the cost of developing a supersonic airliner that was originally to be built in two versions, a medium-range 110-seater, and a long-range 90-seater for the North Atlantic. It was expected to be in service by 1970, that is, by this year, and to cost not more than $400 million to develop and tool, or if you take the predevaluation rate for sterling ruling at the time, around $475 million. That was the top. And the lower figure was a good way down.

Since 1962, the medium-range version has been dropped and the size of the long-range Concorde increased to take up to 130 passengers. Weight has gone up 50 percent to around 385,000 pounds. Cost has gone up more than four times to $1.7 billion, or in sterling terms, which probably mean more in this context, from £170 million to £730 million, of which £400 million has now been spent.

The equivalent of another £80 million has been, or is being, spent in supporting research at government laboratories. These cost estimates have stayed more or less unchanged for the past year, but only because the French franc was devalued by rather more than 12 percent in the meantime; otherwise there would certainly have been another increase. Design changes now under discussion will lead to further cost increases.

The first flight was made in March last year and the first supersonic flight in October. The prototypes are in the air and the manufacturers have been authorized to start work on six production aircraft with the date for certification and the start of commercial service now being given officially as 1973 and, unofficially, as 1974. Performance so far has come out close to prediction but the crucial trials will not start until both prototypes have been fitted with bigger engines and begin flying at the design crusing speed of mach 2, which they have not so far been able to do. Drag at mach 2 and the engine performance is one of the two factors that is going to decide whether the Concorde has North Atlantic range or whether it does not. The other factor, of course, is weight.

The aircraft's last officially reported weight was 385,000 pounds but it is frequently admitted that it now stands at 390,000 pounds and may go up to 400,000 pounds. The manufacturers deny these increases are eating into the design payload, which is itself only 20,000

to 25,000 pounds, but they are now trying to find what it will cost to change the design of the jet nozzles at the rear of the engines in order to get some of the extra weight off again. With the design, weight, cost, performance, and even the delivery date of Concorde still fluid to a greater or lesser degree and all subject to review, its future seems to turn on three issues: (1) Whether the British and French Governments will continue to provide the increasing sums needed to support it; (2) if they do, whether the airlines will buy it; and (3) what effect the introduction of supersonic flying will have on the development of air transport.

If the two governments assessed their support for Concorde in purely cost-effective terms, as a transport aircraft, or even as a means of providing work for national aircraft industries that have to be subsidized in some way or other, then there have been at least three or four occasions in the past 8 years when it would have been canceled. On present estimates, their joint bill, when development, research, and tooling have all been paid, is not going to be much less than £1 billion, say $2½ billion. The immediate market is put at 240 Concordes, and if you accept that figure, that means that government support is going to be equivalent to $10 million per aircraft. It is hoped now to sell the aircraft for around $22 million each and there is very little margin in that for recovering government outlays.

But Concorde has political aspects that have so far outweighed all other considerations. Britain and France began to discuss the possibility of pooling their supersonic design work during Britain's first round of negotiations to enter the Common Market. It happened to coincide with the time when, to show that Mr. Harold Macmillan's government was made up of good Europeans, Britain was taking the initiative in starting a number of joint international projects with Common Market members. The Concorde treaty was drafted in 1962 without any break clauses precisely because the British wanted to make it impossible for any future French Government to pull out unilaterally. But 2 years later it was the British, not the French, who wanted to drop the project.

This happened after a change of government in Britain, but also after the first of the Concorde's major redesigns, which increased its size to 118 passengers, and also its wing area and engine power. The effect of these changes was to double cost. The new government in Britain started talks about cancellation with the French which were far from amicable and ended with a French threat to sue the British for damages in the international court at The Hague. Lawyers advised the British Government that the damages could have run as high as $400 million at the then current exchange rates, and given the state of Britain's balance of payments at the time, it seemed to Mr. Wilson's government that the lesser evil was to allow the aircraft to go on.

The British Government's view of Concorde remains now much as it was then; the majority of its members would like to see the project canceled. But since 1964, it has been recognized that the only grounds on which it could be canceled now are technical ones. Should a major structural fault develop, or the weight, the fuel consumption or the drag at mach 2 rise to levels that seriously affect the payload,

talks about cancellation might be reopened with the French with some chance of success.

An indication of the lines along which the British Government is thinking was given a year ago when the House of Commons was told that if costs exceeded current estimates by more than 15 percent, this would then be equivalent to "a demand for a fundamental redesign of the aircraft" with the implication that this would end any obligations under the original Concorde treaty. But we are facing a general election in Britain, and nothing is likely to be done either to speed up or slow down work on Concorde until after the next British general election, which has to take place some time within the next 12 months.

If both governments do go ahead, then their two national airlines, the British Overseas Airways Corp. and Air France, will be ordered to buy Concorde, although they might both demand a subsidy for flying it, and they might really have grounds for getting such subsidy. The other big airlines will then be obliged to buy Concorde, because BOAC and Air France between them control too big a proportion of world air capacity for the Pan Americans and the TWA's of this world to allow them to have a supersonic monopoly.

But the numbers they buy might be a good deal smaller than the 240 commonly supposed. Assuming the most favorable outcome which is that Concorde meets its eventual design payload of 25,000 pounds, then its direct cost, direct and indirect charges combined, will be between 75 and 100 percent higher than those of a 747. These are the best available current British estimates.

Obviously, airlines can charge a premium if they offer a faster service, but the question is, how much? Concorde salesmen are suggesting that if airlines bring the seats down from 130 to 110 and charge first-class fares, or perhaps 85 percent of first class, all the present first-class traffic will switch to Concorde, plus a proportion of the business traffic that now travels economy. But they are talking now about services across the water only, since it is assumed that almost every country will ban supersonic flying over land.

First-class fares on these over-water international routes are between 50 and 100 percent above economy fares, and in extreme cases, 300 percent above excursion fares so that the volume of international first-class traffic is very limited. Only one passenger in 14 flies the North Atlantic first class, and load factors are well below 40 percent, and it is impossible to tell how many of those occupied seats have in fact been paid for by the people sitting in them.

In theory, three Concordes could comfortably carry all the North Atlantic first-class passengers last year, seven could provide all the seats. Obviously, airlines will put on more than this, which could mean that once supersonic flying has lost its novelty value, load factors could be poor.

The big airlines say there is no way in which they can avoid making losses on Concorde that will simply have to be made up from profits earned on subsonic aircraft. In a time of plush profits they might be disposed to write this off against experience, provided they kept the number of Concordes to the minimum. But the likelihood is that Concorde could be coming into service when airline profits are thin to nonexistent. The widespread introduction of wide-bodied subsonic jets is

facing them with several years in which capacity will be growing several times faster than the traffic, and two new types of aircraft introduced within 5 years of each other is likely to be more than many airlines can stand. The Concorde Board position, for what it is worth, is that options have been taken by 16 airlines on 74 Concordes, none of them legally binding. It is an open question how many airlines will be either able or willing to pay for those Concordes when the time comes to deliver them.

One result is that airlines have been putting pressure on the two governments recently to redesign the production version of Concorde in order to produce a much bigger aircraft for later delivery. They are asking for an increase to 200 seats and the way this could be done is by widening the fuselage in order to get in an extra row of seats down its whole length. This would raise the seating from four to five abreast.

The manufacturers believe that the cost of such redesign could be kept within $250 million, which could just do it under the British Government's 15-percent margin for cost increases. It would not be necessary to change the wing, but the wider fuselage could actually improve lift and aerodynamic performance. But whether the two governments would agree to this seems doubtful. However, it is being discussed, as an outside chance. It would lead to a marked slow-down of Concorde's deliveries.

The crucial question for the United States is whether there are special features about Concorde design that explain its high cost and its chequered career or whether its history is typical of any supersonic aircraft built in the present stage of knowledge. In one respect Concorde is unique; it is a joint project between two governments and four companies, none of which has overall design leadership. The need for continuous discussion has slowed development, probably by 2 to 3 years. Overheads are duplicated; cost consciousness is lower than if the aircraft was built in the normal way. A reasonable estimate is that this had added a third to development costs. But I would suggest that in every other respect, Concorde is probably as good a supersonic airliner as engineers can build in the present state of knowledge.

The reason why Concorde's costs are working out at up to double those of a contemporary subsonic jet is that we do not know how to build engines that will propel an aircraft of this or any other weight supersonically for a reasonable fuel consumption. More than half Concorde's weight is fuel; only between 5 and 6 percent is payload. It needs only a small deterioration in either weight or fuel consumption to wipe out payload altogether as Boeing discovered in its first attempt at supersonic designing.

A company that put a supersonic airliner on the drawing board now, 9 years after Concorde, ought to be able to turn out rather better figures than these, but short of a technological miracle it is not going to come anywhere near closing the 75 to 100 percent difference in cost between an SST and a subsonic aircraft. Apart from the problems of weight, strength, and engine design imposed by flying supersonically, supersonic drag will always penalize a supersonic as against a subsonic aircraft.

So the issue resolves itself into whether governments are justified in spending upwards of $2½ billion to develop an aircraft primarily

for the first-class air traveler, and which halves journey time only at the price of doubling its cost. This is the first time in civil aviation that the slow aircraft has been conspicuously cheaper than the fast, and the projected increase in the size of subsonic aircraft to possibly 1,200 seats looks like pushing the two further and further apart. It seems a very questionable use of public funds to encourage the development of an SST that, because it will almost certainly have to be subsidized out of profits earned from subsonic flights, will contribute to keeping the general level of air fares higher than they would otherwise need to be.

The British and French Governments are in a difficult position in that probably 60,000 people are employed in the two countries together on Concorde work, and the project cannot easily be stopped unless there is something else to put in its place. On the other hand, they have never regarded it as anything but an interim aircraft; with its speed limited by its light alloy structure to a little over mach 2, it can be made bigger but it obviously cannot be made faster.

There are no plans for following on with a second, faster steel-and-titanium based Anglo-French SST. But if the future of Concorde is now seen as lying exclusively in the first-class market, on overseas routes only, then on the best possible assumptions, its market is going to be a restricted one and fears of a huge drain on the U.S. balance of payments do appear grossly exaggerated.

In the present state of technology, it looks as if any American SST would merely take over this restricted first-class market from Concorde in the 1980's. There are some grounds for believing that the low supersonic speeds, the mach 1, 2, and 3 regime, are unsuitable for commercial air transport because the increase in speed is not great enough to overcome the increase in drag. In that case, the way to higher speeds may lie, if it lies anywhere, in the ballistic techniques being developed for the space shuttles, but that is hardly likely to be an issue in this decade.

Chairman PROXMIRE. Thank you very much, Miss Goldring.

General Quesada?

STATEMENT OF ELWOOD QUESADA, VICE PRESIDENT AND CHAIRMAN OF THE BOARD, L'ENFANT PLAZA CORP.; FORMER ADMINISTRATOR, FEDERAL AVIATION AGENCY

Mr. QUESADA. Mr. Chairman, I have no prepared remarks. In what I have to say I will try to be brief. My remarks will be influenced by long experience and a deep conviction, and will be more philosophical than technical.

It may be worth reviewing briefly the history of the supersonic transport from its origin. It just so happens that I was the Administrator of the Federal Aviation Agency at the time. And I can assure you that the program which was originated then was influenced by the existence of a so-called B–70 program. Most of us forget the B–70 now. But it was then a military program hoping to achieve a supersonic bomber. It was the intention of the agency then, and certainly mine, to exploit, as we should, the know-how that the supersonic bomber would logically develop.

The history of American aviation, in its broadest sense, has cer-

tainly exploited military developments to its great advantage. And it was my intention to do the same with respect to the B–70 as had been done in respect to other military programs too numerous to mention.

I must say that I feel the supersonic transport is a logical development of the state of the art in the field of aviation.

Having said that, however, I must express some sorrow over the way the supersonic transport program developed and progressed after the cancellation of the B–70 program. I was sorrowed and saddened to note that the heavy hand of Government was to be injected into the program.

I have been a bureaucrat practically all of my life. So I think that I can speak with some authority and conclude that Government interference and Government participation, to the degree that it is in the supersonic transport, is not a healthy trend.

The aviation industry, in the United States, is by far the most highly developed industry in the world. There is no country in Europe or Asia, including Russia, that can compare, in its excellence and success, to the American aviation industry. And that includes the air transportation industry, the engine industry, the electronics industry, and the airframe industry.

It is my conviction—and a strong one, sir—that we hold this position primarily because it has been developed solely within the free enterprise system.

Now, I must expound on that—only for a minute, however. The 747 program in my opinion is the best example of the free enterprise system that one could ever ask for or expect. The Boeing Co., having enjoyed the development of the 707 at its own risk, has now taken on the development of the 747. The 747 in my opinion will prove to be one of the best airplanes that we have ever developed, and it is beyond our fondest hopes. I am a director of the American Airlines, which has purchased some and is now operating them, so I have some firsthand knowledge of what the result of that airplane is. Boeing should get every accolade that can be bestowed in their direction for the courage and skill it took to develop that airplane.

I wish that I could say the same about the supersonic transport. But I cannot.

If the Government is going to pay 90 percent or 75 percent or anything in between, of the cost of developing an airplane, it is inevitable that it will have something approaching 90 percent or something approaching 70 percent of the say. And this is where I think we are pursuing a path of error.

It has been said that if we do not build this transport under the circumstances that are now being applied, and the conditions that are being applied, we will be confronted with an invasion of a French and English airplane. I do not find that unattractive at all, Senator.

The aircraft industry has been one of our finest exporters of American equipment in our history, and it rivals if not exceeds the automobile industry. Europe has bought our airplanes for decades. There is hardly an airline in the world on this side of the Iron Curtain that does not fly American equipment. It has paid our industry, and hence our country, a handsome dividend. And I can see nothing wrong with us buying a Concorde. I just do not gag on that principle.

It is often suggested that if we do not develop the airplane the Russians will. Let the Russians develop it. If they do nobody will buy it. They never have. I do not know of a single Russian airplane that has ever been purchased on this side of the Iron Curtain. I doubt very much if any airplane in the Russian inventory today could be given away this side of the Iron Curtain.

Now, that does sound like a facetious remark. But I mean it in this light, that it is our free-enterprise system that has given to us a commanding lead in the aviation industry unrivaled by any nation in the world. There is not even a close second. I do not mean to be derogatory, but the fact remains that we do dominate the market.

Now, there seems to be a tendency or trend to copy the procedures that the French, Italians, English, Germans, and Scandinavians have pursued, with less success than has been ours. I do not see why we should change our procedures and adopt those when ours have succeeded and theirs have failed. I would like a supersonic transport to be developed, obviously. But I would like it to be responsive to the demand of the marketplace. And I would hope that the heavy hand of Government would keep out of it to the maximum degree.

Chairman PROXMIRE. Thank you very much. This has been most interesting and helpful testimony.

Miss Goldring, you estimate that three Concordes—just 3 planes—could comfortably have carried the total number of North Atlantic first-class passengers last year. So the airlines do not need Concordes, and it is unlikely the airlines will be either willing or able to pay for 74 Concordes.

The introduction of the 747's is already giving the airlines an increasing problem of overcapacity. I understand that capacity on the North Atlantic route is increasing by 55 percent this year.

Should we take seriously the estimates that the airlines will buy 500 or 300, or even 200 of the U.S. SST's?

Miss GOLDRING. I do not think you should. Because it seems to me that quite a lot of these figures are promotional orders to begin with placed by airlines that are flying over land, and they would not be allowed to use these airplanes. I think the impression that we have always had in England is that quite a lot of the orders placed for Concordes were placed because it was judged by the airlines to be good public relations, and they wrote the deposit off against their advertising budgets.

Chairman PROXMIRE. Dr. Garwin, you state in your statement that it is possible that the Government would receive no return at all until 101 commercial aircraft were produced. You mean that the contract gives Boeing the option of paying the Government nothing at all on the first hundred planes sold?

Mr. GARWIN. Yes. The details of the contract are very interesting. They originally specified that Boeing could delay the designation of the first royalty-bearing airplane until the 101'st. I believe a recent modification gives the project office, Government, that is, the representative of the Government, the right to specify the first royalty-bearing airplane.

But the contract from the beginning has had the provision which allows the Government to defer or to eliminate royalties in the case, for instance, of marginal profits to the manufacturer.

Now, that provision would not be in the contract—speaking like an amateur lawyer—I would say, unless there was some indication on the part of the Government that it could be exercised. So I am sure that Boeing, if the time came when the profit were marginal, would attempt to invoke this clause in the contract for the deferral or the elimination of royalties.

Chairman PROXMIRE. Let me ask, how much money is the Government going to have to spend on the SST before we are through?

You mention the figure $3.8 billion as the FAA estimate of the amount which will have to be raised for the production phase of this project. The number is in 1967 dollars. In current dollars, that is at least $4 billion—and that is not allowing for any cost increase or any future inflation. I gather you feel the Government will have to put up most of this $4 billion, or more, in addition to the $1.3 billion we are investing in the prototype. There just is not much incentive for private capital to come in, because there is not much evidence anybody will buy these planes. So the Government is going to get stuck? Is that right, in your view, is that your judgment?

Mr. GARWIN. To discuss the point of future inflation, the FAA has estimated that the sales price of $40 million in 1967 dollars, which they say is reasonable in their view, will be at the time of sale of the aircraft $52 million in then current dollars. Some of the members of the ad hoc committee appointed by the President last year have pointed out what is known to everybody who has analyzed the program, that Boeing has no reason to set the price at $40 million in 1967 dollars. They maximize their profit by setting a higher price, $48 million in 1967 dollars, and probably between $50 and $55 million in then-current dollars—this results in fewer aircraft sold, and lower royalties to the Government than the FAA has stated.

Now, this indicates that there is some general agreement on the rate of inflation between 1967 and 1975 to 1978, which inflates $40 million into $52 million. Therefore, I assume that the $3 billion to $5 billion required for phases IV and V should be taken rather as $5 to $7 billion in then-current dollars.

I think that it would be reasonable from the point of view of the manufacturer and the private investor who was considering putting up money, to have the Government supply perhaps half of the capital required at almost zero rate of return, and further to guarantee against loss the funds which the private investors would supply. In that case private investors could realize a return of perhaps 20 to 30 percent before taxes on their investment, and they would be guaranteed against complete loss of their funds.

That would make a reasonable proposition to attract private funds. But it is not reasonable so far as I can see from the point of view of Government——

Chairman PROXMIRE. Of course, if you provide a guarantee with a 20 percent possibility of return before taxes, I suppose that would be attractive even with present interest rates?

Mr. GARWIN. There might also be a guaranteed minimum return on investment. Once one starts into the business of guaranteeing return, guaranteeing against loss, there is essentially no end. And the analysis which had been made—although the phase III contract requires the contractor to provide a plan for the financing of phases

IV and V, the first such plan due in the middle of 1968 was never prepared. The second such plan, due at the end of 1969, was not submitted by mutual agreement between the parties to the contract, that is, the FAA at that time and Boeing.

And the next date for the submission of this plan for financing phases IV and V is 1972. But the problem before us now is whether the Government should provide development funds until 1972. I feel if it were my decision to make. I would have to know now what the possibilities are for private financing.

Now, the Under Secretary of Transportation in a press conference on April 1 said "Beyond the prototype phase—and we have consulted frequently with the New York financial community on this—we expect that the program will move to completely private financing."

Since the Under Secretary is going to testify before this subcommittee on Monday, I think it would be good to explore precisely what he means by completely private financing, for instance, whether the prototype phase as planned with the hundred hours of flight test, of which perhaps seven will be at supersonic speed; will be sufficient in his view to call forth completely private financing in the amount of at least $4 billion, and probably, $7 billion without participation or guarantee by the Government—I do not think so.

Chairman PROXMIRE. Neither the Beggs statement nor any statement indicates that there is ever going to be a cutoff. They are not going to say, after this point the financing is going to be private, the Government will go this far, two prototypes, and that is the end, they have not said that.

Mr. GARWIN. No. They are only words like "expect" or "hope" or "believe." There is certainly no limitation on the Government involvement.

Now, if I could comment on some of the other questions that have been raised here, in my prepared statement I have a table which is headed "Change With Time of Performance Requirements." And if one looks at column 1, these are the contract specifications of January 1, 1967. On the basis of these specifications the administration entered into contract, and the Congress provided the money. This was a legal document, not just a "hope." These are minimum production airplane performance objectives for operations from 15 specified international airports. The characteristics demanded are a takeoff field length of 7,500 feet, a liftoff speed of 162 knots, and certain prescribed noise levels.

Now, as you know, in 1968 the Boeing program ran into trouble, and the original design which promised all the desirable, highly superior characteristics of low speed, maneuverability, low noise, short-field operation, low pavement loading, and so on, was scrapped and replaced by a fixed wing aircraft.

This happened by a process of introducing essentially a halt in the development program, setting some strict requirements, that the specifications and the design of Boeing was to submit by January 15, 1969, must in the judgment of the FAA Administrator satisfy the original contract requirements. Contract modification 15 of March 29, 1968 was the instrument of this process.

Contract modification 34, which was effective July 23, 1969, contains characteristics represented in column 2 of the table in my pre-

pared statement. The numbers at first sight are very similar to the specifications of column 1 of the table in my prepared statement, a 7,400-foot certificated takeoff field length, approach speeds of 146 knots versus 135. But if one looks at the actual text of the contract one finds that these are no longer characteristic of the production aircraft. These are specific prototype airplane requirements.

The prototype is 20-percent lighter than the production aircraft, and these requirements then result in a production aircraft with quite different performance characteristics, such as those which are listed in column 3 and column 4 of the table in my prepared statement.

Further, the contract requirement specifies at this point:

> In the event that the Government determines at any time that its best interests and the SST program goals will be adversely affected by continuing to require the contractor's compliance with any one or more of the requirements for the prototype, the Government in its sole discretion may redirect the contractor's efforts by specifying a new and less stringent requirement for attainment.

This is done by written notice of the contracting officer.

So far as I know, no mechanism has been set up for the contracting office to determine the Government's interest in this matter. The Government's interest, of course, goes far beyond the interest of the program office, which are very largely coincident with the interest of the contractor.

Chairman PROXMIRE. I appreciate that very much.

Let me see if I can pin you down on this. What do you think will be the Government's share of the cost of the SST, on the basis of your best judgment now?

Mr. GARWIN. I think that the cost of the development program—phase III alone—will considerably exceed the presently anticipated cost. I don't think there is any requirement in the program for the Government to revise its estimates and for the Administrator of the FAA—now the Secretary of Transportation—to advise and inform the administration and the Congress of these changes. And so in a typical program one waits until the last possible moment before presenting the expected bill for the future course.

Chairman PROXMIRE. You follow this very, very closely. And on the basis of your best judgment what would you estimate is the likely area of cost?

Mr. GARWIN. I would think—and this is just a pure estimate—that the development phase, phase III, would have a cost increased by about 30 to 40 percent, at least, over the present estimates. And I think—I would bet that the Government would either have to guarantee or supply half of the preproduction financing. So I think the Government's involvement would be at least on the order of $3 billion.

Chairman PROXMIRE. Does this include any of phases IV and V, do you know?

Mr. GARWIN. Yes, including half of phases IV and V.

Chairman PROXMIRE. You say it would be in the order of $3 billion?

Mr. GARWIN. Yes. And I think the decision which is being made to continue phase III is a decision essentially to supply that larger amount of money, several billion dollars, if the Government has any hope of seeing U.S. commercial SST's, and any hope of receiving a return on the money that the Government has already supplied. But

we must consider not only the possibility of return on the investment already made, but also on that under consideration.

Now, it is a very good argument to get more money from a supplier of money to say that "we are almost at the end of the current phase. You have put in all that money. I know your return on investment was only going to be 4 percent in the case of success at the beginning for all the money you have put in. Now, however, when there is only 50 percent of the money remaining to be supplied, the return on that investment, on the future investment, is 8 percent, and that is much better than the deal I offered you before."

But the point is that the Government investment will not in my opinion be limited to the rest of the estimated phase III costs. The phase III costs will be larger, and the Government will have to supply the phase IV and phase V proproduction financing. And the program is by no means certain of success.

So the return on further investment is not what one might imagine from the argument that we have only a little ways to go before we finish phase III.

Chairman PROXMIRE. Could I ask you, General Quesada—Miss Goldring seems to give us a nightmare for the airlines. She has told us that the British Government will require their airlines, I understand, to buy the Concorde, and since our airlines will not be flying a supersonic plane it will be necessary presumably for our airlines to feel that they had better have a supersonic mach II plane, too. And she notes that there will be an operating loss when they move into this field. And you said that you did not view with any particular concern —and I share your attitude, I think it is a very sensible attitude—the notion that we will be buying some planes from abroad, they have been buying our planes, as you point out, for many, many years. But does this suggest that there are airlines that are likely to be in some trouble because of this—some further financial trouble because of the development of the Concorde and the policies that will probably be followed by the British Government and the British airlines?

Mr. QUESADA. I think it is inevitable, if the BOAC or other foreign carriers cross the Atlantic with the Concorde, that the American-flag carriers will buy it. I think that is inescapable.

Chairman PROXMIRE. Supposing we either follow Congressman Reuss' suggestion of banning the Concorde from using our airports—which I think may be a little extreme and unlikely—or follow something that is perhaps a little more acceptable, and that is just requiring that the airport noise limitations be realistic, and recognize the impacts on the environment, and insist that they be at a level which it appears now that supersonic transport cannot meet?

Mr. QUESADA. Sir, I listened with great interest to that suggestion. Though it is worthy, I think it could never be made applicable. We cannot legislate as he suggested because we will get retaliation.

However, there is a method that has been employed all over the world, including ourselves. And that is the establishment of standards. And that is a reasonable——

Chairman PROXMIRE. That is what I was getting at.

Mr. QUESADA. And that is a reasonable method. It is not unique. It is fair. And it puts everybody on notice of the criteria they must

meet. And I think that that is a worthy approach. The time has long since passed when this should have been done.

I have to say that when I was the Administrator of the Federal Aviation Agency, this was started. And it has continued.

However, the erosion of the interest, vested interest, if I may say, keeps these standards from changing. I wish that the FAA in this country would set a maximum limit to the Federal aid that will be given to any airport in the development of runways, say 10,000 feet. No airport will get Federal aid to build a runway more than 10,000 feet. No airplane will be certificated that cannot operate within a 10,000-foot runway. No airplane will be certificated that does not meet a noise criteria. That is a very, very simple process. The time has long since arrived when it should be done. The aircraft industry and the engine industry can meet it. The aircraft industry in this country and the engine industry in this country are incredibly competent. They can meet almost any criteria set upon them. It is the lack of criteria that permits this encroachment, greater noise——

Chairman PROXMIRE. Would this be a logical action for the Congress to take, or is it something that can be left to FAA regulations?

Mr. QUESADA. I think that you would take a great deal of pressure off the FAA that will always be on them, if legislative action required them to set such standards.

Chairman PROXMIRE. It is obvious in the flexibility applied here that the FAA seems—I should say because of the technological problem involved, which has been described to us so well by Mr. Garwin, that there does seem to be a developing tendency for us to have to have longer runways and higher noise standards in order to accommodate the SST.

Mr. QUESADA. If you leave the aircraft industry to itself, it will always require longer runways. That is the easiest way to get high speed and longer range.

Chairman PROXMIRE. Isn't one of the problems here too, that the FAA, which is developing the SST, is also responsible for certificating the SST? It is the judge and the jury, and it is playing the whole game.

Mr. QUESADA. That is an area of concern. I understand that the Department of Transportation is considering it and solving it, or partially solving it, by moving the management of the SST program out of the FAA and moving it up and reporting directly to the Secretary.

Chairman PROXMIRE. But you would still say that that would help somewhat—but you would still agree that it would be wise for the Congress to consider taking the pressure off the FAA and the Transportation Department, too, for that matter, by legislating a reasonable standard of that kind?

There are problems in terms of rigidity and limitations, as the situation changes. The regulations are always more flexible than laws are. But in something of this kind, where we have such a deep concern now with environment, and the people are so much aware of noise pollution, and of the impact of airports on living conditions, it seems to me that it is a realistic action for Congress to take.

Mr. QUESADA. I do not mean to suggest that the Congress should prepare the standards. I do suggest that Congress should require the

FAA to prepare the standards and publish them and stick to them. It is not going to be an easy task to write these standards, they are highly technical, and traditionally the Congress does not get into that area of regulation. But I do feel that that would be helpful, both to Congress and the people, and to the FAA, if you require them to establish the standards and admonish them, in some way, that they must be persistent.

Chairman PROXMIRE. I understand from the staff that the Congress has asked the FAA for some standards and they have not done it, noise standards. I do not know how mandatory the language was. We provided it for subsonic rather than supersonic.

Mr. Garwin?

Mr. GARWIN. May I say a few words about standards.

It is perfectly reasonable in my opinion to have non-discriminatory noise standards which have to be applied to supersonic aircraft in order to be certificated. The FAA has under consideration such standards. One possibility is to adopt without change the standards for subsonic jets. Mr. Shaffer, the Administrator of the FAA, said last October to Congress that the supersonic noise rule would possibly be out before the end of calendar 1969. It has not yet appeared. The enabling legislation requires the Administrator of the FAA to take into account economic and technical feasibility as well as the interests of the airport operators and the people.

In connection with this enabling legislation, which also permits regulation of the sonic boom, the FAA has issued a notice of proposed rulemaking a few weeks ago which says that because the analysis shows that there is a market for some 500 supersonic transports overseas, we can forbid their supersonic flight over U.S. territory.

Now, if this hypothesis fails, and there were no economically profitable markets for supersonic transports restricted to over-water operation, the basis on which this supersonic boom restriction is applied would vanish. So far as I can see the rule itself might be ameliorated in order to return a profit to the manufacturers and the operators. I cannot believe that the Congress intended that an industry which does not yet exist, the manufacture and operation of supersonic transports, should be protected and given unfair competitive advantage over——

Chairman PROXMIRE. They let us know they exist.

Mr. GARWIN. No, the manufacture and operation of supersonic transports do not yet exist.

Chairman PROXMIRE. Boeing exists. And they are in the process—they are prospective manufacturers, perhaps they have not started production, but they have got plenty of political clout, and they have let us know about it.

Mr. GARWIN. However, the FAA noise standards on subsonic aircraft read as follows:

> The noise standards are not intended to substitute federally determined noise levels for those more restrictive limits determined to be necessary by individual airport proprietors in response to the locally desired and the locally determined needs for air commerce.

So while the FAA in their noise certification of subsonic aircraft and in their long-awaited rule on supersonic aircraft can set standards for certification, these are by no means standards of acceptability or unacceptability of operation of the aircraft.

The FAA goes on to say:

The FAA encourages affected communities to make their needs known to responsible airport authorities, and is committed to insuring that the aircraft incorporate all noise abatement design features that technology makes available and economically reasonable.

But it should be pointed out that the subsonic aircraft manufacturers and operators are accepting economic penalties in satisfying the subsonic noise requirements. The supersonic aircraft will not have that penalty if their noise requirement is set at a higher level. And therefore, in the competition between these the fact I think should be taken in account that the operation of supersonic aircraft from an airport will impair the community relations of the subsonic aircraft and of the domestic airlines which do not operate supersonic transports.

Chairman PROXMIRE. May I ask you, Miss Goldring, because you do have this knowledge over a number of years, have the airlines been more reluctant than anticipated to permit themselves to buy the Concorde, that is, throughout the world? Could you comment on some reasons why they have not?

Miss GOLDRING. Their position with their Concorde options is a rather curious one. These are no more than booked delivery positions. And the way the regulations stand, no airline is under any obligation either to take up its option, to sign an order, or to do anything like that until one or both of the national carriers have placed orders. So all foreign carriers are completely free, and they have no obligations toward Concorde at all as of this moment.

Now, the two national carriers do not have to place their orders or to show where they stand until they have what are called reasonable performance fares. The manufacturers are tending to say that they will be able to give this kind of performance data by some time this summer.

Now, this is denied in Government departments. The feeling is that there will not be enough information on behavoir at cruise speed, the absolutely crucial question of mach 2 drag and of how these very complicated engines behave at cruising speed, until possibly this time next year. So if you assume that negotiations with the BOAC are not going to take a serious turn in the next 12 months, and you then assume that these negotiations will drag on for a long time, no foreign airline would really have to show the color of its money until late 1971 at the earliest.

Chairman PROXMIRE. Has any progress been made in testing the Concorde and controlling the sonic boom?

Miss GOLDRING. It is something that we are very reluctant to talk about. The Government now accepts that there will be no supersonic flying over land. But in a country of Britain's rather pecular shape this does not matter very much. From practically all our airports you can get out to the sea pretty rapidly before the airplane has to go to a supersonic climb. There are some tests at mach 2 beginning this summer. And there is a very controversial route running from north to south down the west coast of the United Kingdom where the booms will occur over land at one or two places.

It is said that these tests are absolutely essential, not for the boom, but to measure the aircraft performance. And there is a great deal of public controversy about allowing these at all.

The reason why the Concorde is going to be allowed to boom over land is that we must be able to rescue the test crews should any accident happen. And the route has to be a straight one which keeps within reach of land-based radar so that the performance can be measured.

On airport noise our regulations, as far as I understand them, look like they are less strict than those of the United States.

I think there could be a problem here. I have been listening to the other two witnesses talking about laying down exclusively American regulations. If Concorde goes into service—and I think this is still an open question—and if it then meets a ban at U.S. airports, I think the inevitable reaction in the United Kingdom and France will be to retaliate against U.S.-flag carriers, and to take diplomatic action to allow the rules to be bent a little bit so that Concorde does come into American airports.

This seems to me absolutely inevitable, seeing the way the governments work.

Chairman PROXMIRE. You say that even if we adopt the reasonable airports standard consistent with the standard we have got now for subsonic jets, for example——

Miss GOLDRING. Yes.

Chairman PROXMIRE (continuing). That you feel that there will be retaliation, there will be diplomatic protests, there will be pressure, and you think the likely result will be that the standard will be modified, or, as you say, bent?

Miss GOLDRING. This is a rather cynical deduction, but this is what I think would happen.

Chairman PROXMIRE. What about airport and sideline noise? What about air pollution, jet contrails, and water vapor in the atmosphere?

Miss GOLDRING. We have no interest at all in pollution.

Chairman PROXMIRE. You have no interest?

Miss GOLDRING. No. I have practically never heard it discussed in the United Kingdom. We are concerned about supersonic boom.

Chairman PROXMIRE. Hasn't anybody ever raised that question?

Miss GOLDRING. No, sir.

Chairman PROXMIRE. Do you have like an Earth Day over in England?

Miss GOLDRING. No. But we do have clean air regulations.

Chairman PROXMIRE. That is right, you had them long before we had them. And they have been quite successful.

Then I am puzzled why you are not concerned about the air pollution from a supersonic transport, which our scientists tell us at least potentially there are some very serious unanswered questions about?

Miss GOLDRING. Because we feel that there will be so few supersonic aircraft.

Chairman PROXMIRE. You think it is going to be an economic failure, so you are not really worried about it?

Miss GOLDRING. I think the majority feeling in the United Kingdom is that even if Concordes are operated there will not be very many of them.

You see, we have been here before. It happened to us almost exactly a decade ago with the Comet, where again we pioneered a new very fast aircraft with very high operating costs and a greatly improved standard of performance at the time. And we sold in fact very few of them.

If we had sold Comets in large numbers, then jet flying would have been a fact 10 years before it actually happened.

But the airlines sat on their hams and they did not order the Comet, they waited for the 707's. This is why I am very skeptical about beating the competition by 4 or 5 years.

Chairman PROXMIRE. General Quesada, could I ask, I understand the break-even point for the Government is 300 supersonic transports sold. How much do you estimate we would lose if only 279 aircraft were sold, assuming a $40 million sale price, or if only 155 aircraft were sold, assuming that price?

Mr. QUESADA. I think the Government in all probability would lose all of its investment.

Chairman PROXMIRE. John Walgreen of Wheaton College, an economist who assisted former Secretary of Defense McNamara, estimates that if passengers value their time at equivalent to hourly earnings, and if sonic boom restrictions are in effect, only 139 aircraft would be sold, and that this would result in a net loss to the Government of $1,183 million.

I do not know how realistic it is to value time on the basis of hourly earnings. But it is difficult to make any kind of judgment or assessment.

Mr. QUESADA. It is very difficult. I think the study concludes that the supersonic transport will be limited to providing certain city pairs, such as New York-London, New York-Paris, New York-Rome, United States-Buenos Aires, the big generators of traffic. And the demand for the airplane would be down in terms of numbers, and your production would be lessened, and your costs would be raised, and your ability to recoup your investment would be diminished.

Chairman PROXMIRE. General, you were the head of FAA at the time the SST concept was developed, was begun.

At the time the Federal Government made the decision to proceed with the SST, was it anticipated that sonic boom problems could be worked out, and that the plane would be able to fly over populated areas at supersonic speeds. Have these assumptions changed today?

Mr. QUESADA. When the program was first started there was not as much concern over the sonic boom as there is now. But there was a great deal of concern. There was certainly the anticipation that it would be confined to over water travel. There was, however, the general belief—which was mine—that it would be permitted over land. Technology would eventually, in the time scale, either find ways of reducing the sonic boom or eliminating it.

Now, that has not transpired.

Chairman PROXMIRE. So that assumption has changed now, and you have an entirely new economic ball game. If you cannot fly over land, it seems to me that the most productive routes are coast to coast and within our country rather than overseas, and will continue to be?

Mr. QUESADA. It is generally concluded now that the supersonic transport will not fly over land. And it is inevitable that that will substantially reduce the market. That is where the action is. Domestic travel is where the greatest demand for the airplane is.

Chairman PROXMIRE. From a reading of the letters from the Nation's airlines that were written to the SST Ad Hoc Review Commit-

tee last year, I have the impression that the airlines are not terribly enthusiastic about this project. Do you have any comment on this?

Mr. QUESADA. There are a lot of people that say that the airlines wish the airplane would go away. And I am one of them.

Chairman PROXMIRE. The Nation's airlines are presently deeply in debt, and are now in the process of attempting to pay for the new jumbo jets—the Boeing 747, the McConnell-Douglas DC–10, and the Lockheed L–1001. Is it feasible for the Government to expect them to be able to buy the SST at such time as it is ready? If they cannot, where will the money come from?

Mr. QUESADA. I just do not know how to answer that question, sir. I am sure there is going to be a great demand for money to finance the fleet that is now under order. Where the money is going to come from to finance a replacement of that fleet in the form of a supersonic transport, I just do not know. I would hope that if the airplane requires financing it will be able to demonstrate that it is sufficiently profitable to justify the financing. But I have doubts of whether it will be.

Chairman PROXMIRE. I remember in debate on the floor last year on an amendment to the SST that Senator Magnuson and others pointed out that there were commitments that had been made by the airlines to buy a substantial number of SST's. Do these commitments for delivery commit them to buy? And how does this compare as far as the amount and the delivery schedule with the way the airlines bought the 707 and the 747?

Mr. QUESADA. They hardly compare. As I understand, the so-called commitments to which the American flag carriers have now placed themselves, in respect to the SST, are in effect, if not in fact, options. The option price represents the value of the options. It is low. It is an opportunity to buy at a future date.

Chairman PROXMIRE. I see. So it is a low price. So that in the event the price is higher—and all the testimony and all the evidence indicates that for many reasons—I had not thought of that—that the price will be substantially higher—then the commitment is no longer valid, and they can no longer be held to purchase. And if they make a deposit, would they make a deposit of a million dollars?

Mr. QUESADA. At first it was $100,000, if I recall correctly, and then it was raised to a million.

Chairman PROXMIRE. And that is to buy at a certain price. And that price now seems to be—the costs would increase so greatly that the price would have to be higher?

Mr. QUESADA. I think it is fair to say that the financial commitment that the airlines have made in the form of an option, is somewhat meaningless. In the first place, giving up the option to buy would not be costly in comparison to the cost of exercising it.

I am convinced that they made it in good faith. I think they made it primarily to get a delivery position if they do buy the airplane. But the fact remains, Senator, that the cost of that option does not compare to the amount of money that an airline has to put up to buy a 747 today. And there is a great difference. In one case the airplane is deliverable, it is flying, and they are in fact placing an order for it. And they have to put up a very substantial sum of money. It dwarfs the money that we are talking about when we refer to the option price placed on an SST.

Chairman PROXMIRE. In the SST they put up 2 or 3 percent, and on the 747 they put up how much?

Mr. QUESADA. Eventually 50 percent.

Chairman PROXMIRE. There is quite a difference in commitment. So a million dollars is 2 percent of $50 million, and it is 2½ percent of $40 million. But 50 percent, if you are buying a 747; they obviously are——

Mr. QUESADA. And that is as it should be, Senator. Because we are talking about something which is quite nebulous. We are talking about the SST. And the airlines could not be expected to put up any substantial sum. And by the same token, we should not deceive ourselves by saying that they are orders.

Chairman PROXMIRE. Have you formed any opinion on the Concorde project now being built by Britain and France, and whether that project will be commercially successful?

Mr. QUESADA. I was over in England and France specifically to see the Concorde. It is a very pretty airplane. I have serious doubts if it is going to be a compensatory airplane.

Chairman PROXMIRE. Miss Goldring, you have documented some pretty dramatic cost increases on the Concorde. Many of our military airplane programs have shown tremendous cost overruns. Is there any reason to assume the SST will stay in its budget? What magnitude of cost overrun is likely to be encountered?

Miss GOLDRING. I would be surprised if you could do any better than we have. The Concorde——

Chairman PROXMIRE. Of course, part of the costs that you described is for a different plane.

Miss GOLDRING. Yes.

Chairman PROXMIRE. I am talking about the costs for the same plane. You had a much smaller plane to begin with, and there was a dramatic growth. But to the extent that you can, give us the figures, the change in the plane with the same weight, and so forth.

Miss GOLDRING. Are you talking now of the straight cost inflation?

Chairman PROXMIRE. Yes, I am talking of whatever you say, it is £185,000.

Miss GOLDRING. Yes, it went up from about a quarter of a million dollars to getting on £400,000.

We could not have built the original Concorde if it could not fly the Atlantic. So the reason for the cost overrun——

Chairman PROXMIRE. When did they discover that?

Miss GOLDRING. They discovered it after about 18 months of designing. However, they got across with enough fuel, and no passengers, or the passengers had to swim half the way. So they cut in a bit on the fuselage.

Chairman PROXMIRE. They cut down on the time the passengers had to swim the last thousand miles.

Miss GOLDRING. This is what we are hoping we have done. But the troubles of Concorde have not been technical ones, they have been this constant struggle to try and make it economically more attractive aircraft. And we are fighting a losing battle on this in the same way that I think Boeing fought a losing battle on its first SST design. It does appear to be beyond the state of the art.

We can put in another $250 million and put the extra row of seats

into the Concorde that the airlines are asking for. I am not sure by the time that is done we will end up with any more attractive design.

Chairman PROXMIRE. Will the current model fly the Atlantic without refueling?

Miss GOLDRING. We will not know until we try it.

Chairman PROXMIRE. That will be this summer?

Miss GOLDRING. That will be this summer. There is this crucial question of how the engine intake behaves. At cruise 63 percent of the thrust for the engine comes from the ram effect of flying supersonically. This has not been tested. There is more elaborate system inside the engine of parquetry doors, louvers, duct doors—the whole thing moves during flight. And we have yet to see how well this works and what effect it has on fuel performance. We are coming up to a very crucial 6 months.

Mr. QUESADA. May I interject here, from my own experience, what is being said is substantially true. The problem of whether the airplane will be able to fly across the Atlantic or not, is in doubt. It is associated almost entirely with the engine and fuel consumption. However, the history of aviation proves conclusively that those problems are always overcome. So I would not want to have you believe, sir, that there is a high probability of the Concorde not being able to fly across the ocean. Because I have enough confidence in the aviation industry to think that it will overcome all of these problems.

Chairman PROXMIRE. I am sure they can. But as Miss Goldring tells us, it may fly over beautifully, but without any passengers.

Mr. QUESADA. It will fly with passengers. It is going to cost more than can be paid, but it is going to do it, I will predict.

Chairman PROXMIRE. More than what?

Mr. QUESADA. I do not think the airplane is going to be a compensatory airplane.

Chairman PROXMIRE. I see. You mean they will fly with passengers, but not enough to make a pay-off?

Mr. QUESADA. I think they will fly across the ocean and with a full load of passengers. But the cost of doing all the things, as she says, that have to be done, is going to create a situation where, when you do fly a full load, the airplane still does not pay for itself, is what I am trying to say. The cost of this airplane will be so great that they will be a noncompensatory commercial vehicle.

Chairman PROXMIRE. Miss Goldring?

Miss GOLDRING. I wonder if I might make one point about this which I do not think is widely known in the United States. If our national airline, or indeed any Government-owned industry in Britain, is ordered by the Government to take positions against its commercial judgment—for instance, if BOAC says, we will make a loss on Concorde, and our commercial judgment is not to buy it, and the appropriation is then ordered by the Government to buy it, the Government is legally obliged to subsidize the airline for flying an uneconomic aircraft. But it is not legally obliged to subsidize foreign airlines which then buy the aircraft in order to meet BOAC's competition. It is quite a difficult point.

But I have heard some American executives begin to grumble about it. And it seems to me that they learned about this very late in life.

Chairman PROXMIRE. So that as far as Britain is concerned, because

of the fact that the airline is owned by the Government—is it owned by the Government?

Miss GOLDRING. Yes.

Chairman PROXMIRE. And I presume the same thing is true of Air France?

Miss GOLDRING. Correct.

Chairman PROXMIRE. The economic problems are the same. You have in the budget—apparently they debated it as we debate our subsidies. But you would not have the kind of marketplace decision which is so decisive in our airline industry.

Miss GOLDRING. No, you would not. And it will take the form of a directive from the Minister to the airline. And it may be an operating subsidy, it probably will be a political subsidy——

Chairman PROXMIRE. You argue that Government support of an SST is bad economics and bad public policy, both in Britain and in the United States. You seem to feel that the British Government would like to find a way out if they could but they have become locked into the program. I presume the U.S. administration feels much the same way. I cannot think that there are many people in the executive branch who see this program as anything but an embarrassment, an albatross.

Do you see any way for our respective governments to get together and agree to extricate themselves from the box they are in? That is why I am a little disappointed that you feel the noise restriction—which seems to be a good way to do it, and the way to do it without the embarrassment of just banning the plane representing your country—that the restriction on noise might be a more graceful way, and maybe there is a much better way than that?

Miss GOLDRING. I do not think the restriction on noise would do it, because our investment in Concorde and the money that is already under the bridge is too high. I think Britain is not a very noise-sensitive country. And we would have not a great deal of sympathy with what we thought was a deliberate American move to try and keep Concorde out.

I do not see at this present stage any way in which Britain and France could gracefully fade out, or in which they could cooperate with the United States. Because I have some doubts about whether the United States can offer to build a spectacularly better supersonic aircraft than we can, in which case our reaction will be that we are simply giving away the market to big bad Boeing again.

I think that politically it is probably unacceptable. And the important thing is to see if this can be avoided in the future, particularly if, as I hear some hints about, there is possibly a civil version 20 years from now of the coming space shuttles. At the moment——

Chairman PROXMIRE. That space shuttle is something I just opposed yesterday on the floor of the Senate. The Senate put $110 million into it. They did it over the objection of Senator Mondale and myself. It is going to cost $14 billion. And no one knows why they are doing it, except that it is kind of fun to put 14 or 15 men and women up there to go around the earth indefinitely. Maybe this will help to give us a substitute for the supersonic transport.

I was interested in your observation that your country is not noise

sensitive. In view of some of the musical exports, the Beatles, and some of those other fellows, I agree.

Miss GOLDRING. That is probably what had a great influence on us.

Chairman PROXMIRE. I think if we drown that out it would be a great improvement.

Miss GOLDRING. It has enriched a lot of people's lives.

I think you are quite hard on the space shuttle, because it has seemed to me, particularly in relation to the SST program that——

Chairman PROXMIRE. $14 billion would be hard on anything. It is a whale of a lot of money.

Miss GOLDRING. But so many in support of the American SST program have said that this is necessary in order to maintain American prestige in the foreign market. It seems to me that a country that can put men on the moon does not need to look to the prestige on the SST. That is why I think it is more acceptable to invest the money in the way of blue sky engineering where you do see some payoff over the long term.

Chairman PROXMIRE. I would be much interested in seeing if we could share this glory and cost of space travel with other countries. After all, the benefit is not national, there is no military advantage. Defense dropped the MOL, they could not put it in the budget. If this is going to be of great benefit and prestige, let us get the governments together, the French Government, and the Russian Government, and if we can do it on that basis, even if we have to pay as much as half, I would not be so much opposed to it.

But if we are going to do it alone it raises questions as to what really we are going to get for it.

Mr. Garwin, I feel I have been holding you up. I did not mean to. You go right ahead.

Mr. GARWIN. Yes. I wanted to comment on whether the Concorde or the SST could eventually meet its technical specifications. There is no physical law against it. I do not think one can eliminate the sonic booms. But I think that eventually with enough work on the engines, that is, enough money, and as enough time goes by, the aircraft will be able to fly across the ocean and at economical fares by current standards.

But all the comparisons have assumed that the subsonic aircraft development stopped in 1969. And it is unreasonable to believe that the 747 and succeeding generations of subsonic aircraft, which will, of course, be required for overland purposes, will not surpass in economy and comfort the present generation. So the competitive comparisons are just nonsense.

Further, if somehow the proponents of the Concorde or the SST manage to get their airplanes developed, then there is no reason any more to consider the development costs. Because the question at that time is, "should we produce these airplanes?" And the economic alternatives are then going ahead with production and making some money on the production, comparing costs with sales price, or abandoning the program and not making that profit. The question then will no longer be whether it was a good thing to do, to have spent several billions of dollars on development. And if they can get that development money, then the question will be, "is the production itself an eco-

nomically profitable situation, if we don't repay the development cost?"

And there you have a different comparison. There the Concorde, if we believe the specifications, has about half as many passengers as the SST, and it has about half the gross weight, and it burns about half the fuel—if we believe all this, it is about as good an airplane per passenger as is the SST.

We hear that the SST is much more productive per aircraft. Sure, but you pay twice as much for it. It is bigger, it has a smaller crew fraction per passenger. But that is not a very big effect.

So that the usual comparison between production of SST's, counting all the development costs, no matter by what arguments they were obtained, or whatever their magnitude, and the comparison of that with the procurement of Concordes, counting all their development costs, is not so straightforward as people have indicated. The Concorde will have the advantage of being a smaller airplane, easier to schedule, easier to fill, capable of operating on lower density routes.

On the other hand, to get into this dilemma in which Concorde will be more competitive than has been assumed, one must, in my opinion, grant development funds far more than are asked now without expecting any return on them.

Chairman PROXMIRE. I was very interested in the conclusion of your statement, Miss Goldring. You said the way to higher speed may lie, if it lies anywhere, in the ballistic technique developed in the space shuttle. You mean one would be shot like a bullet from one country to another out of the atmosphere in outer space and land?

Miss GOLDRING. This does seem to be a possibility. I say it with some trepidation, but when I first heard it discussed at the turn of the year I was told this was unworkable. Since people have been looking at the shuttle more carefully, they have begun to think that it is a form of supersonic passenger transport that would be quite well worth exploring, and that it does not have the built-in disadvantages of ordinary supersonic flight through the atmosphere.

Chairman PROXMIRE. That is very interesting, because yesterday I asked a number of advocates of the space shuttle to give me a single justification for it, tell us the benefits. And they said, "we do not know, we cannot tell, we will have to see what will develop." They say the benefits will be very great. But nobody mentioned this. And I think this is an imaginative projection. I think it would be a benefit. I am not sure it would be worth anything like the amount the space shuttle is costing.

We have to evaluate our time some way. It will certainly make a smaller world.

Miss GOLDRING. The experts, I think, would be very reluctant to go on the record at this stage and say that it is possible. But it does look very interesting.

Chairman PROXMIRE. General Quesada, I would like to ask you the same question that I asked Mr. Garwin. The Department of Transportation claims that total cost for the SST to the U.S. Government will go no higher than $1,285 million. And I would ask you if you agree, and have you an opinion as to what the SST will eventually cost the U.S. Government if we go ahead with this project all the way through?

Mr. QUESADA. I would have to answer that question, sir, in the light of history. I do not know of a single Government program, and certainly a program of this magnitude, that did not cost more and did not take longer to reach the program goals. And usually and eventually we get what we ask for, but the cost is invariably greater, and the time is always longer. I do not know of any program in which that does not apply.

Chairman PROXMIRE. Would you say that a range of $3 to $4 billion would be a reasonable expectation?

Mr. QUESADA. Very reasonable, and very probable.

Chairman PROXMIRE. I want to thank all of you witnesses. But I would like to ask one more question of each of you to think about and give me an answer.

I would like to ask: What are other countries doing about noise regulations? Will either the Concorde or the U.S. SST be able to land at airports around the world if this ground noise problem is not overcome—as apparently it will not and cannot be?

Certainly airport operators in the United States are concerned about this. The Airport Operators Council International has stated:

> We do not believe that communities in the vicinity of airports will accept these noise levels. Nor will it be economically feasible to build a separate set of isolated airports just to accommodate the SST.

Why are we going ahead with this program when no solution to this noise problem is in sight? I want to quote Dr. Raymond F. Bisplinghoff on this noise problem. This is quoted in Dr. Garwin's statement. It is so important I want to repeat it. Dr. Bisplinghoff is a prominent supporter of the SST:

> Noise and sonic boom are characteristic of the supersonic transport for which there are no satisfactory solutions in sight * * *. There is very little prospect of bringing the sideline noise down to subsonic transport levels by any practical methods known at the present time * * *. There is virtually no research on the fundamental mechanisms of jet noise generation in the United States.

So under these circumstances, what are other countries doing about noise regulations, and will this block the Concorde or the SST?

Mr. GARWIN. The International Civil Aviation Organization is well on the way, in my opinion, to adopting the same certification standard as the United States has for subsonic aircraft. And this means that in general people view the problem with somewhat the same set of values that we do, or if they do not, they feel that it is in their future interest to become more noise sensitive.

So far, supersonic aircraft have not been considered. They were not considered in the meeting in Montreal last fall of the ICAO which regarded noise certification requirements for supersonic aircraft as an urgent matter.

However, I would like to comment on Miss Goldring's statement that there might be diplomatic pressure to allow the Concorde into this country.

I certainly would not favor discriminating against the Concorde, against our friends the British, the French, or even the Russians. I do believe that we have a right to set certification standards, as the FAA has done on aircraft which are going to operate in this country. If the standards happen to preclude our SST and the Concorde, so be it, and that is what I recommend. If the British and French wish

to argue diplomatically that the Concorde should be exempted for some reason, because the program was underway, or something like that, they may possibly have some influence on the Federal Government.

However, the admission of aircraft to landing at airfields is a function of the local authority, the airport proprietor. And he has to live with his neighborhood. He has a franchise in some cases. He is in some cases an operating agency of the local government, and the legislative history and the judicial history in this country is that the Federal Government has no right to state that an aircraft is acceptable or not acceptable to an airport operator. An aircraft not meeting the certification requirements cannot fly in the United States. If it does meet the requirements, it is up to the local authority to decide to accept or not accept a class of aircraft.

Chairman PROXMIRE. So that 5 percent of the money, or part of the airport costs come from the Federal Government?

Mr. GARWIN. The FAA has stated the principle very clearly that the noise standards, certification standards, do not preempt the authority of the local operating agencies.

Chairman PROXMIRE. General Quesada?

Mr. QUESADA. He is substantially right. But that does not preclude the possibility of the FAA setting standards that become effective, both in noise, runway length, and takeoff performance. And the way they can implement those standards is by the certification of the airplane in the first instance, and by Federal aid in the second. As an example, the Federal Aviation Agency would be perfectly within its rights if it said, "no Federal aid will be given to a local community if that money is going to go into a runway of more than 10,000 feet."

Chairman PROXMIRE. How about in reverse, supposing the FAA, with the pressure from the President and the State Department and so forth, should sympathize—as Miss Goldring suggested—with their position on the Concorde, and the local airport would have regulations that would prevent the Concorde from landing because it does not meet the sound requirements, then if the FAA wanted to make those requirements more lenient, would they be in a position, in your judgment as the former head of the FAA, to require the airport to make it more liberal and generous and make it possible for the aircraft to land?

Mr. QUESADA. I think they would have a hard time imposing on the port authority, as an example, restrictions that the port authority does not itself impose. Likewise I think they would have a hard time making the port authority relax the restrictions that they do have. The port authority has restrictions right now——

Chairman PROXMIRE. I see. So the position that Mr. Garwin takes might very well prevail. It may well be that the entry of the Kennedy Airport, for example, New York, would be closed to the Concorde if the port authority decided that they wanted to prescribe a certain sound level, and Concorde could not meet it, in spite of what the diplomatic pressure might be here in Washington.

Mr. QUESADA. That is correct. But the port authority could not impose a restriction on the Concorde that is not imposed on all aircraft that enter Kennedy.

Chairman PROXMIRE. It would seem to me that if this is true in

this country it would be especially true in other countries. In this country we are in a vulnerable position; a weaker negotiating position. As General Quesada pointed out, we sell many airplanes abroad and we have airplanes that are worldwide, perhaps more than any other country in the world. But these other countries are concerned with maintaining a better environment and atmosphere and reasonable noise levels. They could not care less whether they could sell supersonic planes; they are not going to make them anyway. And as I understand it, Sweden, for example, and West Germany have already passed some kind of regulations prohibiting supersonic flight over their country.

Under these circumstances would you not feel that this might become a problem for your Concorde?

Miss GOLDRING. I would be surpised if it did. I think it would become a very big talking point. But in all these countries the airlines are publicly owned. And if the French, the German, and the Italian state airlines all have Concordes—and in the last resort their governments are going to make it possible for them to use them—if we had very large numbers of supersonic aircraft, so that they were coming in one or two a minute, then I am sure you would have restrictions. But we are talking about, let us say, one daily flight. I think European governments would take a lenient view of that. I do not think they will allow supersonic flying over land, but around the airports I think that people will just have to put up with it, because the national investment will be in SST's through the national airline.

Chairman PROXMIRE. Of course, it is possible that the Government may look at the fact that they own the airline and they might conclude they don't want to buy a white elephant, and they are not making any money on the Concorde—and everybody seems to agree on that—they are losing their investment.

I want to thank you all—all of you witnesses. This has been a very stimulating, interesting, and informative morning. We have made a very fine record. And I appreciate it very much.

The subcommittee will stand in recess until Monday, when our witnesses on supersonic transport will be Representative Sidney R. Yates of Illinois and Under Secretary of Transportation James M. Beggs.

Thank you very much.

(Whereupon, at 12:23 p.m., the subcommittee adjourned, to reconvene at 10:30 a.m., Monday, May 11, 1970.)

ECONOMIC ANALYSIS AND THE EFFICIENCY OF GOVERNMENT

MONDAY, MAY 11, 1970

CONGRESS OF THE UNITED STATES,
SUBCOMMITTEE ON ECONOMY IN GOVERNMENT
OF THE JOINT ECONOMIC COMMITTEE,
Washington, D.C.

The Subcommittee on Economy in Government met, pursuant to recess, at 10:30 a.m., in room 1202, New Senate Office Building, Senator William Proxmire (chairman of the subcommittee) presiding.

Present: Senator Proxmire and Representatives Conable and Brown.

Also present: John R. Stark, executive director; Loughlin F. McHugh, senior economist; Courtenay M. Slater, economist; and Douglas C. Frechtling, economist for the minority.

Chairman PROXMIRE. The subcommittee will come to order.

This morning we will continue our examination of the public costs and benefits of the SST program. I pointed out Thursday that while I am able to identify very large public costs for this program, I am totally mystified as to the public benefits. Our witnesses last Thursday were excellent. I learned a great deal about the SST. But I do not believe they pointed out to us any public benefits which had previously gone unnoticed.

What I did discover at Thursday's hearing was that the costs of the SST are even greater than I previously realized. The airport noise problem is extremely serious. Our existing airports are not designed to accommodate a plane that makes this much sideline noise. I do not believe our local communities are going to put up with this noise. Are we going to build a whole set of new airports just to land the SST? It makes absolutely no sense to put Government money into a plane which cannot land at existing airports.

The airport noise problem alone ought to be enough to dissuade us from supporting this plane. Unfortunately it is only one of numerous environmental problems associated with the SST. I am hopeful our witnesses this morning and tomorrow can give us additional factual evaluation about these environmental costs, as well as about the direct dollar costs—which are also, I am certain, much larger than we have previously been led to believe. Only if we can carefully and objectively evaluate these costs and compare them to the benefits—whatever they may be—can we make a correct judgment regarding further Federal support of this program.

Our first witness today is Representative Sidney Yates. Mr. Yates

is a member of the House Appropriations Subcommittee which considers SST appropriation requests. The careful scrutiny which he has given the program during the hearings of that committee has been an enormous public service. We are honored that he has agreed to share his authoritative knowledge of the SST with this committee today.

Following Mr. Yates' testimony, we will hear from Under Secretary of Transportation James Beggs. Mr. Beggs is accompanied by Mr. William M. Magruder, Director of the Office of Supersonic Transport Development. We are grateful to Mr. Beggs and Mr. Magruder for their willingness to discuss this program with us this morning.

Tomorrow morning our witness will be Mr. Russell Train, Chairman of the Council on Environmental Quality. That hearing will be at 11 a.m. in the Atomic Energy hearing room.

Mr. Yates, will you come forward to the witness table.

As I say, we are proud and happy to have you. You have a distinguished record in the House of Representatives, and I know you are highly qualified.

We are ready to hear from you, sir.

Representative YATES. Thank you very much, Mr. Chairman.

STATEMENT OF HON. SIDNEY R. YATES, A REPRESENTATIVE IN CONGRESS FROM THE NINTH CONGRESSIONAL DISTRICT OF THE STATE OF ILLINOIS

Representative YATES. It is a pleasure to appear before this committee, Mr. Chairman, because of the fine work this committee does. And I appreciate very much the opportunity to testify before you on the SST. We have just finished our hearing before the Appropriations Subcommittee of the House for the Department of Transportation, including our hearings on the SST, and I think you will be pleased with the hearings when they are published.

I have been an opponent of the supersonic transport program for many years. I have been skeptical about the extravagant claims made for the plane, and I am convinced that any benefits that might be derived from the program would not be worth the economic and environmental costs to the Nation.

Since early March letters and coupons have been pouring into my office, more than 5,000 in all, supporting my opposition to the SST program. The flood began with the publication of advertisements in the New York Times and the San Francisco Chronicle, but since that time I have had a daily flow of 35–40 letters opposing appropriations for the SST.

Those letters come from all over the country and I would like to submit a few of the more provocative ones for the record, Mr. Chairman.

Chairman PROXMIRE. Without objection they will be put in the record.

(The letters referred to follow:)

BUTANO CANYON,
Pescadero, Calif., March 12, 1970.

Representative SIDNEY R. YATES,
House Office Building,
Washington, D.C.

DEAR SIR: I am an airline transport pilot with 33 years experience in aviation in the United States and I wish to add my thanks to those of the growing number who applaud your efforts to stop the funding of the SST and instead to divert those funds for use where they are needed to solve pollution problems, rather than to create them.

I would not pilot an SST and I would not pay for a ticket on one because I feel that this grossly extravagant and unnecessary airplane would damage the environment far out of proportion to the small good I or any other man could gain from it. It does no good to the country to shuffle a few dollars into my pockets as the pilot or to the Boeing Company at the expense of waste of human effort, raw materials, and increased pollution by burnt or unburnt gases and by noise.

Please continue your efforts to stop the SST.

Sincerely,

JOHN LISSOL.

MAY 1, 1970.

SIDNEY R. YATES,
U.S. Representative, House of Representatives,
Washington, D.C.

DEAR REPRESENTATIVE YATES: I am writing to you concerning the pending appropriation request for the Supersonic Transport (*SST*). As a member of the subcommittee (and incidentally my representative) I urge you NOT to vote for any such appropriation. My personal feelings are such that supersonic air traffic is totally unnecessary. The whole project has gone way over its budget. But the real tragedy is the resulting noise—sonic booms—more noise pollution. People have already reached their threshold for pain—must we add more, especially when it is useless? Can't we spend the money for water and air pollution—or poverty, hunger, housing—to name a few? Why must we Americans be so stupidly backward? I have read the pro statements and I would hope—probably naively—that we could stop destroying our environment—the economic considerations cannot outweigh the defects. As a young person I would like to live a full life. The SST is just one more step to stop my hope.

Thank you for your time and consideration. Please look into this matter carefully as your vote is important.

Sincerely,

(Miss) ALEXANDRA M. MALOS.

MAY 6, 1970.

DEAR MR. YATES: I am writing to urge you, as a member of the House Transportation Appropriations Subcommittee, to oppose President Nixon's request for $290 million for the Supersonic Transport. Couldn't this money be put to better use in anti-pollution research? Instead, President Nixon would use it to ravage our environment further with sonic boom and the property damage, animal deaths and frayed nerves that result from this wretched noise.

If the President doesn't recognize that we are in an environmental crisis, I hope you do, and I hope you will oppose his request for the funding of the SST.

Respectfully,

MRS. KATHRYN GREEN.

BOARD OF CHRISTIAN SOCIAL CONCERNS
OF THE UNITED METHODIST CHURCH,
Washington, D.C., March 12, 1970.

HON. SIDNEY YATES,
U.S. House of Representatives,
Washington, D.C.

DEAR MR. YATES: This is my belated thanks for the great opportunity made to prevent the SST from being funded and getting those funds used for something more important for the human race. Please keep up the task.

Cordially,

RODNEY SHAW,
Director, Department of Population Problems.

CITY OF DEARBORN,
LAW DEPARTMENT,
March 9, 1970.

HON. SIDNEY R. YATES,
House Office Building,
Washington, D.C.

MY DEAR CONGRESSMAN YATES: I know that because of the New York Times article of Thursday, March 5, 1970, you are going to get a lot of mail regarding the funding of the SST.

The City of Dearborn has had a very serious problem of noise pollution inasmuch as the western part of our city is directly under the glide path of Metropolitan Airport. I know that I speak for everyone in town in saying that we appreciate your efforts in this area.

Count this letter as another voice shouting above the din, urging you to do all you can to see that in any new planes that are developed, adequate noise suppression devices are designed into the airplane.

Sincerely yours,

JOSEPH J. BURTELL,
Corporation Counsel.

MISS PATRICIA L. MULLIN,
SAN FRANCISCO, CALIF.

I fly about 50,000 miles per year on business, coast-to-coast, SF–NY. Even I cannot see any reason for the SST. It's an expensive "toy."

PATRICIA L. MULLIN.

DES PLAINES, ILL., *May 6, 1970.*

REPRESENTATIVE SIDNEY R. YATES,
House of Representatives,
Washington, D.C.

DEAR MR. YATES: The attention of many concerned citizens in Illinois and around the country is currently focused on the upcoming Congressional action for funding of the proposed *supersonic transport plane.* As one of these concerned citizens, I would like to urgently petition you to oppose Federal funding of this monstrosity. Our exploding technology has already wrought sufficient havoc on our environment, and the added insults of noise and jet engine exhaust which the SST will produce cannot be justified by the dubious advantages to those few individuals who must fly bigger and faster. Federal funds are desperately needed for vital domestic reforms.

The time has come to set our priorities straight; the SST cannot be included among them. Thank you so much.

Very truly yours,

DR. AND MRS. ROBERT G. STAGMAN.

AMHERST, MASS., *May 5, 1970.*

Hon. SIDNEY R. YATES,
House Office Building,
Washington, D.C.

SIR: An appropriations request for the supersonic transport is in front of your Subcommittee on Transportation for the fiscal year 1971. We would like to express our *strong* disapproval of its development and construction. We are already subjected to far too much pollution which will only be increased by the SST: noise pollution, especially with the sonic boom, will affect not only our own living but that of wild life and wilderness areas and may destroy property and archeological ruins in national parks. Air pollution from its exhaust will greatly add to the pollution in the cities where its terminal points must be located.

Second, there are many more demanding needs for our limited monetary resources than supplying luxury travel for a few persons. We feel it is wrong that we should have to pay for others' luxury. Little else is gained since scientific knowledge in relation to supersonic flight can be achieved equally with already existing military supersonic aircraft.

Third, the argument that the United States must increase its flight records and travel facilities simply because a European SST is already developed is poor when so many other issues go unheeded. Why not compete with the Europeans in terms of quality education, medical care, housing, employment, etc.

rather than unnecessary and luxury items benefitting only a few? It is a sad response that we must always equal or better every other nation in every respect.

After all these considerations, we urge you to vote against supplying appropriations for the supersonic transport.

Sincerely,

ALLAN K. HANSELL,
MARGARET M. HANSELL.

ST. CATHARINES, ONTARIO, MARCH 13, 1970.

Representative SIDNEY R. YATES,
House Office Building,
Washington, D.C.

DEAR SIR: As a U.S. citizen living in Canada, I am writing to you to commend you on your continued fight to divert funds from the SST to more pressing and immediate problems. Not only is the SST a grave environmental hazard, but a nation with as many social and environmental problems as we have now cannot afford to spend large sums of money on unnecessary items. It is my hope that you will continue your fight against funding of the SST. Thank you.

Sincerely,

JOAN BICKART.

Representative YATES. But what is more important, in my opinion, is that I have scarcely received a single letter in support of the program, certainly no more than five. Support for the SST seems to be concentrated in the State of Washington, the Department of Transportation, and, inexplicably, in the U.S. Congress.

Many Members feel that because we have already spent so much money on the plane, that the development program must be completed. One need only see the long list of scrapped military aircraft to establish the fallacy of that argument. I would like to submit for the record as exhibit A a list of military aircraft which never reached the production stage and the cost of each program. I think it may be helpful.

Chairman PROXMIRE. Without objection it may be received for the record.

(Copy of exhibit A referred to follows:)

EXHIBIT A

Project	Year started	Year canceled	Funds invested (millions)
Army: XV-3 convertiplane	1952	1960	10.1
Navy:			
Seamaster	1951	1959	330.4
F-8U-3	1956	1958	100.0
HSL-1	1950	1955	94.0
F-5D-1	1954	1957	49.0
A-2D-1	1950	1954	47.0
T-40	1954	1958	33.0
A-2J-1	1948	1963	20.0
F-10F-1	1950	1953	15.0
F-2Y-1	1949	1955	15.0
F-111-B	1961	1968	[1] 418.0
Air Force:			
ANP	1951	1961	[2] 511.6
F-108	1958	1959	141.9
XF-103	1950	1957	104.0
F-107	1954	1957	1.0
C-132	1952	1957	54.0
YH-16	1951	1954	23.4
X-21	1960	1966	36.0
X-19	1962	1966	16.0
XB-70	1958	1967	1,468.1
X-15	1959	1968	210.5
Total			3,698.0

[1] Estimated R.D.T. & E. plus PAM, Navy funds. Exact investment will not be available until terminal investiagtions with the contractor are completed.
[2] Air Force costs only.

Representative YATES. I think too, as an aside from my prepared statement, that Professor Garwin made a very valuable point in his testimony before this committee last week when he brought out the fact that the specifications for the plane, the size of the runways, the noise allowances, have gradually been changed from the initial contract. And I will be interested to hear the testimony of the following witnesses as to why the contract is being altered to free the contractor from its performance provisions.

I think the list makes clear that the termination of an aircraft development program prior to completion, at substantial financial loss, is certainly not unprecedented. It is interesting to note that the most expensive flop was the XB–70 long-range supersonic bomber, which is the closest thing we have to a military counterpart of the SST.

If the SST program is stopped now, we can cut our losses. If it continues, we run the risk of surpassing the $1.4 billion cost of the XB–70 failure.

The Congress has been voting for the SST for 7 years, despite the fact that today's SST program differs radically from the development which was originally planned and incorporated into the original contract. Last Thursday, Dr. Garwin explained in detail the technical and economic shortcomings of the proposed prototype airplanes, so I will not repeat that information now.

Suffice it to say that the SST, which looked like a supersonic marvel on paper, looks more and more like a supersonic white elephant as the time approaches to begin prototype construction.

During the 6 months since the last DOT appropriations bill, much has happened which should be taken into consideration before this year's request for $290 million is approved.

THERE HAS BEEN A $76 MILLION OVERRUN IN THE SST PROGRAM

The most important new fact is that over the last 6 months the SST development program has experienced cost growth of some $76 million, $57 million of which must be absorbed by the Government. In the hearings of the transportation subcommittees, Mr. Beggs, who is scheduled to testify next—and may I say in passing that I consider him to be one of the most capable public servants that I have met in all the time I have been in Congress—blamed the overrun on the cut in funding on the SST program last year. His reasoning goes like this, and I quote:

> The estimate we gave the committee last year was predicated on a schedule which was given to you at that time.
>
> Since that testimony was given, the program has slipped. It slipped because, as you know, there was some $11 million taken out of the appropriation last year. This year the Bureau of the Budget cut the projected appropriation which we had for this year of $315 million, back to $290 million. The result of these two actions has been a slip in the program of about 4 months in the completion of the prototype phase.
>
> This has meant that necessarily, because we are incurring costs in this period, that those 4 months cost us money. It turns out they cost about $76 million.

The lesson Mr. Beggs would seem to have us draw from the overrun is that Congress must provide the entire appropriation request every time his department asks for it, or we will end up paying more for the prototype airplanes. He would have us believe that the overruns are

not the responsibility of the contractor or the Department of Transportation, but of the Congress.

Needless to say, Mr. Beggs' reasoning overlooks the recent history overruns in military weapons systems procurement in which congressional scrutiny and restraint provides virtually the only hedge against cost growth.

It is well established that a major cause for cost growth has been the close relationship between the Pentagon and weapons manufacturers which results in contracts so open-ended that the costs which taxpayers are asked to absorb inevitably skyrocket.

Over the last year or so DOT seems to have appointed itself guardian over the welfare of the aerospace industry.

Mr. Beggs, in a statement before the press on March 31, offered the proposition that the SST is required to prop up the Boeing Co. in particular and the aerospace industry in general. He said:

> . . . but the fact is that as you look at these planes and as they're produced, you have the 707, 727, 737, 747—as you drop a plane off from production because you've completed the orders on that unless there is another plane that is going into production, those employees naturally are dropped off.
>
> Now, what we're going to be seeing here if we had not proceeded with the SST is a point about six or seven years down the road—about that. I can't say to be explicitly six or seven, it could be five, it could be eight—where our aviation industry in this nation—not just the Boeing Company because that's a very small segment when you take the whole industry into consideration with all subcontractors almost in every state of the union—forty-two out of the fifty I believe —you'd have a situation where you would have, not just thousands, but tens of thousands of employees that would be laid off and the aviation industry would just go to pot.

It is just that kind of overzealous advocacy of private industrial interests which paves the way for cost overruns and poor performance. If the Department of Transportation would look out for the aviation industry a little less and look out for the taxpayer a little more, I believe the Nation would benefit.

Boeing ought to be able to stand on its own two feet. Surely the SST program is laden with financial peril for the Boeing Co. whether or not the prototype airplanes are built. It would certainly be much more desirable if at all possible, for the Boeing Co. to diversify its production further into the mass transit antipollution markets rather than rely on such Government projects as the supersonic transport.

There is a good possibility, I believe, that the Concorde will not be able to invade the American market because of its extreme noise. I should interject at this point that there is a question in my mind as to the limits, the tolerable limits that are going to be established for supersonic craft by the FAA. I think that deserves the very serious consideration of Congress, because I fear that the tolerance limits will be governed not by their effect on the public but rather on the performance of the plane. I am concerned that FAA will stretch the limits to accommodate overly noisy performance.

If the Concorde is barred because of noise, the competition which is spurring Boeing into the supersonic field will no longer be present, thereby increasing the market for the Boeing 747 whose financial return is assured and not dependent on Government subsidy. We would be doing the environment a real service by keeping the noisy Anglo-French supersonic away from our airports.

And may I say in passing that I do not have anything against the

Anglo-French endeavor. I am worried about the noise that their plane is likely to bring to this country and the people who live around the airports.

THE COST TO THE GOVERNMENT OF THE SST PROGRAM

The Department of Transportation has always insisted that Government participation in the funding of the SST development program will terminate upon completion of the prototype phase, but they have not produced a single shred of evidence that private financing will be available for the certification and production phases of the program. Aviation Week and Space Technology, a respected trade publication which editorially supports the SST, is under no illusions about the likelihood of private financing.

In a special SST issue published last January, Aviation Week referred to the financing problems posed by the plane as "unprecedented." Indeed, when one compared Boeing's net worth of $810 million to financing requirements that could amount, according to Dr. Garwin's testimony, to $5 to $7 billion in 1967 dollars, it is difficult to account for the Department of Transportation's optimism about private funding for the certification and production of the plane.

Aviation Week considers some form of Government participation in the production phase as "more than a possibility." It is only reasonable to conclude, the DOT notwithstanding, that this year's appropriation request is part of a program whose total cost to the Government through the production phase could easily be $3 to $5 billion or more, rather than the $1.5 billion figure that is continually cited by the plane's proponents. And, of course, the $1.3 billion refers to the program through the prototypes.

Quite frankly, the Department of Transportation has not yet met its responsibility to discuss fully the probable cost to the Government of the SST.

May I say in passing, Mr. Chairman, that in interrogating Mr. Beggs before the Committee on Appropriations I asked him what would happen if the prototypes were not perfect enough to attract private financing. It had been stated in earlier testimony that if the prototypes do well, then the FAA and the DOT anticipated no great difficulty in obtaining private financing. So I asked: Suppose it is not as perfect as you anticipate the prototype would be. They said at that point that they expected that they might very well ask the Federal Government for the money to help through the production phase.

DOT still has not required Boeing to follow its contractual obligations and provide a credible scheme for private financing of the certification and production phases of the program. We must be concerned, therefore, that the nearly $700 million in Federal funds which has already been plowed into the SST program is merely the tip of a multi-billion-dollar iceberg. The Congress should be aware of that fact now, rather than 5 years and hundreds of millions of dollars from now.

Boeing and the Department of Transportation have already had several years to come up with a program for private funding of phases 4 and 5, but with no results. It is time to end the wishful conclusion of the plane's proponents that Government participation will be at an end when the prototype phase is concluded.

It is time to evaluate the SST program on the basis of fact and knowledge rather than wishful thinking and to insist that more accurate information be given than that offered to date by the Department of Transportation.

THE AGE OF THE SUPERSONIC TRANSPORT IS UPON US

In approving the SST budget request for last year the House Appropriations Committee stated in its report that, "The age of the supersonic transport is upon us." That same theme is repeated over and over again in administration presentations before congressional committees and in debate in both Houses. It is true only in the limited sense that supersonic transport flight is now feasible from a technical standpoint. It neglects to mention the very likely possibility that the supersonic derby between the U.S. SST, the Soviet Tu-144, and the Anglo-French Concorde may be a competition to determine which nation can lose the most money—assuming they can even develop the production model.

Mr. Chairman, earlier this spring I took a firsthand look at the Anglo-French Concorde, the plane whose performance and comfort is supposed to be so terrific that this Nation has no alternative but to build a competitor to it. The Concorde, Mr. Chairman, resembles nothing so much as a flying pencil. Its tubular cabin is so narrow and so low that I had to stoop over as I moved down the aisle between the seats. If the Concorde represents a step forward in terms of speed, it represents a leap backward in passenger comfort.

The President of Pan-American, Mr. Najeeb Halaby, shares my opinion of the Concorde. He describes the Concorde's interior as "restricted"—and in that sense I think that word is a euphemism—and said, "We're going back to the tube."

In the same statement he made it clear that Pan-Am was not about to place any orders for the Concorde until its economic usefulness was fully demonstrated. In fact, no orders have been placed for the Concorde—some delivery positions have been purchased, but at very little financial risk to the airlines. They will wait until the Concorde proves itself before committing themselves to buying it.

A cursory reading of the airlines letters submitted last year to the FAA shows that for every ounce of enthusiasm about speed, there is a pound of misgiving about range, payload, comfort, and economic utility. If the age of the supersonic is in fact upon us, one will have to look someplace else besides the airlines for proof of the proposition.

Mr. Chairman, there is a whole range of questions about the SST which I did not consider in my testimony today because most of that information is already a part of the public record—the problems of air pollution, airport noise, and sonic boom—and incidentally, among the students that came down to see us over the weekend on Cambodia were several Ph. D.'s in biology who were worried that the jet trails of SST might bring about a "greenhouse" effect over the country—the negative views of almost all of the members of the President's Ad Hoc Review Committee on the SST—the technical and economic deficiencies of the proposed prototypes—the shaky premises which lie at the root of the optimistic market predictions for the SST—all of those things have been examined already.

I have studied the SST development for many years now and it is

my view that the bulk of the evidence favors an end to Government participation in the program. I think it is essential that the case against the SST be presented to the American people so that they can make their own judgment on the merits of the program.

They should decide whether or not $290 million for the supersonic transport and $106 million for air pollution control is an accurate reflection of the priorities which they think ought to be guiding the Nation.

I commend the chairman for holding these hearings so that the facts concerning the SST can be subjected to rigorous, public examination.

Thank you very much, Mr. Chairman.

Chairman PROXMIRE. Thank you, Mr. Yates, for a fine statement.

Incidentally, you conclude your statement by saying that the American people should decide whether or not this money should be spent. And, of course, you and I act for the American people. Every poll indicates that the American people are overwhelmingly, and I mean overwhelmingly, against it by margins of 8 to 1, 9 to 1, and 10 to 1, a decisive rejection of this proposal.

So I am confident that if we have any kind of referendum that the rejection would be emphatic and clear.

You have some very interesting new information here that escaped me before—I tried to follow this very closely—on the overall cost growth in the SST. This is most alarming. And the explanation is particularly interesting. The explanation apparently is that this is because you say Congress did not fund the SST, this is the explanation.

Representative YATES. This is the explanation that was given by Mr. Beggs to our committee. And I am sure you may want to ask him about that.

Chairman PROXMIRE. I would like to ask you about the notion that if one Congress fails to provide $11 million one year and $25 million the next year, for a total of $36 million, that this can result or should necessarily result or somehow result in a $76 million overrun. Does that make sense to you?

Representative YATES. It does not make sense to me, no. And in the hearings before the Appropriations Committee I told the witnesses for the SST that I thought they had been somewhat derelict in their responsibility for not having advised Congress of what the consequences of its reduction in appropriations was likely to be, that in reducing appropriations by $11 million the Government was likely to incur an additional $76 million total cost in the program.

Chairman PROXMIRE. Here you have a situation where the costs are going up and the standards are going down.

Representative YATES. That is right.

Chairman PROXMIRE. Apparently the noise is increasing. The length of the runways have to be substantially increased. And these are both factors of a deteriorating quality. So we are paying more money and getting less plane back.

Representative YATES. I think there is no doubt about that. The standards in the initial SST contract were much more restrictive than the present standards for the SST are. The contractor has been permitted to really alter the requirements that were much more restrictive when the plane was originally designed, until now one wonders what the ultimate SST standards are going to be.

It seems that as the contractor runs into difficulties in the development of the prototype that the standards are made much less rigorous. There are still three or four defects that they have no explanation for to our committee. They are going to permit the flight of the prototype under standards that are not the same ones as are called for by the production plane itself. One of the most difficult ones will be the fact that they still have not found a fuel sealant, they say they have one for the prototype, but they do not have the one for the production plane itself.

This is only one of three or four problems that are really great obstacles to the development of the plane.

Chairman PROXMIRE. You say that the FAA may find that the noise of the supersonic transport would be too great to justify its being allowed to land at our airports with regard to the Concorde, and that this presumably could apply to our own SST?

Representative YATES. I must confess, Mr. Chairman, that when they testified before our committee I was surprised when I was told that the ones who determined these standards for planes entering airports are not really the FAA, but the airport management.

Chairman PROXMIRE. That is precisely what I was getting at. Because General Quesada told us last Thursday that it would be perfectly conceivable that at Kennedy Airport, for example, the port authority might, with very understandable reasons, say, we have this kind of a sound limitation, and the Concorde is exceeding that, and the SST too—after all, they are not part of the Federal Government—the SST, the American SST is exceeding it, and it cannot land until it improves this noise performance.

Representative YATES. That is right. This is a possibility, that the supersonic planes may not be able to use American airports, and the European supersonic may not be able to use American airports because of the noise restrictions.

Chairman PROXMIRE. Do you have any opinion on the ultimate total cost to the Government of the SST?

Representative YATES. No, I have not at this moment. I know what Mr. Garwin testified before this committee that the cost in dollars at the time that the production plane is completed may very well be from $5 to $7 billion.

Chairman PROXMIRE. I am talking about the cost to the Federal Government. The total cost is $5 to $7 billion. How much of that would be——

Representative YATES. I don't know how much of that would be the Federal Government. I just do not know how they are going to finance the production plane. We have not had a scheme presented to the Congress or to the executive branch for financing the production phase yet. All we have is the assurance by the DOT officials that if the prototype is successful they will experience no difficulty in obtaining private financing.

In response to my question, as I indicated before, suppose the prototype is not entirely successful, what will you do then, they said, we expect to come to the Federal Government for our money.

Chairman PROXMIRE. I do not see any alternative.

Representative YATES. That is right. And at this point, Mr. Chairman, on the basis of present estimates, if the Federal Government were

to finance it it would be another $2 to $3 billion at the minimum to complete the plane.

Chairman PROXMIRE. In the light of the overwhelming, virtually unanimous recommendations of President Nixon's own advisers last year that the SST be suspended or shelved, do you have any idea what prompted the present administration to go ahead with this project?

Representative YATES. I have no idea, Mr. Chairman. I am not a party to their conferences.

Chairman PROXMIRE. Mr. Conable?

Representative CONABLE. Thank you, Mr. Chairman.

I regret that some of my colleagues who support this program are not here. I tend to vote against it myself. And I am reduced to the role of devil's advocate, I guess.

I am not going to push this discussion any further. I think you have a fine statement.

Representative YATES. Thank you, Mr. Congressman.

Representative CONABLE. I think you have added to our knowledge.

I will say, however, that I do not think there should be any great surprise that if we stretch out the development program, the cost is going to go up.

I notice you take issue with the estimate by Mr. Beggs that if we do not fully fund the program and require a stretch-out that the cost is going to rise. Hasn't that been the history of almost every Government research and development program in a period of inflation, that inevitably something costs more next year than it does this year?

Representative YATES. I think that is true, except that in respect to the point I was making in connection with the $76 million overrun, in the conference between the House and the Senate on the appropriations bill when the question was raised as to how much money to allow the SST program, it was stated to the conference that $86 million would be adequate. And so that was the amount that the conference approved.

There was no information given to the conferees as a result of the cutback that an additional amount of money would have to be paid by the contractor and by the Federal Government in connection with this.

Representative CONABLE. But in the light of the large sums of money involved and the comparatively modest net worth which you point out here of the performing industry, it is unlikely that they are going to be content to be part of the program until the Government does bear a considerable part of the risk of rising costs, isn't that true?

Representative YATES. Under the contract as it now exists the Government takes the major share of the rising costs.

Representative CONABLE. I think there is ample reason for concern about the cost of this program in any scale of national priorities. I would not be surprised if stretching out the program raised the cost above the present estimates, however. And that is true whether you are talking about a Federal building somewhere or a dam somewhere, or a supersonic transport.

Representative YATES. That is one of the reasons, Mr. Conable, that I think we ought to bring the program to an end.

Representative CONABLE. Are you serious about this "greenhouse" effect by Concorde trails? I have a feeling that we sometimes resort to unnecessarily esoteric arguments and somewhat improbable conclusions in our anxiety to turn back a proposal of this sort. If we are going

to get a "greenhouse" effect from the Concorde trails, I would say that that would indicate that there are going to be a lot of Concordes in the air, and that you would be unwilling to acknowledge that, on the basis of the testimony you have given about the tubular construction and discomfort?

Representative YATES. Mr. Conable, I was as incredulous as you were this morning when these physicists came to visit me. And I said, "You cannot mean this about the Concorde trails having this 'greenhouse' effect?"

And they said, "Yes, we do mean it."

They talked about the ionosphere. And I have never felt the generation gap more fully than in my conversations with these Ph. D.'s this morning. They talked about the ionosphere and the Concorde trail bounding up against some ceiling up there, just staying up there, the condensation staying in the nature of a cloud cover.

Representative CONABLE. In other words, they were not talking about the volume of the pollution caused; they were talking about its location in the ionosphere?

Representative YATES. That is right. They are flying so high, and the condensation stems from the exhaust. And the operation of the plane will leave this kind of an effect in the ionosphere. And in time, they say——

Representative CONABLE. It may very well raise the temperature of the world?

Representative YATES. That is right.

Representative CONABLE. Melt the polar cap?

Representative YATES. Yes.

Representative CONABLE. I would hope that we base our opposition to the SST on something more substantial than that, although I must acknowledge that I am not part of this esoteric scientific fraternity.

Representative YATES. Mr. Conable, we have many more arguments that seem more substantial to you and to me. But these biologists are worried about the ecology of the earth, and to them this was a very tangible argument.

Representative CONABLE. I think there are likely to be more substantial ecological arguments against the SST than that.

Representative YATES. Yes, the noise factor.

Representative CONABLE. I am willing to acknowledge the ecological argument in terms of sonic boom and noise level.

May I ask you, do you know anything about the present status of the Russian supersonic transport?

Representative YATES. No.

Representative CONABLE. And do we have any solid facts about that except from its apearance at the Paris Air Show?

Representative YATES. Mr. Beggs could probably tell you about that. I asked him when he appeared, and other officials of the SST. And they say the Russians are trying to sell their plane to the countries of the world.

Representative CONABLE. The Russians have had very bad experience in selling their planes to anybody other than satellites.

Representative YATES. In the past, that is correct. They say there is a very serious and determined campaign being undertaken by the Russians to sell the Tu–144. When I tried to find out what information they

had that is more substantial than that sort of a statement they said that they had no further information.

And I said, "Well, can you find out? Can you make inquires about it?"

And we still have no information that has been given to our Appropriations Committee.

Chairman PROXMIRE. One of the big arguments about the SST, of course, is its potential contribution to the balance of payments. To what extent does our aircraft industry at the present time maintain a favorable balance of payments? What is the dimension of what we are talking about here?

Representative YATES. Well, there are two theories about the balance of payments. One, of course, is the one that was used in the Cabinet committee when they said that the sales of SST's plus the amount spent by tourists who use them in other countries will cause a reverse balance of payments. The sales of the SST's by themselves will not. And this is the argument that is used for a favorable balance of payments by the proponents of the SST's.

The Cabinet Committee and the Treasury Department in the Cabinet committee believe that the overall effect of the balance of payments should be considered, and that included the tourism which the SST would carry with it from this country to the other countries, and the money which they would spend. And so they felt that there would be an unfavorable balance of payments.

Representative CONABLE. The feeling is that the SST would contribute a great deal to an outflow of tourists in this country?

Representative YATES. This is what the Cabinet Committee concluded.

Representative CONABLE. Well, perhaps.

Mr. Chairman, that is all I have.

Chairman PROXMIRE. I just have one other question, Mr. Yates.

My staff inquired last week about the financial plan Boeing is required to submit. We received the following reply from DOT:

"This report was waived by mutual agreement until June 30, 1972, per modification No. 34 of the contract."

I am puzzled by that, because modification number 34 of the contract appears to read that this plan should have been submitted December 31, 1969. Mr. Yates, do you know of any good reason why the Government should have agreed to delay this very important matter until 1972?

Representative YATES. I know of none, Mr. Chairman. I suspect that this requirement has been delayed from time to time. And it is going to be delayed from time to time until they see where they are going with the prototype. They will not know how to offer a plan for financing of the production model until they know where they are going with the prototype.

Chairman PROXMIRE. This is a 2½-year delay, and it goes right to the heart of what you have been telling us, that there is serious question that Boeing will be able to finance this in the market.

Representative YATES. I do not think there is any question about that. If I were in the Boeing hierarchy I would be concerned as to what effect the production of the SST would have upon the company itself. They are going to make money with the 747, although that has not happened yet. They are in a financial bind at the present time, because

they have not sold as many 747's as they expected. They may work them out of that.

Chairman PROXMIRE. But you say if we go ahead with this program and appropriate all the funds that are asked for, it still could be a disaster for Boeing rather than a benefit?

Representative YATES. I would think so.

Chairman PROXMIRE. They could end up with a plane they could not really sell?

Representative YATES. That is right.

Chairman PROXMIRE. And then they would be in worse shape than they really would have been if they had recognized the facts of life and gotten into something else?

Representative YATES. With a substantial investment. They might find themselves like Lockheed with the C–5A.

Chairman PROXMIRE. I am sure Lockheed would like very much to go back and erase their whole experience with the C–5A.

Thank you very much for very fine testimony.

Representative YATES. Thank you.

Chairman PROXMIRE. The next witness is Mr. James M. Beggs, Under Secretary of Transportation, accompanied by Mr. William M. Magruder, Director of the Office of Supersonic Transport Development.

Gentlemen, we are very happy to have you, You heard Mr. Conable saying that he does not agree with you fully. And I think that goes for me. And you are two of the champions of this project. So I think your testimony will be most helpful.

STATEMENT OF JAMES M. BEGGS, UNDER SECRETARY OF TRANSPORTATION; ACCOMPANIED BY WILLIAM M. MAGRUDER, DIRECTOR OF THE OFFICE OF SUPERSONIC TRANSPORT DEVELOPMENT

Mr. BEGGS. Thank you, Mr. Chairman.

As you mentioned, I have with me Mr. William M. Magruder, who recently joined us as the director of the SST program. Prior to this time Mr. Magruder was with the Lockheed Co. as the deputy director of commercial engineering for the 1011 program. So he has a broad background in the commercial transport field.

I appreciate very much, Mr. Chairman, the opportunity to appear before you today to discuss the program for the development of a supersonic transport.

First, I would like to describe briefly the nature of the SST program and its progress. The objective of the program is to develop a supersonic airliner which is safe for the passenger, economically sound for the world's airlines, and superior in operating performance to competing supersonic aircraft.

The SST is designed to be the fastest commercial airplane flying during the next two decades. It will fly above 60,000 feet, carry about 300 passengers, have a range of over 4,000 miles, cruise at 1,780 miles per hour, three times the speed of today's jets, and be equipped by the most powerful engines ever built. It will be designed for utmost passenger comfort and will be equipped with the most modern safety features.

The SST program will require a very sizable investment, from both

the public and private sectors. The Federal investment, however, is designed to be self-liquidating, with royalties on production sales set at a figure that provides for the return of the full prototype investment with the sale of the 300th airplane. The manufacturers and the airlines are sharing in the costs of the program under an arrangement which provides an incentive for diligent pursuit of program objectives.

The SST program has been subjected to careful evaluation at each critical point of its development. The program was given a particularly intensive review last year, both by the new administration and the Congress. The administration's review culminated in a decision by President Nixon last September to proceed with the program. The Congress approved this decision in December by appropriating the funds necessary to continue the program.

The committee has asked the Department to discuss the public costs and benefits of the Federal investment in the development of a supersonic transport. I should note at the outset that this type of program is not susceptible to a traditional quantitative benefit/cost analysis. The many intangible factors involved simply defy quantification. Nonetheless, the benefits and costs of the program have received careful scrutiny and a great deal of effort has been devoted to weighing and balancing the various elements involved. I doubt that any Federal investment has ever been subjected to more extensive and intensive analysis.

While I cannot quantify all of the costs and benefits of the program for the committee, I can review the considerations involved in the President's decision to proceed. The President referred to two of these when he announced his decision: first, the future of American leadership in air transportation; and, second, the opportunity to make a massive stride forward in transportation art.

For many years the United States has dominated the free-world aircraft market. More than 80 percent of the total commercial fleet was built in this country. If we do not choose to compete for the market for the supersonic family of aircraft, we stand to lose the preeminence we have enjoyed in this field and the accompanying economic and political benefits.

This preeminence, of course, is not the only factor. Also involved are the impact of changes in the health of our aircraft industry on persons who work in the industry, the importance of maintaining a high level of competence in this area of technology, and the effect on our balance of payments.

With respect to the balance-of-payments issue, there are uncertainties in any assessment of the overall impact of the SST. In terms of aircraft imports and exports, however, the picture is relatively clear. Of the 500 U.S. SST sales now projected, we estimate that 270 would be to foreign carriers. The sale of these aircraft and spare parts abroad would produce $11.5 billion in export revenues over a 13-year period. In the same period, we estimate the U.S. airlines would buy about 60 Concordes at a total cost of $1.4 billion, for a favorable net balance of $10.1 billion.

Without a U.S. SST in being or on the way, U.S. carriers, for competitive reasons, would import about 300 Concordes by 1990, at a cost of 7 billion U.S. dollars flowing out of the country. Offsetting that flow to some degree would be exports of about $1.3 billion in additional

subsonic jets that could be sold if a U.S. SST were not available. The difference, combined with the $10.1 billion in gold flow that would otherwise be earned through the sale of U.S. SST's overseas adds up to a possible net loss of $15.8 billion for the United States.

On the issue of employment, we estimate that the production program will result in the direct employment of 50,000 persons. The work will be spread throughout the country, touching most of the 50 States. Because it is difficult to predict what the labor needs will be throughout the production stage—both in the technical and unskilled areas—the extent of the benefit attributable to the employment factor is indeterminable. On balance, however, it is a plus factor.

On the technological side, the SST program provides a seedbed for the application of advanced technology. The SST program has already been responsible, for example, for advances in titanium fabrication techniques applicable to other sectors of our industrial society.

Another significant, but intangible factor to be considered is that of enabling travelers to move between distant points at supersonic speeds. Man has always sought ways to speed up communication, and the fact is that the supersonic transport is the next step in that process, whether the United States builds it or not. And this is not simply a case of providing an added convenience or commercial benefit to be realized by a select group of individuals—it concerns the impact that another step in the shrinking of the globe has on the outlook of man and his way of life. The U.S. SST presents an opportunity to make a giant stride in this regard.

In the environmental field, noise and sonic boom present the greatest difficulty. Both are being vigorously attacked along technological as well as regulatory lines. We believe the environmental consequences of the SST in these areas can be minimized.

I know of no major technical program where the environmental issues have been given more consideration than the SST program. Government studies of environmental effects over the last several years have significantly influenced the design of the SST.

Smokeless engines, work on improved noise suppression devices, and the incorporation of a fixed horizontal stabilizer to provide high lift performance for community noise reduction are but a few examples of this design influence. Results of sonic boom studies have provided the basis for the current FAA rulemaking action providing for the prohibition of boom-producing supersonic flight over populated areas.

In conclusion, Mr. Chairman, an extensive evaluation of the costs and benefits of the SST has been made. Many of the elements involved, however, cannot be assigned a monetary value because of their intangible nature. Therefore, in the final analysis, the decision to proceed with the SST program had to rest on a combination of informed judgments, technical evaluations, and economic studies.

In our view, the President and the Congress exercised sound judgment and the public interest has been served thereby.

Mr. Chairman, that concludes my prepared statement. Now I will be happy to answer any questions you may have.

Chairman PROXMIRE. Thank you very, very much, Mr. Beggs. I think your appearance here is most helpful to us, because we do need a really authoritative and competent analysis of the benefits as seen by

somebody who is for the program and thinks the program is well worth while.

I must say that when you go over the benefits, as you do in your statement with meticulous care, either they seem to be highly generalized, like the future of American leadership in air transportation, and the opportunity to make a massive stride forward in the transportation art, help the industry, and so forth—which are fine objectives, but, I think, they cannot be justified—or when they are at all specific, they have been repudiated flatly by competent experts in the area.

Take the balance-of-payments argument. I do not think you can get a more competent judgment on this than the U.S. Treasury Department completely repudiated this. They said, your contention that the United States would benefit is not true, this would not benefit our balance of payments. On the whole they seem to come up negative.

Do you take the word of a great expert on the balance of payments like Dr. Kindleberger, who has appeared before this committee many times, and is recognized widely as an international expert on the balance of payments, when he said that whether this has a favorable or unfavorable effect, the balance-of-payments argument should not in any case be used to justify this program? If there has been a single independent economist, outside of the Department of Transportation or the FCC, if there has been any economist who says that this will benefit our balance of payments, I would like you to give me his name right now. Tell me any recognized expert on the balance of payments who says that this will be of benefit to our payments balance.

Mr. BEGGS. I cannot answer specifically your question respecting an economist, Mr. Chairman. But the Department of Commerce, which, of course, is responsible for the trade balance efforts that are being made——

Chairman PROXMIRE. Yes, but the balance of payments is a Treasury responsibility. You are right on trade, that is a commercial responsibility. But this is a matter of payments.

Mr. BEGGS. That is correct. I would only say this relative to the Treasury and CEA statement on the balance-of-payments argument. First of all, the argument is predicated on the fact that they envision that with this additional service the outflow in the travel account will more than balance the inflow in the sale of equipment.

I submit that this is an "iffy" point of view.

Second——

Chairman PROXMIRE. But it is a fact that we have to cope with the outflow of tourist dollars, isn't it?

Mr. BEGGS. And it is based on what happened during the initial introduction of the subsonic jets. As I suggested to Treasury, the reverse of that now seems to be taking place, that is, we are getting an influx of Europeans into the United States as a result of the increased affluence of the European population. And in the long run I think that that account will balance out.

But the other factor that was considered by both the Treasury and the Council of Economic Advisers was that at the time they made the initial judgment—although I do see that they have confirmed that judgment to some extent—they envisioned that the Concorde would not be a commercial success. And I submit that the fact that the Concorde now looks to be a successful commercial program means that the

increase in travel will no doubt take place whether or not we produce an American SST.

Chairman PROXMIRE. We had a witness from England on Thursday, a member of the staff of The Economist, a fine British publication, who contended that the Concorde would be an economic disaster. But you think this has to be seen. It may or may not work out commercially. It has not even had its final tests yet, and we won't know.

I would like to move on to this other question, the question of a second specific benefit, which would be employment. Again we look to an outside objective, fair appraisal. And we go to the Labor Department, Secretary Shultz. What did he say? He said that this would not have any significant effect on employment. And he pointed out the fact that the people you hire here are people who are trained technicians, capable people who by and large are employed anyway, or they would find employment relatively easier, that they are in short supply rather than in excess supply. And it would seem to me on the basis of the analysis by Secretary Shultz in the Labor Department that this could contribute to the present inflationary problem, which is largely based in my view on a shortage of skilled labor.

Mr. BEGGS. I think it would be largely dependent—I think this is sustained by some of the thinking in the Labor Department—on the mobility of that group of employees, those skills. If they are very mobile and willing to move from their present places of employment to the places where these shortages exist, I would concur in that. If they are not, however—and some recent experience in the Seattle area and other west coast areas suggest that they are not as mobile as we would like to believe—then there will be substantial unemployment in those industrial areas as the aircraft industry comes down from the peak points of its current transport programs.

Chairman PROXMIRE. Here is what the Labor Department said this last week:

> Although the overall employment situation in the country has certainly shifted since last year, we would still conclude that:
> (*a*) The net employment increase from the SST would be negligible;
> (*b*) The overall national demand for high skill professionals remains strong; and
> (*c*) SST production would do little to benefit those lower skill workers hardest hit by the current downturn.

The Council of Economic Advisers, the most expert people the President could find—Mr. Houthakker was the principal representative on the ad hoc committee here—they called the SST a white elephant. They said it would be highly inflationary to go into this program.

And in addition, on the technological side you made the argument that the SST provides a seed bed for the application of advanced technology. Well, the Office of Technology, Dr. DuBridge—the President's expert in this area, and again a very highly competent scientist, and very much admired in this respect—found that this would make little technological contribution, no significant contribution, apparently not in relationship with the enormous cost that is involved.

Mr. BEGGS. I might point out, Mr. Chairman, that the Labor Department in this recent letter also said that the field offices they contacted, indicated that workers with specialized aircraft skills and exensive experience, instrument, aircraft and electrical engineers and

other technicians, may remain unemployed for relatively long periods unless they migrate to or seek jobs in other areas.

I think that this is the dilemma that we face with this class of employees. If they are mobile they can find jobs in some other segment of the economy. If for one reason or another they are not, then we have a dislocation in that area. I am not suggesting that this is a rationale for proceeding with this program, however. I am simply saying that I think it will employ substantial numbers of people who might otherwise not be employed.

Chairman PROXMIRE. In the past few day we have had estimates from witnesses that the ultimate cost of the plane, that is, to the Government, will run far higher than the $1.3 billion as now projected. Dr. Richard Garwin, former science adviser to Presidents Kennedy, Johnson, and Nixon, projected total costs of this plane eventually at $5 to $7 billion, with the Government footing a heavy percentage of that figure, he said $3 to $4 billion. General Quesada, FAA head during the Eisenhower administration anticipated that the Government share of this plane would fall in the $3 to $4 billion range.

This has been corroborated by institutional analysts as well. All of these estimates were predicated on the assumption that the Government funding would not be able to stop at the conclusion of phase 3 stage, and that the Government would eventually have to become heavily involved in phases 4 and 5, that is, certification and reproduction of this program.

What assurance can you give us that the United States will not end up contributing money to the phases 4 and 5 aspect of the program either through outright funding or by way of a loan? Suppose the private financing which you now anticipate falls through, would not the Government want to protect its billion dollar investment?

Mr. BEGGS. Mr. Chairman, one of the things that was of great concern during our review of this program last year was this question of the continuity of financing and how we would proceed from the prototype phase into the production phase. There are several questions that one needs to address in this regard.

First of all, of course, is the question of the cost of the prototoype program itself and whether that will escalate. Suffice it to say that in the past several years there has been a period of fairly substantial escalation of costs in this country, substantial inflationary pressures. And that will have and has had an effect on this program.

It is also certainly true that we want to know whether we have a successful transport so that the financial people who will provide the backing for the production program will be encouraged to do just that.

Therefore one of the things that the President decided in conjunction with his overall decision was that we should decouple the production program from the prototype program. And I should point out that these two programs initially had a 1-year overlap, which meant that, had it proceeded on the original basis we would have been financing, or the company would have been financing, the production program prior to the time that we had the greatest amount of information possible on the prototype program.

We therefore decided to decouple the two programs so that test information from the prototype would be available, and we would have

assurance that we would have a successful transport prior to proceeding with the production program.

Now, the question of private financing for that production program is one that, of course, will depend on whether the financial people, the financial community, feels that they have a successful transport program on their hands. If they do I submit that the likelihood is that they will provide the necessary financial support to the Boeing Co. The Boeing Co. has recently been through an experience that gives encouragement to that thought, in that they succeeded in bringing the 747, which was perhaps the first of the major new transports that did not have substantial backing from the Government, to production with private financing.

And that financing amounted, as I understand, to between $400 and $500 million. The financing for the SST will require at least twice that much. And we are talking about this financing in the time period of 1975 through 1980. During that time the Boeing Co. should have a substantial net cash flow into the company treasury from the 747 program and other programs which should enable them to liquidate a good deal of the current debt and put them in sound financial condition to borrow the necessary funds to finance the SST program.

Chairman PROXMIRE. Let me ask you point blank, will or will not you give me assurance that the Government will not go ahead with financing part of phases 4 and 5?

Mr. BEGGS. Mr. Chairman, I am on record, as I think Mr. Yates stated, in the Appropriations Committee with the statement that while I was of the opinion that private financing would be available, if it were not at that time, and if we felt that we had a successful SST program on our hands—that is, a successful transport after the prototype testing—and it required some Government-guaranteed loans, then I would think that we would so recommend.

Chairman PROXMIRE. And the sky can be the limit?

Mr. BEGGS. No; I do not believe so.

Chairman PROXMIRE. $5 to $7 billion, at any rate?

Mr. BEGGS. We have not yet proceeded with the financial study as to what will be required—that is, what the net cash requirement will be to bring the airplane from the prototype to the production stage—but the indication from the studies we have made thus far is that about a billion dollars will be necessary to bring it from that point on. But these would be in the form of loans which would be liquidated as the aircraft proceeded from that phase to operations.

Chairman PROXMIRE. My time is up.

Mr. Conable?

Representative CONABLE. Thank you, Mr. Chairman.

I am pleased to note the arrival of my very able colleague from Ohio who firmly supports the SST. And that relieves me of any constraint I might feel to balance the questioning.

Sir, I am interested in the implication that this is some kind of an aviation Appalachian program providing employment to an area of otherwise possible substantial unemployment. Aren't we talking about employment still some distance off? Because the great part of the employment will be related to the development and not research, isn't that correct?

Mr. BEGGS. That is correct, Mr. Conable.

The employment peaks in this program would not occur until the latter half of the 1970's.

Representative CONABLE. And doesn't that assume also that this employment otherwise will be lost to foreign competition, that the Concorde or the Russian plane will be the ones that are selling like hot cakes, and that our more traditional standard transport will be a drug on the market?

Mr. BEGGS. Yes. But I think you should perhaps add there the full dimension of what I am talking about.

Let me try it this way. The reason that 80 percent of the world's air transports are American is that there has been a continuous family of American aircraft. It is to the advantage of an airline to buy equipment, one model of which is compatible with another. And this is the reason that many airlines—and I might ask Bill Magruder to comment on this—many airlines tend to make their purchases from a single air frame manufacturer.

If it turns out that the Europeans—and this is a game that the Europeans understand very well, because the American air industry completely took the market away from the European equipment manufacturers during the fifties—if it turns out that we do not proceed and the Europeans have a successful SST program on their hands, the stakes they are playing for is not simply an SST, they are also playing for the stakes of substantial quantities of other kinds of aircraft. And so I think that in a real sense what they are after is the market. This matter must be considered in that context.

Representative CONABLE. Is there any connection between the phasing down of NASA's expenditures and the feeling that we have to fill the technological vacuum with this kind of a program?

Mr. BEGGS. There is no feeling on my part that you have a tradeoff here, Mr. Conable. On the other hand, I will say that in my view the American economy has realized very substantial benefits from the advanced aeronautical programs which we have conducted in the past. And much of our new materials technology has come out of that program.

Certainly, if you go back to the war years, the entire basis for our aluminum industry today is the hurdle that we got over as a result of our aeronautical programs. Today we are pioneering titanium technology. That will result in a substantial benefit to the economy, as will the work on the large jet engines which have been developed, and so forth and so on.

We have realized very large technological advantages by pursuing advanced aeronautical programs. And I suggest that the SST is another example on that scale.

I am not suggesting, however, that if this were an uneconomical program per se that we ought to pursue it simply for those benefits. But I am saying there is a significant fallout.

Representative CONABLE. Do you think there would be a substantial tradeoff between, say, the roughly hundred thousand people that have been laid off in the aerospace industry as the result of cutbacks in NASA and this particular program? You are talking about 50,000 jobs here?

Mr. BEGGS. No, sir, we are not talking about anything near the scale present in the space program. What I am saying is that we have

here the continuation of a series of commercial transports which have been coming along since the early 1950's, mid-fifties, and unless we continue our thrust here I think eventually we are going to lose our leadership in aeronautics, civil aeronautics, and eventually cause large unemployment throughout the industry.

But the part of that that is attributable to the space effort I think is quite a different problem.

I would like to point out, however, that the NASA aeronautics budget as opposed to the space side of the aeronautics budget has increased every year for the past five. And the realization that this represents is that aeronautics needs to be pushed in this country. And that has been supported—and I might add, supported very well—by the Congress in the appropriations to NASA.

Representative CONABLE. This brings me to the next question, which has to do with the control of this program. It has been taken away from the FAA and given to Mr. Magruder, who reports pretty directly to the Secretary of Transportation. I would like to know a little more about the reasons for this shift. Was the FAA lukewarm in its advocacy, or too active in its advocacy? Or why wasn't this left under the general jurisdiction of the agency responsible for air transport for the most part, civilian air transport?

Mr. BEGGS. First, the FAA had the SST program by reason of the fact that the program started with the FAA when it was an independent agency. There have been a number of suggestions over the past several years that lodging the program in the FAA created a bit of a conflict of interest, because eventually the FAA will have to certificate the aircraft.

And so there were suggestions that perhaps it would be better lodged under the Secretary.

Representative CONABLE. Why not NASA?

Mr. BEGGS. May I finish this one, and then I will try to address that one?

In addition, of course, the program is a national program which was given Presidential blessing last year. And the President is holding the Secretary of Transportation responsible for pursuit of the program. Thus, it was felt that both from the standpoint of visibility and for the purpose of providing rather direct management from the office of the Secretary, that it should be lodged right under the Secretary.

Now, the reasons why it is not in NASA, are, I guess, historical as well as philosophical. As a general rule the NASA in their aeronautical program has pursued programs only up to the point of proof of concept, the idea here being that NASA and its aeronautical centers are best kept employed by advancing the technology and not by going into development programs to make specific pieces of equipment.

Mr. James Webb, who, of course, ran NASA for many years, was fully committed to that proposition, that NASA should pursue technology up to the point of proof of concept and not get into the development of specific air transports or any other kind of commercial program.

And it was for this reason indeed that NASA over the years spun off of the space activities that resulted in commercial programs, the communications satellite program, the meteorological satellite, and so forth.

So when the decision was made to go forward with the supersonic transport, NASA was, of course, asked whether they would be interested in managing the program. And they said in line with their philsophical position they would not. And I think, having served in NASA, that that is a sound position.

Representative CONABLE. Thank you, Mr. Chairman.

Chairman PROXMIRE. Mr. Brown?

Representative BROWN. Mr. Beggs, would you expand on the reference in your testimony to the Federal investment and the anticipated amount of that investment at this point?

Mr. BEGGS. Yes, sir. The anticipated total investment in the prototype program by the Government is $1,051 million. The total investment in the prototype program is $1,283 million.

Now, the statement I made in the third paragraph was directed to the fact that under the contract the Government has retained royalty rights on the sale of the transport in the commercial market, so that with the sale of 300 airplanes the Government will recover its total investment.

Representative BROWN. Of $1,051 million?

Mr. BEGGS. That is correct, sir. Beyond that the Government has royalty rights until it recovers a 6-percent return on that investment. And the estimates on the sales of the aircraft run to about 500 aircraft right now.

Representative BROWN. What experience is the 500 figure based on?

Mr. BEGGS. It is based on a number of studies which project the demand for air travel through the next 20 years, and the percentage of the market that this aircraft will serve, and the likelihood of the various airlines throughout the world buying the aircraft in order to maintain their competitive position.

Representative BROWN. Are those conservative figures? For instance, what is projected for the 747 in the way of purchases?

Mr. BEGGS. Recently I visited the Boeing Co., and they are still projecting sales of upward of 800 747's over the life of the aircraft. My personal view is that sales of 600 to 800 airplanes are in the cards for that airplane. The question of conservatism here, I think, is, of course, a matter of judgment. We have studies in the Department that indicate, projecting again the demand, that sales of 800 SST's are possible. We also have estimates in the Department, based on some economic analysis, that the sales will be as low as 350—380 I think is the lowest one that we have. But my view is that 500 is a reasonable expectation at the current time, based on the studies that we have.

Representative BROWN. What about the return to the manufacturers? If my figuring is correct, they make a $232 million investment, is that right?

Mr. BEGGS. Yes, sir, based on these figures. But that is not entirely correct, because there are certain parts of the program which the Government does not participate in—such as manufacturing facilities, which will be necessary to manufacture both of the prototypes. And, of course, these facilities will be used later to manufacture the production model.

The total investment by the manufacturers through the prototype program runs to about $322 million.

Representative BROWN. Where are we in terms of the expenditures

which the Government has already put into this, either from the appropriations standpoint or from the standpoint of unrecoverable investment?

Mr. BEGGS. We are into the program right now—I think the figure is $663 million obligated.

Representative BROWN. So if we stop now we have invested over half the money, is that correct?

Mr. BEGGS. That is essentially correct, sir. We actually would be investing somewhat more than that if we were to stop now, because the company, upon a termination for convenience, would have financial rights for recovery up to, as we figure it, a little over $60 million additional.

Representative BROWN. And what percent of the project will be complete if we provide the $290 million this year?

Mr. BEGGS. I believe about 70 percent complete, sir.

Representative BROWN. Are we going to hold on to the $1,283 million figure as accurate, will we go beyond that?

Mr. BEGGS. So far as we know now, this is the figure that we feel that we can complete the prototype for. It is going to require prudent management of the program, and I think we have had prudent management up until this point. But we are going to have to watch the program very carefully. We are going to have to insure that the manufacturer and the program office make the necessary trade-offs as we go along on this thing to keep the program in financial balance.

But my view, after a recent visit to Boeing and a complete analysis of the financial situation in the program office, is that we are on reasonably good ground with this estimate. As I say, we have made certain predictions as to the inflationary pressures that will exist in the future. And if they were to get worse this program would suffer. But that is where we stand.

Representative BROWN. Is the 747 merely a bigger or more commodious version of existing aircraft? Is there any great technological difference between the 747 and some of the earlier generation aircraft that we produced recently?

Mr. BEGGS. That is correct, sir.

Representative BROWN. What is the distinction between the SST and the 747?

Mr. BEGGS. In the progress of technology, and in the progress of engine technology in particular, as you go along in these programs you can develop engines of a larger and larger size. You can take advantage of that larger size engine either in terms of making the aircraft a good deal larger, as Boeing did in the 747, or you can take——

Representative BROWN. With the same speed, is that what you are saying?

Mr. BEGGS. With the same speed—or you can take advantage of it in terms of both a larger aircraft and greater speed, as we are doing in the SST.

Now, the issue that we are addressing here is that of productivity in airline use. Over the past 20 years the airlines continually have been willing to pay for increased productivity, because that increased productivity always translates into higher profits. If the aircraft is properly used, and assuming the demand curve continues to go up, the SST will be as productive as about two 747's in terms of its ability to move passengers and freight throughout the world.

Representative BROWN. If you will stop there just a minute, the increase in domestic air travel in this country has been phenomenal in the last 30 years or so, more particularly in the last 20 years since the war. Can that curve logically be expected to continue to increase at its current rate?

What about international travel? Are we following the same kind of a curve?

Mr. BEGGS. The increase in demand over the past decade has been very spectacular in the overall airline market. It has run about 15 percent a year.

Now, we anticipate on the domestic side that the percentage increases will slow down a bit in the seventies to perhaps 10 to 12 percent per year compounded. This will still constitute a very substantial growth in the total market. As a matter of fact, we are predicting about a tripling of total movements in the country by 1980.

Representative BROWN. I am just about out of my time, but I do want to discuss foreign travel because I think that is the whole issue here.

Mr. BEGGS. Yes, sir.

Representative BROWN. The increase in domestic air travel has represented a shift in mode of travel from trains to airplanes. Unless we assume that those people who are currently traveling by car will change to airplanes, there is not much room for future growth.

So I assume that that is the reason you are seeing a tailing off a little bit of this sharp increase in domestic travel. I would like for you to address yourself to that.

Mr. BEGGS. The number of people traveling abroad is increasing. This trend is continuing very directly. And it is the strongest segment of the airline market today. As a matter of fact, we are finding that many of the routes—and this was one of the reasons for the CAB increasing the competition on many of these routes—we are finding on many of the foreign routes that, with the speed of the subsonic jets, more and more routes are opening up, and we are getting a high demand on those routes, to the South Pacific, Japan, Indonesia, Australia, and so forth.

Our studies indicate that this demand will continue strongly throughout the seventies and through the eighties.

Now, the interesting thing about the SST is that it will bring the same kind of service in terms of time to the widely separated points on the globe. For example, this airplane will bring South America as close to us as Europe is today with the subsonic jets. So we envision that a large number of additional city pairs will open up to a high demand for air travel.

The likelihood, I think, is good, because experience seems to indicate that if you cut the travel time down to a half a day or less between city pairs, your commerce and cultural exchange between those city pairs seems to increase almost in a logarithmic manner. It moves up very rapidly.

So this airplane will enable us both to move people on the existing international market and open up new international markets. And this is the area of strongest demand today.

Representative BROWN. Thank you.

Chairman PROXMIRE. I think all of us would agree, Mr. Beggs, that

we would like to see aviation advanced. The only problem is—the reason America is supreme in my view is exactly because we have relied for so much of our aviation on private enterprise. We have not had the long deadly hand of the Government coming in. We have seen, where it has come in in military aviation, how devastatingly costly it can be.

Representative Yates has just told us that a $76 million overrun or cost growth has been experienced in the SST, $57 million of which will have to be absorbed by the Federal Government. First, could you confirm this for us?

Mr. BEGGS. That is essentially correct, $76 million in the total program.

Chairman PROXMIRE. As you explained it, if Mr. Yates is correct, on the basis that the appropriations were not what you had planned, you had to stretch it out, and therefore you can stretch out a program that is representative, as Mr. Conable said, you have higher cost. This is another problem that is peculiar to Government financing, governmental operations?

Mr. BEGGS. If I may make one comment on that, Mr. Chairman, I said that we both stretched it out. And we unfortunately stretched it out during a period of quite high inflation. And so it is a combination.

Chairman PROXMIRE. That would be awfully high, because if you stretched it out to only the extent of $36 million, you get a $76 million increase in cost?

Mr. BEGGS. That is correct.

Chairman PROXMIRE. We have not had that much inflation.

Mr. BEGGS. But it is $57 million in terms of the Government's share of this thing, which I think is a fairer comparison, because the contractors would be sharing in the effects of that $36 million.

Chairman PROXMIRE. Now, assuming that Congress adheres to the schedule of funding now anticipated by your Department, what are the prospects for further overruns in this program? I understand that you have changed your titanium three times, from titanium honeycomb to stress skin to brazed titanium. And how do we know the basic structural material would not be changed again? Certainly one of the problems here, as Mr. Brown pointed out so well in his questioning, is that you have got a new state of the art, apparently, or you are using a new material, and here is where your costs are running high, and where your overruns or cost growths are pretty sure.

Mr. BEGGS. Let me answer just briefly and then ask Mr. Magruder to comment further.

It is not, I think, unusual in a development program of this type to run through several fabrication methods, and indeed be looking at several different kinds of processes, when you are trying to select the best one for construction. And indeed this was true of our titanium experience in this program.

I think we have a satisfactory material right now, it looks very good.

I will ask Mr. Magruder to comment further.

Mr. MAGRUDER. The present materials follow the aluminum brazed type concept—and I think one of the nice things about a prototype

program, which we do not get an opportunity to enjoy in the military programs any more, is this ability to study while you are working on the prototype and make flexible changes that are trade-offs on schedule and cost. I would not want to say now that the aluminum brazed honeycomb would be the final structural design for production because that airplane is some 8 years away, and we should continue to make improvements in structural design and up the payload and performance of the airplane. So I would not be discouraged about this.

Chairman PROXMIRE. We have already moved from the honeycomb, as I understand it, to stress skin and the brazed titanium, is that correct?

Mr. MAGRUDER. There have been several steps, I am sure. And as you speak to me, obviously, you are speaking to a 30-day expert on the SST program, but one who is not unfamiliar with the SST or commercial aviation. And I am sure Mr. Beggs is asking me to speak to put this in the context of the advantage of a prototype program over one where you have to overlap commercial production and the early development.

Chairman PROXMIRE. The point I am making in terms of future cost growth, overruns. We are so familiar with the devastating record of the Defense Department. But this committee discovered this $2 billion overrun on the C–5A, about from $3.2 to $5.2 billion. The FS–11 and many other military planes have cost far, far more than it was originally estimated. And we are concerned here again, not because it is a military plane, but because the Government is involved, and there are all kinds of problems, including a lack of incentive compared to a strictly private enterprise operation.

Mr. BEGGS. Mr. Chairman, may I suggest on this point—because this was one that was raised frequently in our hearing before the House Appropriations Committee—that we have had some very, very sad experiences in some of the military programs. In particular, the C–5, which is a transport program, might logically be compared to the kind of thing we are doing here. However, I might point out that there are two substantial differences between that program and this in financial terms. One is that the company and the military were working to a very, very severe type military specification. As a matter of fact, they had signed up to meet this on the basis that there would be no changes at all as they proceeded through the program, no ability to trade-off.

The second is that the contract——

Chairman PROXMIRE. Of course they make some changes, substantial changes.

Mr. BEGGS. Of course, and they always do.

Chairman PROXMIRE. Speed, weight, and so forth.

Mr. BEGGS. The other point that I wanted to make, though, is that they started off with a contract that was tied not only to the production of a prototype, if indeed there ever was a prototype in the program, but also to a substantial quantity of production aircraft.

So they were committed to a total program. And they found that with that quantity of aircraft, the problems they had in meeting the specifications and the problems they had in bringing the airplane along according to the estimates caused the cost of each aircraft to

escalate, and that resulted in a very, very large overrun. We are not committed in this program to any production quantity; and, indeed, we expect to be able to make evaluations as we go along as to where we stand relative to the cost of a production aircraft.

Chairman PROXMIRE. Let me ask you, could you give us a general rundown of what assurances we now have that private financing will come in to take over the development of this plane? How firm are these assurances? We have seen lately a situation in the money market that is extraordinarily difficult. Many big corporations are in really serious trouble; their credit is being squeezed tightly. And when money is so tight can we rely on this money coming in when it is needed?

Mr. BEGGS. We have several things to go on here. When you have assurances and you go and ask a banker for the money, as you know, you never know that he is going to lend it to you. However, we did consult with Mr. Eugene Black, a very experienced and distinguished member of the banking community. We have consulted with him several times on this program, and he has assured us that if we have a successful prototype program on our hands that he feels confident that the private financing would be available.

Now, we have spoken with a number of people in the financial community. Last year Mr. Shaffer, the Administrator of the FAA, went to New York to discuss specifically this question with the Society of Air Line Analysts, who, as you know, is made up of a very experienced group of investment bankers in the New York community. And they felt very confident again that if we have a successful prototype program on our hands that the necessary funding will be available to pursue this program through the production phase.

Chairman PROXMIRE. May I ask—it is my understanding that the airport noise, what is referred to as sideline noise—and this is a new problem that was developed in our hearings the other day, new to me—is a very serious problem with the SST. I would like to get the facts clear on this. The FAA has issued a regulation on maximum sideline noise limits for subsonic aircraft.

What is the maximum permissible sideline noise for subsonic aircraft under this regulation?

Mr. BEGGS. It is 108 EPNdb at the 0.35-nautical mile mark.

Chairman PROXMIRE. How much sideline noise does the current 747 actually make, according to the tests FAA has conducted?

Mr. BEGGS. We have the figures here. It looks like it is 102 EPNdb.

Chairman PROXMIRE. What is the performance specification required in the SST contract for sideline noise?

Mr. BEGGS. The original objective set here was 116 EPNdb. However, this was set some years ago, and it was before we had gotten into the regulatory process with these various types of subsonic aircraft. This is a problem, of course, which has recently received a great deal of publicity, and it is one to which we are devoting quite a bit of our resources and energies.

Chairman PROXMIRE. Where is it now, about 125 EPNdb?

Mr. BEGGS. The current engine that we are running today, which is a very early prototype model of the engine, is either 118 or 128 EPNdb, depending on how we calculate it.

Chairman PROXMIRE. At any rate, the SST is not going to meet the contract requirements in this respect, is that right?

Mr. BEGGS. I should point out that that was not a requirement in the strict sense, it was an objective. Our objectives still stand, but now we are using the new subsonic rule method of measuring. We think that there are substantial things that we can do that may bring the noise of this engine down. And we think there is a substantial amount of technology coming along that will be available in the next 5 or 6 years that is going to enable us to make the production engines even quieter.

Chairman PROXMIRE. I hope that will happen.

Mr. BEGGS. It has happened every time in the past.

One of the reasons that the 747 is quieter than the 707, and one of the reasons that it looks as though we have passed over the peak in the noise curve, is because we have had this vigorous technical program in NASA, in the FAA, and in the last 3 years in the Office of the Secretary of Transportation. And I believe very firmly that some of the things that are coming along in this field may give us the handle to bring this noise problem back under control.

I should make one other comment in this area——

Chairman PROXMIRE. Isn't it true that you get the noise down by increasing the field length so that you cannot land on existing runways?

Mr. BEGGS. No, sir. The current requirement or the current situation, current field length requirement for the aircraft, is about the same or a little less than the requirement for a 707. So we are in no great difficulty on that.

I would like Mr. Magruder to comment on that.

Mr. MAGRUDER. I would like to comment on that from the standpoint of having just come from an advanced jumbo jet program where we also worked to get the noise down. The SST does have some distinct advantages that do not belong to the subsonic jets. They are unique to that design alone. And if you isolate——

Chairman PROXMIRE. Noise advantages?

Mr. MAGRUDER. Noise advantages. If you isolate your thinking to the sideline noise which is basically on the airport and the immediately adjacent community, you tend to ignore the fact that on approach, for example, the SST's inlet noise can be suppressed by making use of its inherent supersonic inlet. In other words, you can choke the inlet or create sonic velocity blockage in the inlet so that inlet noise simply does not generate outside, forward, and down on the community. For example, that advantage is worth as much as 10 EPNdb over a 707—it cuts the noise in half.

Chairman PROXMIRE. At the present time the 747 is 102, and the supersonic transport is 125. And the decibels are measured on a logarithmic scale as I understand it, so that 125 is several times as noisy as the 102?

Mr. MAGRUDER. We are not talking about the same things. The number I have is 113 EPNdb for the 747 while it is in the air. While on approach it might be on the order of 113 or 114. I am speaking of approach now.

I am trying to direct your attention to the fact that you probably annoy the community on takeoff and approach more severely than you do along the sides of the runway while on the airport. That is where you have the airport boundary working for you. And as you fly out over the residential areas, or as you approach over the residential

areas, you probably get a larger number of complaints than you have due to noise on the airport itself. I am trying to make the point that a supersonic transport when it takes off and flies over the community, or it approaches over the community to land, has inherent advantages. And the whole story is not simply one of airport or sideline noise.

Chairman PROXMIRE. Our expert the other day, Mr. Garwin, testified that the SST has the noise taking off of 50 commercial jets.

Mr. MAGRUDER. I would like to address myself to that question, because it is very easy to play games with physics or engineering numbers. What he said was, I believe, that if you make that comparison on the basis of pressure, then on a pressure basis one SST might be equivalent to 50 subsonic jets taking off simultaneously.

Now, I see you are puzzled. And it is not surprising that you are puzzled. The engineering and the acoustics engineering community have been working for some 12 years to come up with a parameter that would let you and me, who are literally laymen in this area—although I have spent most of my life working with these people—understand these phenomena of noise. And the perceived noise level, or an equivalent or effective perceived noise level, has been defined for us, so that we can understand this factor.

If you go to the dictionary or physics books it will define the decibel as the lowest unit of pressure your ear can perceive. There are other ways to define it, but that is the classical one.

The perceived noise limit takes into account frequency—if you scratch your fingernail over a blackboard it may have a very low decibel, but it sometimes gives the ladies a chill.

When you say effective perceived noise level, you are adding frequency considerations with time duration and tone qualities.

We have all gone down that road all over the free world. The British have made substantial contributions to this. It is not an FAA generated thing. As a matter of fact, the committee that does the greatest amount of work on this is the Society of Automotive Engineers Subcommittee on Noise, which includes people from our universities, from the field of engineering, manufacturers, engine manufacturers, and airlines. And they have agreed to use these terms.

So when we take the liberty of now saying, I am going to make a comparison on the basis of pressure and pressure alone, we sort of fly in the face of this 12 years of research. And it is easy to play this kind of game and come up with misleading numbers.

I would have liked to have come here with a simile of how much the noise would be in terms of, for example, if a herd of elephants were to walk about. This would be less annoying than one Volkswagen on the basis of noise pressure alone.

But I would prefer not to get into that kind of argument, and say that the entire scientific community as well as the FAA, has zeroed in on EPNdb, effective EPNdb. There are plenty of arguments there, and I will stick with those, because they were invented by the whole technical community so that we could communicate with each other and not go off on those tangents that tend to create imaginative responses. And I am saying the same thing when I say you should not speak to sideline or airport noise without directing your attention also to the advantages that can accrue when flying over the community on takeoff and approach.

That is really where the problems have been in the past as far as annoyance is concerned.

That does not mean that we say the sideline noise is not important. It is very important. We are investing a great deal of money examining that, and we have high hopes for finding a solution. But if you ask me to take a photograph sometime today and predict where we will be 8 years from now, in all candor I must say that I do not know.

We are just going to work more on it. And we have confidence that our engineers will get down to it.

Back on that point, on approach, on a EPNdb basis, the SST, because of the choked inlets, has a significant advantage over the subsonic jet. The best of the subsonic jets are having a very hard time matching what the SST can do. And by that I am talking about the DC–10's, and the 1011's and the 747's during takeoff, because I can point out that we expect that the SST will get to higher altitudes very quickly. And it can get down to the best of the subsonic jets very closely.

So we are matching the subsonics on takeoff, and beating them on approach, and we have a problem on the sideline. That is what we are going to work on, and address ourselves to that.

Chairman PROXMIRE. Mr. Brown?

Representative BROWN. Mr. Secretary, how many years have you been investing Federal money in this SST?

Mr. BEGGS. The original decision, of course, was made back in 1959–60. And we have been spending some money each year since 1961. The major expenditures for the program have occurred in the last 3 or 4 years, when we moved into the active design and development of the prototype.

Representative BROWN. When was the $1,283 million estimate put together?

Mr. BEGGS. If my memory serves me, an estimate was made in 1966, but was updated to $1,283 million this year.

Representative BROWN. So at 6 percent on $1,283 million we come up with about $76 or $77 million, is that correct?

Mr. BEGGS. I am sorry, Mr. Brown. I have confused both you and myself. May I go back and start over again?

Representative BROWN. Yes.

Mr. BEGGS. The estimate last year was $1,207 million. As has been stated several times this morning, that escalated $76 million to $1,283 million, which is the current estimate, updated as of this year. So the $1,207 million was last year. The $1,283 million is the updated figure.

Representative BROWN. If you take a 6 percent inflationary factor over 1 year you come up with about that figure?

Mr. BEGGS. That is correct, sir.

Representative BROWN. Is that to allow for what has happened to the dollar, or what has happened to the program?

Mr. BEGGS. I guess there are several factors involved here. Of course, since the initial estimate was made we have had a rather drastic change in the program. We went from what was initially a variable geometry swing wing design to a fixed wing design. We changed the program in terms of the way we were going to proceed with the testing of the prototype, and we have made numerous adjustments, numerous tradeoffs within the program as to how we would proceed. And so a complex series of decisions was made over the last 2 or 3 years in terms of the

way we were going to run the program that unquestionably have had some impact on costs. The statement I made to the Appropriations Committee this year was based on the fact that when you project over the coming years the impact of the $36 million which was not advanced to the program, which is what we are talking about now, that is, how much we are going to spend from now until we produce the first prototype, in the initial schedule, in late 1972, and on the new schedule, in early 1973, you get a $76 million effect, $57 million of which is the Government's share.

Representative BROWN. In any event, a substantial portion of this relates to inflation. I am not getting the same Ford station wagon in 1970 that I got in 1967 but it is still a Ford station wagon and it costs somewhat more this year than I spent in 1967 for that year's version of the same model Ford station wagon. I assume you are having the same problem.

Mr. BEGGS. Yes, sir.

Representative BROWN. Are we fairly comparing the SST to the C–5 in terms of cost overrun? In a technical sense, is the C–5A this next generation airplane, or is it just a bigger plane, of the same type that we have done before?

Mr. BEGGS. The C–5 was a very difficult technical challenge indeed. And so by what I am saying here I do not want to imply that the C–5 was an easy job. It was a very difficult technical job. The specifications required a substantial jump in size and weight, as well as pressing the art in a number of fields, such as high-lift characteristics so it could land on short strips, so that it could land in cross winds—a whole host of very difficult technical requirements.

Now, having said that, however, the C–5 is not a particularly advanced aircraft in an aeronautical sense. It is a standard, subsonic airplane that uses fairly conventional kinds of operating procedures. But it did involve some very severe technical problems, severe technical challenges.

The SST, on the other hand, without question is the most advanced aeronautical program in this country today. It is a highly advanced program. But at the same time it rests on a base of technology that has been brought along over the last decade in supersonic flight both in military programs and in the NASA aeronautical program. So when it was launched as a program there was substantial cofidence that we could do the job.

I am not sure I have answered your question.

Representative BROWN. I think you have, because in breaking the barrier between subsonic and supersonic we are at least getting into a new technological area, is that correct?

Mr. BEGGS. That is correct.

Representative BROWN. Which was not the case, and this is the point I am trying to pursue—with the C–5A. Even though you had certain aerodynamic qualities which you wanted to modify in terms of the takeoff and landing speed, and the size of the plane, and so forth. It is not unlike the difference between the 707 and the 747. You just have a bigger plane than the 747.

Mr. BEGGS. That is correct, except that this one is the biggest of all. And it is substantially bigger than a 747.

Representative BROWN. Let me ask you about the question of other

technological advantages. I gather from the response that you have made so far that you think some of the environmental problems created by the SST can yield to technological advances. What other spinoffs or technological advantages in related fields are we likely to get into from the SST? You mentioned titanium and the development of titanium because of the SST studies?

Mr. BEGGS. The titanium, I think, is the outstanding example of the advancement in the actual usage of a new technology.

I might ask Bill Magruder to comment further when I get through.

In the engine field—this is, of course, the largest and most high-powered and by far the largest engine in size that we have ever built, and as a consequence of that, it too will advance materials technology in some of the refractory metals as well.

Now, the SST as such involves a number of new kinds of technology. The sealing of the fuel tanks, for example, will be an advance in the chemical art of sealing fuel tanks, and undoubtedly will be applicable to a number of situations where you need a seal for high temperature conditions. The design of the entire control system of the aircraft will be an advance in the art, and will undoubtedly have fallout not only in the aeronautical field but in other areas where one has to cope with control problems requiring fast responses.

Representative BROWN. Because of the speed of the airplane itself?

Mr. BEGGS. Yes, because of the speed factor and the design. The design of the electrical system will be an advance, and will undoubtedly have fallout in the aeronautical field and in a number of other areas.

Bill, can you add to that list?

Mr. MAGRUDER. I would like to add to that list.

In all of the testimony I have heard in the 30 days I have been on the program I detect that there has been something of a misunderstanding of the challenge of the SST. I think that the SST represents the greatest aviation technology challenge of our decade.

Representative BROWN. If I may interrupt you at that point, are we in a region between subsonic flight and space flight in the SST?

Mr. MAGRUDER. I would prefer not to answer it that way, if I may. I would like to define the challenge the way I see it, and it has not been exposed in that way in my mind.

That is, when you take on a military project you have to guarantee performance, get bombs to the target, and so forth. It is when you get into the commercial environment you really face long life, reliability, safety, maintainability, dispatchability, all of those things that answer the question of whether or not you will make money as a commercial operation.

The SST represents a new, long-range supersonic cruise aircraft, designed to provide the reliability required for commercial aviation. It has a special planform with a new engine to achieve this long-range cruise. It has new metallurgy technology in it. People address this program by asking, does the SST provide technology now or will it do it at some specific time later? And the answer to this is now. I got an excellent answer to that question from Mr. John Pirtte of GE. I would like to read some of the things that lead to his picture of advancing technology as a leapfrog process.

You do not complete an SST and then stand back and look at it and

say, now it is going to do this for technology. It starts the day you start the SST, and it continues to filter in all along the line. It filters into military programs, makes a jump, and filters back to the SST. And it is an evolutionary, continuing process.

John Pirtte has provided these examples: René 63. A nickle-based alloy which is an improved high strength sheet or bar material which will allow the replacement of conventional alloys and will result in significant weight-savings and longevity. Compared to the use of René 41, René 63 increases the life of a typical part from 4,000 to 12,000 operating hours.

René 80. A high-strength nickel base turbine blade-vane material, with hot corrosion-resistance, has been successfully developed and commercially produced. Planned application includes the J79, TF39, TF34, GE4, and F101 engines.

Combustor. The SST's GE4 combustor was designed for high heat-release and smoke-free operation, and will subsequently be evolved in many other designs.

Turbine. The air-cooled turbine blades of the SST engine, the GE4 allow high cycle temperatures for longer periods than projected miltary requirements.

And I could go on and read numerous items of this nature. But I think Mr. Beggs has pointed out advancements all through the airplane control systems and in instrumentation and navigation related to commercial requirements. And in these areas of reliability, long life, dispatchability and maintainability, there are going to be advantages from the SST program that you just do not get by pushing the military programs. And it goes to the military and will come back to the commercial.

So it is not a cut-and-dried black or white thing. Once you start new technology, it goes into the military, and it comes back to the commercial and keeps going on.

Representative Brown. If I understand what you are saying, you are suggesting that in our space effort and in our military effort to develop things that transport us, or weaponry, transport weaponry, that we usually go into it without any thought of whether it is economically viable, but we get some technological spinoff that may benefit us some place, or we may not.

In this I gather we are going into it with the idea that it is economically viable, that is, the Federal Government will get its money back eventually if projections which would seem to make sense are correct, and we will get certain technological spinoffs besides which may have a benefit in many other areas. Is that what you are saying?

Mr. Magruder. That is what I am saying. But I do not want to leave you with the impression that the military people do not look at economic viability. The driving factor on the military machine is the military mission, within the constraints of their funding. But for a commercial airplane it has to be a moneymaking, reliable, highly dispatchable machine. And that kind of a requirement simply is not a major factor in new military design. It evolves in the military designs, and it comes along much later. And they push the state of the art, they must push it to stay ahead of the enemy, if you will. And that one requirement on the SST in my mind makes it probably

the most demanding aviation focal point in the history of aviation, the new concept, the new speed regime, the new altitude regime, the new metallurgies and new engine, all at the same time. And thank goodness we have had 10 years of research to date and will have had 18 by the time the airplane goes into service, and 13 by the time we have to make a decision, prototype versus going into production. A prototype-program is a very wise approach in my experience.

Representative BROWN. Thank you.

Chairman PROXMIRE. Mr. Magruder, what you have been telling us is—I would expect you with your responsibility and interest to give us this, you are a very capable man, that is why you are here, but you are also an advocate with a responsible and proper role to play. At the same time I am very skeptical as to the military value of this. They have some kind of a generalized statement by the Secretary of the Defense Department that this would be of some value, I suppose, but they were not successful in the past in getting the military to say this was of any value to them, or NASA to say that they wanted it and would need it in any way.

And President Nixon as an advocate of the program appointed the Technological Fallout Committee.

In conclusion, the Technological Fallout Subcommittee said:

> We believe the technological fallout in the SST to be of relatively minor importance in this program, and therefore it should not be considered either wholly or in part as the basis for justifying the program.

As I say, I would not expect you to agree with that. And you do not have to agree with it. But I think that this committee in considering the testimony of competent, expert, objective witnesses has to take that into account.

Mr. Beggs?

Mr. BEGGS. FAA now has in process a rulemaking action on the sonic boom. In general this rule would prohibit any boom producing flights over populated areas. And so that is a part of their rulemaking process.

Chairman PROXMIRE. The SST is going to be held to the same standard on sideline noise, as the subsonic plane?

Mr. BEGGS. I do not know as yet, Mr. Chairman. We are right now in the process of investigating and studying the problem of setting noise standards for the SST. One of the problems in the area, as you know, is that the establishment of standards is not strictly a domestic responsibility. It requires consultation with and some joint studies with foreign authorities so that any standards we set will be reasonably consistent with the foreign certification procedures.

Chairman PROXMIRE. And local airports can set their own standards, can they not?

Mr. BEGGS. Yes, and they do right now.

Chairman PROXMIRE. Why shouldn't the SST have the same standard as the subsonic for sideline noise?

Mr. BEGGS. The purpose of our noise specifications and the purpose of our whole noise program, both in the research area and in the area of setting standards, is to decrease the exposure of people to noise. I think that explains our philosophy.

Now, as Mr. Magruder explained earlier, you have two problems

with which you have to deal here. You have noise on the sideline as the aircraft rolls down the runway to take off, and then you have exposure of the community to noise as the aircraft flies over the community either on take-off or on its approach to the airport.

Now, our efforts are to reduce the noise exposure of this total pattern, that is, the total footprint that the airplane makes.

Now, if we find in our investigations that an airplane by reason of its characteristics will decrease the total exposure of people to noise, even though it does not quite meet one of the criteria, then we will modify the rule. Because, as I say, our objective here is to reduce the numbers of people who are exposed to high levels of noise.

Chairman PROXMIRE. That is a skillful rationalization, but either you have a standard that meets a sensible requirement on sideline noise or you do not have. I can see where you might have a standard that is hard for the subsonic to meet in the noise on the approach, or the take-off. And that is an important standard. And I would not expect you to just set it to qualify the subsonic. At the same time, the sideline noise at the airport is a standard it seems to me is something that every plane ought to meet, subsonic or supersonic, or else the sideline noise standard ought to be changed for all planes.

Let me ask this. Now I have heard it said that we will have to build a lot of new airports, nice big, square airports, to accomodate the SST. This does not seem very practical, because the cost would be very great, and I do not think it has been included in the costs of the SST. Are our existing major international ports designed to accommodate the SST with its sideline noise? Will this sideline noise be acceptable at existing airports in Boston, New York, Miami, Los Angeles and San Francisco?

Mr. BEGGS. I think it is fair to say that it can operate satisfactorily into airports like Los Angeles and Kennedy. There is a question as to Logan in Boston. But it can operate acceptably into most of the large international airports today.

Now, there is another point here. I agree we cannot afford to build airports specifically for the SST. But as you know, Mr. Chairman, we are building a large number of regional airports. We are going to be building one in Florida. We have a nice square one out here at Dulles. We are going to be building a new airport in Los Angeles out in the Palmdale area. We will undoubtedly be building another large jet port somewhere in the San Francisco area in the foreseeable future, whether or not we build an SST. But these airports will be regional airports in character. And they will be designed to the FAA specification, which is that in order to minimize noise they should both have sufficient land and be in a fairly square or circular pattern. And in addition to that, we are asking the public planning bodies to provide for compatible zoning around those airports, so that the annoyance factor which is primarily related to residential areas is reduced to the absolute lowest point.

Chairman PROXMIRE. You know what this means; you know it much better than I do. We have had this problem for some time; people complaining about locating airports in the area for fear of what it would do to their community and their own peace of mind, as the airport has to get bigger because your landing strip has to be longer. And as you have to be insulated and concerned about the noise decibels,

then you have to locate your airports further away from the cities, and the time advantage that you get in flying a supersonic flight begins to diminish.

By the time you get into the city, you wonder if the value of saving an hour or maybe a few minutes of supersonic flight would be worth it.

Let me quote Dr. Raymond Bisplinghoff on this noise problem. Dr. Bisplinghoff is a prominent supporter of the SST:

> Noise and sonic boom are characteristics of the supersonic transport for which there are no satisfactory solutions in sight * * *. There is very little prospect of bringing the sideline noise down to subsonic transport levels by any practical methods known at the present time * * *. There is virtually no research on the fundamental mechanisms of jet noise generation in the United States.

Why are we going ahead with the SST when no solution to this noise problem is in sight?

Mr. BEGGS. In the first place, I agree with Dr. Bisplinghoff on most things, but I cannot agree with him that there is no substantial research going on in the area of the reduction of noise.

Chairman PROXMIRE. Maybe he meant in terms of progress rather than the money the taxpayers were having to pay for it.

Mr. BEGGS. I believe we have made very substantial progress in the last 4 or 5 years in this area. I think the 747 engineering is clear demonstration of that. But in my view we have a very good, vigorous, well-directed and well-planned program on noise reduction of the big jet engines going forward both, as I say, in NASA and the FAA and in the Office of the Secretary of Transportation.

But Dr. Bisplinghoff in his statement on—I know in one case he was asked about the question of the elimination of or substantial reduction of sonic boom. This is a physical phenomenon. You can attenuate the noise of sonic booms somewhat by a very clean aerodynamic design, but you cannot eliminate it. It is a physical phenomenon that is very difficult to cope with in a scientific way. And the likelihood of coming up with any kind of cure for the sonic boom in the near future is, in my view, very, very low on the probability curve.

Chairman PROXMIRE. The National Environmental Policy Act of 1969 requires that the responsible official include in every recommendation or report on major Federal actions significantly affecting the quality of the human environment a detailed statement on:

> (i) The environmental impact of the proposed action;
> (ii) Any adverse environmental effects which cannot be avoided should the proposal be implemented;
> (iii) Alternatives to the proposed action;
> (iv) The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and
> (v) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.
>
> Prior to making any detailed statement, the responsible Federal official shall obtain the comments of any Federal agency which has jurisdiction by law or special expertise. Copies of such statement and comments shall be made available to the public.

This is in the law, we voted it into law last year.

Have any such reports and supporting documents been submitted concerning the SST? Do you plan to submit such a report? When?

Mr. BEGGS. We have not as yet submitted a complete report under that act. One of the problems here is that the new Environmental Quality Council is still wrestling with its criteria as to how such a

report should be put together. However, we have had two meetings with the full Council, and presented to them the environmental picture on the SST as best we can. We will comply with the requirements of the statute, and will submit a full report. And this, of course, will conform to the way that the new Environmental Quality Council wants it put together.

As to time, we have not set a specific time, but I would say certainly before the end of this calendar year, and I would hope probably by this fall.

Chairman PROXMIRE. When you say this fall you mean you hope before Congress adjourns?

Mr. BEGGS. We will try to make that, yes.

Chairman PROXMIRE. At any rate, you hope it will be, say, in late September or October—at any rate by the end of the calendar year?

Mr. BEGGS. Yes, sir. And I should say, too, that the Environmental Quality Council has asked us to take a hard look at an additional research program; to take a look at some of the unanswered questions in the area of noise and sonic boom, and perhaps to take a further look-see at this question of high altitude water vapor which has been mentioned.

Chairman PROXMIRE. We are having Russell Train up tomorrow, who is a very competent man in this area.

Mr. BEGGS. He is indeed.

Chairman PROXMIRE. And I hope you will have a chance to review his testimony. And he is going to raise some questions about this. Of course, he is not going to take positions, but he is going to raise some very serious questions which will be helpful to you, I am sure, in making the report.

Mr. BEGGS. We have been hoping that Russ Train would talk about the problems of environment. He suggested that we undertake additional research in this area, and we are now sitting down and putting together a program to do the things he has asked.

Chairman PROXMIRE. Mr. Brown?

Representative BROWN. I just have one or two other questions.

I want to go back to the question of timesaving, Mr. Beggs. On a 6-hour trip overseas what would the SST cut off in time as compared with the 747?

Mr. BEGGS. About 3 hours from New York to Paris.

Representative BROWN. Or Washington?

Mr. BEGGS. Or Washington to London, any of those city pairs.

Representative BROWN. I can make it in from Dulles in about 45 minutes. So that allows me 2 hours and 15 minutes, allowing time for my baggage. So we still have an advantage.

Chairman PROXMIRE. You just about break even.

Mr. BEGGS. Again to me the important point is not so much the New York-Paris run, although that is a very important run, because it is the most highly traveled, most dense route in the world, but it is the speed advantage and time advantage in going to the major cities of South America, Rio de Janeiro, Buenos Aires, and so forth, that one really should look at. Because that will bring those cities as close to us as Paris is today. And I think that is very important.

Representative BROWN. I have been sitting here trying to summarize, and as I understand, there are two basic disadvantages to the

SST. One of them is basically economics. And that is that it costs money. However, if I have understood your testimony, it is your theory that we will get that money back?

Mr. BEGGS. Yes, sir.

Representative BROWN. That is, the Federal Government will get it back.

The other one is that it makes noise which is environmental in first degree and economic in second degree. But it is your contention that that problem can be solved or at least improved, is that correct?

Mr. BEGGS. Yes, sir.

Representative BROWN. And if I may list some advantages. One is that it assists our balance-of-payments situation.

The other one is that it will assist employment in a currently adversely affected industry, is that not correct?

Mr. BEGGS. That is correct, sir.

Representative BROWN. And I see that as an economic advantage.

Certainly technology will be developed which can be used in other areas, including the military. And I see that as an advantage.

The SST apparently meets the need in the fastest growing part of aviation, that is, international air travel.

Mr. BEGGS. Yes, sir.

Representative BROWN. I think there is an economic advantage for me if I go to Europe, because I think I could do something better with my time than what I could do in an airplane. But in any event, there is an advantage in saving that time. And I would assume this would be true of any traveling executive.

And certainly this raises another economic opportunity. And that is to develop new trade areas, because they that are so far away have not generally received the attention from this country that we have given to Europe that is a little closer to us.

But let me ask, are there other areas here that you think we have not covered adequately, Mr. Magruder?

Mr. MAGRUDER. I think Mr. Beggs made a very cogent point when he said, in talking about economics, it is best to talk about what is good for an airline. And here is an airplane that does between two and three times the work of anything that is subsonic. And that is how they keep their fares down and earn more money with smaller amounts of equipment. It might cost more on the initial——

Representative BROWN. You are saying that we may be able to get to Cape Town not only faster but cheaper in the long run, and we can develop that route more extensively?

Mr. MAGRUDER. It carries more people and does it more times a day than a subsonic airplane. The subsonic spends so much more time en route that the work it does is less than what the SST can do. So it is a better money-making plane for the airlines, and will certainly be in its ultimate development.

Representative BROWN. I want to be sure you understand what you are saying. You are saying that this will actually reduce the cost of transportation for those distant areas for somebody who is going to travel that route, is that correct?

Mr. MAGRUDER. No, I do not want to say that, because that is a very tangled web when you get into that. What I do want to say is——

Representative BROWN. Let us put it another way. If the traffic in-

creases internationally—as we have every right to think that it will—and if it increases very rapidly, if we continue to handle that traffic by subsonic transportation, the economics of that is that subsonic transportation is still going to be more expensive than if we handle it by supersonic transportation?

Mr. MAGRUDER. The supersonic will be more efficient.

Mr. BEGGS. May I add to that, Mr. Brown, insofar as this aircraft is concerned, there are many elements to the cost curve of the aircraft and in the operation of an airline, but so far as this airplane is concerned, it will be a more productive airplane, and, thus, will reduce the costs in the long run.

Representative BROWN. Are there any other areas of economic advantage or disadvantage that ought to be mentioned?

Mr. BEGGS. I think you have covered them very well, sir.

Representative BROWN. Thank you.

Chairman PROXMIRE. I do not think anybody would disagree with the fact that some day we are going to have supersonic flights, and that it will save time, and so forth. The only disagreement is on how you do it and whether you abandon something which has been very successful, the American free enterprise commercial operation that has not had the dead hand of Government on it, change it and now insist on a governmental program—governmental administration which—with great respect to you gentlemen, who are very able gentlemen, certainly—has certainly not succeeded in the military area in getting economical results.

You know, when you talk about the fallout, the benefits—I cited the finding of President Nixon's task force and his experts on technological fallout stating that the fallout benefits would not be significant. This kind of experimentation on supersonic flight has been going on for more than 10 years, with B–70 and now the SST. And if there has been any real technological benefit, where is it? We have not been able to elicit from you gentlemen who are the experts in this area or from anybody else—what we have gotten in really substantial technological benefit from the enormous amount of money we have put in it?

We have put $2 billion in the XB–70, and it has ended up in a museum in Ohio, a complete waste of money. And now we are putting in a billion dollars on the SST, and when we have finished the appropriation this year it will be 70 percent completed, a billion dollars in the SST and we cannot see anything for it.

Mr. BEGGS. In my view we did gain a lot from that XB–70 program. Among the fallouts, of course, are the very large commercial jet engines that we now have in operation. These XB–70 engines are a very dramatic advance in the art. And it helped us to design the existing generation of engines pushing these wide-bodied jets today.

The technology that we developed in supersonic flight respecting the control of that airplane, and the understanding we gained of the phenomena of supersonic flights has been beneficial. Of course, on the military side there have been substantial benefits in pursuing their programs which involve both supersonic dash, or in some cases substantial amounts of supersonic cruise.

Chairman PROXMIRE. What programs were you talking about?

Mr. BEGGS. I am talking about the XB–70 program, sir.

Chairman PROXMIRE. And where has it been beneficial? What program has it benefited?

Mr. BEGGS. In terms of specific benefits it has unquestionably benefited the design both of the current F–14 and F–15.

But you were asking for fallout, I believe, in the civil economy. And I would say that the materials technology that was advanced in the XB–70 has found wide application in the civilian technology.

Chairman PROXMIRE. Maybe it has wide application, and maybe not. But you cannot find anything specific. The F–14 and F–15 programs, to what extent do they now exist?

Mr. BEGGS. They are really drawing board designs, but they are proceeding to the prototype and production phase in the military.

Chairman PROXMIRE. So we do not know if it is beneficial or not?

Mr. BEGGS. What I am saying is that without the knowledge that we have gained, without the experimental program that we ran with the XB–70, we would unquestionably know a great deal less, and probably our fund of knowledge would have been—what we would have needed to come up with a similar program in order to gain that knowledge, put it that way—that has enabled us to design better the aircraft that require supersonic performance.

Chairman PROXMIRE. Once again, we do not know yet. We may. But we have to have the plane operating to see if it works.

Mr. Beggs, let me read you another excerpt from the FAA's notice of proposed rule on the sonic boom:

> A restriction on sonic boom producing flights over populated areas is supported at this time by the inconclusive results of research concerning the effects of sonic boom on the surface environment.

If further research proving we like the sonic boom after all can be arranged, will the FAA rule be changed?

Mr. BEGGS. No, sir. It is our view—and the President has stated it as a national policy—that he would not permit supersonic flights over populated areas.

Chairman PROXMIRE. Why don't we do this by statute, write it into the law, why wouldn't that be a good idea?

Mr. BEGGS. I think that we would argue that the current statutory authority that you have given us provides ample authority to do this. Once regulations are issued under that legislation they have the same effect as a statute.

Chairman PROXMIRE. You see, there seems to be a very, very clear and very heavy and strong motivation to permit the supersonic plane to fly over populated areas. The real payoff routes are within this country. You talk about how great it will be to go to Rio de Janeiro, Buenos Aires, or, of course, to fly over Asia. These are glamorous flights, and some people can go. But this is not where the enormous bulk of American travel is. Long flights, a long-haul flight I am sure from coast to coast, from Chicago to the west coast, here is where the real money is. And here is where it seems to me you are going to fly if you are going to have economic payoff. And the only study of the economic feasibility made in the Defense Department a couple of years ago showed that it cannot possibly pay off on an SST unless you permitted the flight over populated areas.

If you are going to confine this to flights overseas you are not going to get your return.

Mr. BEGGS. In my view there is going to be a substantial demand for flights to Japan at these speeds, and it is going to grow. Japan, according to a number of experts, such as Herman Kahn and others, is on the way to being one of the great industrial powers in the world. In fact, as you know, it is the third largest in the world today. Our commerce with them increases every year. And as a matter of fact, it is the largest two-nation exchange of trade involving the United States and a foreign nation today.

Chairman PROXMIRE. Do you have any figures at all on the proportion of our people who fly at all regularly overseas?

Mr. BEGGS. We can submit them for the record; sir, if you would like. I do not have them at my fingertips.

Chairman PROXMIRE. Please supply them for the record.

(The following information was subsequently supplied for the record by the Department of Transportation. The Department is unable to estimate what fraction of those who took international flights in 1969 could be regarded as regular, or frequent international travelers. However, surveys taken by the Port of New York Authority indicate that almost half of the trans-Atlantic passengers leaving from New York had taken no other international round trip flights during a 5-year period. Less than 15 percent had averaged one international flight per year during a 5-year period. If an average of one trip per year is taken as a definition of a "regular" international traveler, this suggests that less than one-half of 1 percent of the population are regular international air travelers:)

PROPORTION OF U.S. POPULATION WHO FLY

	U.S. citizens	
	Percent	Number [1]
Adult population who have ever flown	[2] 45	54, 811, 350
Total persons who have flown in 1969, domestic	[3] 22	44, 706, 860
Total persons who have flown in 1969, international	[4] 3	6, 096, 390
Total who have flown in 1969	25	50, 803, 250
Percent of 1969 flying populace flying international	12	

[1] Based on estimated U.S. population of 203,216,000 and 121,803,000 adult pouplation 21 and over at July 1, 1969, Bureau of Census.
[2] ATA "Facts and Figures" 1970.
[3] Two percentage points above 1968 TWA figure of 20 percent resulting from Gallup survey.
[4] Based on 62.3 percent of the international air travelers being U.S. citizens, from U.S. Department of Justice, Immigration and Naturalization Service, "1969 Report of Passenger Travel Between the United States and Foreign Countries." Assuming also that 70 percent take 1 round trip, 10 percent take an average of 2 round trips per year, and the remainder 1-way trips.

Chairman PROXMIRE. I would be astonished if it were more than one-half of 1 percent.

Mr. BEGGS. Of the traveling public, or of the population?

Chairman PROXMIRE. Of the population, of the people.

Mr. BEGGS. I would think it would be a little higher than that. But it is a small percentage, to be sure.

Mr. MAGRUDER. Do you have the number of people who travel by air?

Chairman PROXMIRE. Yes.

Mr. MAGRUDER. What is the total of our population that travel by air?

Chairman PROXMIRE. My question is the population, after all we have to consider the whole population. You might put it this way. The taxpayer is paying for this. We have 50 million American families who one way or other, through income taxes or some other kind of taxes, are paying for it. And if half of 1 million American families get any benefit from flying overseas I would be astonished.

Mr. MAGRUDER. I was just trying to make the point that the total number of people that travel by air likewise is not an astounding number at this time. Do you have that number handy?

Chairman PROXMIRE. This is why I feel so strongly that aviation is great, and we ought to do all we can to encourage it. But I am not sure we should take money from the taxpayer to do it. And that is why I am concerned that this is the only program that does it for commercial flight. We have invested a lot and should invest a lot to keep our military supremacy. But I do not think there is a convincing argument that now we should do this for commercial flight when only a tiny fraction of the American people are going to use it.

Mr. BEGGS. I think the argument again has got to go back to the question of leadership in civil aeronautics and the sales of transports abroad. And that certainly is beneficial to a large number of the American people.

Chairman PROXMIRE. Of course the State Department, our experts in that area disagree with that. We cannot find anybody except the people in your area and people who are affected in Congress by aviation who will agree with it.

Mr. BEGGS. I think they will argue that the balance of payments will not be, as we say——

Chairman PROXMIRE. The State Department is talking about national prestige. They say this should not be undertaken for that reason.

Mr. BEGGS. OK. But I am not arguing the national prestige so much here as I am arguing the question of our substantial lead in civil aeronautics and what that has meant to the Nation. And, I think, it has meant a great deal. Think of the vast majority of the people of the world who travel in American transports, the image that is created in their minds of the advanced technological position of the United States—I think that is a very important asset.

Chairman PROXMIRE. Any nation that has gone to the moon, that has the terrific technology we demonstrated for that, certainly does not have to be in the front end of everything at all times at all points. That is the least convincing part of the presentation in favor of the SST, that American aviation leadership needs this. I am convinced that regardless of the preferences for supersonic flight in the future the American aviation leadership is not going to have to rely on this kind of a subsidy of program over the next few years to continue its enormous leadership in all these other areas, especially when we have a parallel program going on in the military with the B–1 bomber.

Mr. MAGRUDER. May I speak to that?

Chairman PROXMIRE. Yes.

Mr. MAGRUDER. Speaking as one who has been trying to get other countries to buy U.S. airplanes and maintain that leadership, I am concerned about the fact that there is a Concorde, and in addition the fact that there are six airplanes authorized for production, and another two that are authorized as preproduction prototype to be rehabilitated

for production delivery. And you do not buy airline equipment on the basis of a single airplane.

Nobody goes to a manufacturer and says, I like that airplane you have, I will buy it. They look at you on the basis of long-term supply—are you going to be there 10 years from now when we need you for training and for spares and for business reasons.

If this country defaults the SST to the foreigners, who also are working very hard to penetrate the air bus market with the A–200 and with other airplanes, and are joining together on both engine and avionic technology that is not behind ours in advancement, they may well have a much more attractive market than you can foresee at this moment in time. And the reason we have always had this leadership is, you could come to the United States and you could get what you needed, you could find a supplier who had a stable of airplanes who was very attractive to do business with for 5 years. If we suddenly indicate to the world that we are going to stay with subsonics when there are going to be supersonics, you are going to tip that balance of thinking on world air leadership.

Before I took this job I went to the airline presidents not only in this country, but in others, and they expressed this to be a matter to be concerned about. They want the United States to have an SST. They like to buy from the United States, because we do things on schedule, and are reliable when it comes to supply, training, and spares.

If we begin to indicate that we are not going to keep this up, then we are going to tamper with the market, not just because of a single airplane, but because of this whole broad spectrum. And I submit that that has not been discussed in the past.

Chairman PROXMIRE. Thank you, gentlemen, very very much. You have been two excellent witnesses. You have done a fine job, although it is obvious that I do not agree with you.

I would like to ask, Mr. Beggs, for the record—don't bother about answering now—some questions about the St. Lawrence Seaway. I am chairman of the Great Lakes Conference of Senators, and I am very much concerned about that. And I would like very much to get your responses.

Mr. BEGGS. Yes, sir.

(The following additional questions asked by Chairman Proxmire and answers thereto were subsequently supplied for the record by Mr. Beggs:)

Question 1. What is the statutory authorization being relied upon for the SST program?

Answer. Section 312(b) of the Federal Aviation Act of 1958 [72 Stat. 752, 49 U.S.C. 1353] which reads as follows:

"(b) The Administrator is empowered to undertake or supervise such developmental work and service testing as tends to the creation of improved aircraft, aircraft engines, propellers, and appliances. For such purpose, the Administrator is empowered to make purchases (including exchange) by negotiation, or otherwise, of experimental aircraft, aircraft engines, propellers, and appliances, which seem to offer special advantages to aeronautics."

In addition, Section 6(c)(1) of the Department of Transportation Act (80 Stat. 931) provides as follows:

"There are hereby transferred to and vested in the Secretary all functions, powers, and duties of the Federal Aviation Agency, and of the Administrator and other officers and offices thereof, including the development and construction of a civil supersonic aircraft . . ."

Question 2. A. I understand that, at the request of the Senate Aeronautical and Space Sciences Committee, DOT and NASA have begun a joint study of the costs and benefits of civil aviation research and development. Could you describe briefly the purposes of this study?

Answer. The study was conceived in August 1969, and an agreement was entered into between NASA and DOT setting forth its purposes and aims. Because of the lateness of FY 1970 appropriations (DOT's were enacted in December 1969), personnel recruitment difficulties and other problems, the full activation of the study group was not accomplished until early this calendar year. Professional staffing then started in earnest and by May was essentially completed. Numerous assignments have been made and several support contracts with outside firms will be let in the near future. In short, the effort is off the ground but is still in the preliminary stage.

Question B. How many people are employed on this? How many outside consultants?

Answer. A total of 34 professionals are employed on a full time basis at the present time including 9 consultants. In addition, some 20 NASA and 12 FAA personnel are working part time on certain aspects of the study.

Question C. When will you have some results to report?

Answer. A preliminary report is scheduled to be issued in September of this year. The final draft report is scheduled to be issued by December 31, 1970.

Question D. Will the results of this study enable you to compare the social return to Federal investment in SST development to, say, STOL (short take off and landing vehicle) development? Or to investment in improved airport access?

Answer. It is intended that the report will provide more information and analyses than hitherto available for assessing the kinds of tradeoffs you refer to. However, such tradeoffs which must consider among many other factors, social, economic, and environmental impacts, inevitably involve values that are not readily reduced to numerical or dollar amounts. The study will examine these variables in various models and should produce an improved and more sophisticated basis for judging alternative investment opportunities in air transportation.

Question E. If the results of this study are unfavorable to the SST, what action would you recommend?

Answer. The Department has the SST progarm under continuing review and if at any time new information or new developments indicate that pursuance of the program is not in the national interest, we will recommend its termination. The results of the study will be carefully considered and our recommendation would depend upon our assessment of it, the overall status of the SST program, and other relevant factors.

Question 3. Senator Mondale last year introduced S. 3137, which would refinance the St. Lawrence Seaway and convert its existing debt into general Treasury debt. The Seaway is unique in having to repay its own capital costs, and in having a crippling system of tolls imposed upon it in order to retire this debt. Present projections now are that the Seaway may never be able to retire its own capital costs—certainly not by the projected date of 2009. Has the Department yet developed a position on improving the financial structure of the Seaway?

Answer. The Department is developing a position on improving the financial structure of the Seaway; however, as indicated in our recent Hearing before the Subcommittee of the Senate Commerce Committee any financial changes can only be accomplished in the light of our existing relationship with Canada. Preliminary contracts have been made; however, a final position has not yet evolved.

Question 4A. Recent studies by the Army Corps of Engineers indicate that extension of the shipping season on the Great Lakes and the St. Lawrence Seaway is "economically feasible," and is "of manageable proportions." The estimated capital cost of the de-icing operations for year-round operation is less than $300 million. Has the Department made any studies on the amount of economic benefits that could be realized from a year-round operation of the Seaway?

Answer. The Department contracted with EBS Management Consultants, Inc., to study the economic effects of an extended sailing season. The EBS Management Consultants' study pointed out that the costs of keeping the Seaway open for an extended period of time during the winter months would dramatically increase to the point that would negate potential economic benefits. This report was submitted in 1968 and has been made available to your office. Recently, the SLSDC has undertaken a review study of this problem in order to define the constraints and clarify the problems.

Question B. Do you concur in the Corps of Engineers conclusion that de-icing is economically feasible and of manageable proportions?

Answer. Keeping the waterway open on a year-round basis apparently is physically possible. However, there are many problems that must first be solved to make such an endeavor economically justifiable. Ship technology and hull construction must be improved; equipment to permit lock operations in sub-zero temperatures must be installed; out-flows from the lakes must be assured in restricted areas where the ice cover has been disturbed; international agreement through the International Joint Commission to insure the 1909 Boundary Water's Treaty provisions recognize navigation's priority over power interests in the St. Lawrence River; and, of course, ice breaking capability on both sides of the border to insure that the shipping channels remain open. These are some of the problems which the Seaway Corporation is now studying.

Question C. Has last year's ice-breaking trip of the Manhattan any portent for the Lakes and Seaway?

Answer. Certainly this trip through the Arctic North amply demonstrated that ships properly strengthened and powered can navigate in extreme sub-zero temperatures. The problems of navigating in the Arctic are quite different than those encountered in the narrow channels of the Seaway such as the St. Lawrence River and the St. Mary's River in addition to the various lock systems. Another perplexing problem in the Seaway is to insure the outflows from the Lakes without causing ice jams and flooding and to not impair the power generating capabilities of the Quebec Hydro, Hydro of Ontario and Power Authority State of New York plants on the St. Lawrence River.

Question 5. Seaway tolls are up for negotiation this year. Is the Department firmly committed, in its negotiations with the Canadians, to hold tolls on the Seaway to the absolute minimum?

Answer. The Department has not committed itself to a toll position since such a position is dependent in part on the outcome of any possible restructuring of the debt and resultant negotiations with Canada.

Question 6. Recently, several East European countries have sought to bring their ships into Great Lakes ports. Before doing so, they must have government clearance. Can you fill us in on the status of this?

Answer. Any category vessels desiring to transit the Seaway are subject to prior security approval and surveillance by the U.S. Government. To date, there have been six category vessels through the Seaway so far this year and there were 23 vessels in 1969. These vessels have traded only with Canada. Movements of these vessels to U.S. Great Lakes ports are subject to Governmental approval. The Department is again contacting the National Security Council to find out the current status of this clearance.

Chairman PROXMIRE. Tomorrow we will meet at 11 a.m., in room S–407, that is, the Atomic Energy Room, to hear from Russell Train, chairman of the Council on Environmental Quality.

Mr. BEGGS. Thank you, Mr. Chairman.

Chairman PROXMIRE. Thank you very much, gentlemen.

(Whereupon, at 1:05 p.m., the subcommittee recessed, to reconvene the following day, at 11 a.m., Tuesday, May 12, 1970.)

ECONOMIC ANALYSIS AND THE EFFICIENCY OF GOVERNMENT

TUESDAY, MAY 12, 1970

CONGRESS OF THE UNITED STATES,
SUBCOMMITTEE ON ECONOMY IN GOVERNMENT
OF THE JOINT ECONOMIC COMMITTEE,
Washington, D.C.

The Subcommittee on Economy in Government met, pursuant to recess, at 11:05 a.m., in room S-407, the Capitol Building, Senator William Proxmire (chairman of the subcommittee) presiding.

Present: Senator Proxmire.

Also present: John R. Stark, executive director; Loughlin F. McHugh, senior economist; Courtenay M. Slater, economist; and Douglas C. Frechtling, economist for the minority.

Chairman PROXMIRE. The subcommittee will come to order.

This morning we hope to enlarge our understanding of the environmental consequences of Federal transportation investment. That these consequences can be serious has already been made abundantly clear during this series of hearings. Indeed, the environmental problems associated with the supersonic transport are so large and so obvious that it seems utter folly to continue with the production of this plane until we have developed the technology necessary to make supersonic flight compatible with reasonable respect for our environment.

The most widely publicized environmental consequence of the SST has been the sonic boom. The assurances we have been given that no supersonic flight over populated areas will be allowed are still far from satisfactory.

I would like to submit for the record at this time a prepared statement the subcommittee has received from Dr. William A. Shurcliff, director of the Citizens League Against the Sonic Boom. Dr. Shurcliff's prepared statement points out some of the weaknesses of the FAA's proposed rule.

(The prepared statement referred to by Senator Proxmire for inclusion in the record at this point follows:)

PREPARED STATEMENT OF WILLIAM A. SHURCLIFF

RESISTANCE TO THE SST'S SONIC BOOM IS INCREASING

On Sept. 24, 1969, an additional $94,015.93 was paid by the U.S. Government to Oklahoma City residents for damage done to their homes by the FAA's 1964 sonic boom tests. On Aug. 7, 1969, a Navy F-4 Phantom damaged windows and plaster walls in Kelowna, British Columbia, to the tune of $250,000. On Oct. 31, 1969, the report by the President's SST Review Committee was published in the Congresional Record (pp. H-10432—H-10446), revealing that the Committee regarded the SST's sonic boom as a major threat to the environment. In recent

months in Europe (1) a "Swiss Federal Committee Against the Sonic Boom of Civil Aircraft" was formed and expects to arrange a nationwide plebiscite to ban the SST's sonic boom, (2) at the Feb. 3, 1969, Paris meeting of the Organization for Economic Cooperation and Development, representatives of six nations said their countries would not tolerate the SST's sonic boom, (3) the British "Anti-Concorde Project" became increasing active and placed full-page advertisements in two British newspapers, (4) in the Near East the sonic booms from military aircraft were employed as weapons for producing retaliatory damage to cities.

Here in USA countless environment-conservation groups have come out against the sonic boom. "Friends of the Earth" devoted a full-page New York Times advertisement to the threat of the SST. A new "Coalition Against the SST" was created, with headquarters in Washington, D.C. In the first six weeks of publication of "SST and Sonic Boom Handbook" by Wm. A. Shurcliff, Director of the 3900-member Citizens League Against the Sonic Boom, over 150,000 copies were sold. The nation's press has become increasingly scornful of a kind of "progress" that would result in:

Inflicting jolting sonic booms on a large fraction of the earth, night and day.
Startling as many as 20,000,000 people per transcontinental flight.
Converting the oceans into sonic boom dumping grounds.
Creating intolerable noise at airports and in nearby suburbs.
Exposing passengers to dangers from lightning, flash-fire, sudden loss of cabin pressure, ozone, cosmic rays.
Requiring multi-billion-dollar subsidy by the taxpayers.

There Is No Regulation Against Sonic Booms

There is still no firm law or regulation against SST's inflicting their booms on our cities, parks, etc. The President's Jan. 8, 1970, policy statement against supersonic SST flights over land has not yet been implemented and could be rescinded at any time. The FAA's proposed rule against overland SST sonic booms (Docket 10261, Notice 70–16, publ. in Fed. Reg. Vol. 35, No. 74, April 16, 1970) contains large loopholes, such as allowing SST supersonic flight over land if the SST manufacturer and the FAA agree that such flights would be in some sense ". . . necessary to aircraft development". In any event, years may elapse before the rule goes into effect, and if the airlines then find the rule to be an economic straightjacket the FAA could weaken or rescind the rule on the pretext of being "practical". FAA Head J. H. Shaffer, in his testimony of Nov. 1969 before the Senate Committee on Appropriations (*Hearings*, H.R. 14794 p. 792), said that pressures from users of the SST" . . . may drag it into the market, which one might identify as east to west or west to east over populated areas".

Economic Prospects of the SST Appear Increasingly Poor

With the growth of airplane travel slowed, major airlines operating in the red, interest rates so high as to discourage borrowing to purchase airplanes that may cost $60,000,000 each, and with the (boomless, subsonic) 747 plane coming into widespread use and flying with nearly half of its seats empty, the market prospects of the SST are minimal. There are no firm orders for SSTs and the number of "positions" has shown no increase in two years. Airline officials have expressed increasing doubts as to the merits of a plane that would be extra-expensive, require extra-high fares, have short range, carry only a very small payload, compress the passengers into a tube-like fuselage, and cannot be permitted to fly at cruising speeed over continents or islands.

SST's Would Hurt Our Balance of Payments

Although the initial sale of Boeing SST's to foreign airlines would help our balance of payments, subsequent use of such planes would *hurt* the balance of payments. If SST's are to be used in great quantity, millions of additional persons must be persuaded to fly aross the seas each year; and, in an extrafare plane, most of the passengers are likely to be US citizens, paying many hundreds of dollars each to the foreign airlines and paying hundreds more dollars to foreign hotels, restaurants, gift shops, etc. Within four years the amounts paid by these luxury-class US travelers would exceed the initial purchase price of the aircraft. The more SSTs sold, the greater the injury to our balance of payments.

The Citizens League Against the Sonic Boom urges that our Government drop the SST project which, at great expense to the taxpayers, solves no existing problems and creates a host of new problems.

Chairman PROXMIRE. Dr. Shurcliff's prepared statement also points to the growing public sentiment against the SST. Representative Yates in his testimony yesterday referred to the large volume of mail he is receiving from concerned citizens. Numerous opinion polls have indicated overwhelming citizen opposition to the SST.

The sonic boom is not, of course, the only reason for public distaste for this program. Airport noise, possible climatic effects, safety hazards to passengers and crew all argue against proceeding with this program in its present form. We learned from Mr. Beggs yesterday that the Department of Transportation has not yet submitted the reports required under the National Environmental Policy Act of 1969. Surely Congress should not be expected to appropriate further funds until this legal requirement has been met?

Our witness this morning is Mr. Russell Train, Chairman of the President's Council on Environmental Quality. I know that Mr. Train fully shares our concern that adequate consideration be given to the environmental consequences of Federal programs. Indeed, he is charged with special responsibility to see that this is done, and I know that we can look to him for vigorous execution of this responsibility.

Mr. Train, we are very pleased that you have accepted our invitation to meet with this subcommittee, and you go right ahead in your own way.

STATEMENT OF RUSSELL E. TRAIN, CHAIRMAN, COUNCIL ON ENVIRONMENTAL QUALITY; ACCOMPANIED BY GORDON J. F. MACDONALD, MEMBER OF COUNCIL; AND TIMOTHY B. ATKESON, COUNSEL

Mr. TRAIN. Thank you, Mr. Chairman.

As Chairman of the Council on Environmental Quality I am responding to your invitation to discuss environmental considerations which should enter into Federal transportation expenditure decisions and specifically the decision as to development of the supersonic transport. I am accompanied by Dr. Gordon J. F. MacDonald, a member of our Council and a scientist with considerable background on the scientific issues involved.

I am also accompanied by Mr. Timothy Atkeson, the General Counsel of the Council on Environmental Quality.

At the outset I should make clear that the mandate of the Council under the National Environmental Policy Act is to advise the President concerning the environmental aspects of Federal Government programs and activities. The goal of the act is to assure that, to the greatest extent practical, environmental considerations are given careful attention and appropriate weight at all stages of the planning and decisionmaking process in every agency of the Federal Government.

We recognize, of course, that environmental considerations are not the only considerations relevant to this process.

I turn now to the views of the Council on Environmental Quality on the environmental considerations that would be relevant to the development of a fleet of supersonic transports. The question of a

civilian supersonic transport is important in its own right but has a broader significance because of the problems and opportunities that we as a nation face in the years ahead.

In the case of the supersonic transport our great technological strength provides us with an opportunity to make a significant advance in aviation. Yet we must assess whether such progress in aviation represents progress for society—for our whole society.

We must at all times be careful that we do not pursue technology simply for the sake of technology—simply for its own sake—but rather for its contribution to human welfare. There is a growing awareness that, with certain technological advances, come social and environmental costs that are difficult to quantify but that must be taken into consideration.

What is true for aviation is also true for many other technologies. In the years ahead we must assess the full consequences of technological advance well ahead of the deployment of that technology.

Before proceeding to a brief discussion of the specific environmental aspects of the development of a supersonic fleet, I wish to emphasize four points:

1. The administration's program is for the design, development, fabrication, assembly, and 100-hour flight tests of two identical prototype supersonic transportation aircraft. In and of themselves the two prototype models would not give rise to environmental problems provided appropriate precautions are taken with regard to their test flights.

2. The final decision with respect to the production of further supersonics will depend on a number of factors, including economic and foreign policy aspects, as well as environmental considerations. The administration's program has carefully separated prototype development from possible future commercial production. I would hope that before the time that a decision must be made with regard to production, we will be in a position to assess correctly the environmental costs of full-scale production and operation. In the decision to proceed with prototype development, it has been implicit that a decision to proceed with commercial production would not be made in the absence of a satisfactory resolution of environmental problems.

3. The U.S. Government, together with a few other nations, has taken the environmental lead throughout the world in prohibiting supersonic flights over any land area of the United States. The proposed rules issued by the Federal Aviation Administration governing overland flights effectively forbid flights at speeds which would produce a detectable boom at the ground.

4. The environmental problems I will discuss are of concern not only to the United States but also to those nations that are proceeding with the development of supersonic transports, to those nations whose airlines might fly a supersonic transport and indeed to all nations of the world. I will return to this point.

At present the most significant unresolved environmental problem I see for the supersonic transport is the high level of noise in the vicinity of airports. Because of its relatively steep degree of climb, the SST will actually create less community noise in the direction of its flight path than present subsonic jet aircraft. The SST also generates less noise on approach.

However, the current design of the U.S. supersonic transport and of the Concorde leads to a noise field radiated perpendicular to the runway, called "sideline noise," that is substantially greater than that of the conventional subsonic jets. In terms of the measures used by the Federal Aviation Administration to assess annoyance, the SST would be 3–4 times louder than current FAA sideline noise standards and 4–5 times louder than the 747.

In terms of noise pressure, the sideline noise level would also be substantially higher than that of subsonic jets meeting the FAA requirements.

I doubt that communities adjacent to our large international airports will accept this added noise burden if it should extend beyond airport boundaries—a circumstance which seems likely in the case of most existing airport facilities. This is a view that I believe is shared by a majority of those responsible for the operation of airports. Furthermore, the discomfort and hazard to those actually on the airport site—both passengers and service personnel—will require careful attention.

It has been suggested that the sideline noise problem can be solved by: (1) Technical improvements to the airplane, (2) confining noise to the airport, (3) converting communities near airports into industrial or commercial areas, and (4) developing new airports.

With regard to technical improvements, it is doubtful that current technology can produce the required lowering of noise levels and still carry a viable payload. If indeed new technology is to be the solution of the future, then there should be greater emphasis on research and development of a quieter engine.

As to the other possible solutions, I do not think it is practicable to confine the noise projected by the SST to the airport. Most airports were designed many years ago and were not built in such a way as to minimize the effects of sideline noise.

Redevelopment of areas near airports would require an investment on the order of billions of dollars; it seems unrealistic to assume that the country would undertake investment of such magnitude simply to provide for the supersonic transport. Doubtless, some new airports must be constructed to facilitate the traffic volume forecast by 1980. Adequate land planning in such cases could mitigate sideline noise.

At the same time, we believe it important to establish now and maintain the principle that the noise environment in the vicinity of all our airports is not to be degraded in any way. Furthermore, the problem of sideline noise at airports is not just a domestic matter. Other countries are developing supersonic transports with comparable high sideline noise characteristics and they will, without question, wish to use our airports. Further, noise problems at international airports abroad will be as severe as our own.

I now turn to a potential problem which has not received the attention it deserves. The supersonic transport will fly at an altitude between 60,000 to 70,000 feet. It will place into this part of the atmosphere large quantities of water, carbon dioxide, nitrogen oxides and particulate matter. This part of the atmosphere is to a substantial extent isolated from the rest of the atmosphere.

For example, on the average, 18 months are required for a water molecule introduced into the atmosphere at 65,000 feet to find its way

to the lower atmosphere. A fleet of 500 American SST's and Concordes flying in this region of the atmosphere could, over a period of years, increase the water content by as much as 50 to 100 percent. This could be very significant because observations indicate that the water vapor content of the stratosphere has already increased about 50 percent over the last 5 years due presumably to natural processes, although there is a possibility which should be researched that subsonic jets have been contributing to this increase.

Water in this part of the atmosphere can have two effects of practical significance. First, it would affect the balance of heat in the entire atmosphere leading to a warmer average surface tempertaure. Calculations on the magnitude of this increased temperature are most uncertain but probably it would be on the order of 0.2° to 0.3° F.

Second, water vapor would react so as to destroy some fraction of the ozone that is resident in this part of the atmosphere. The practical consequences of such a destruction could be that the shielding capacity of the atmosphere to penetrating and potentially highly dangerous ultraviolet radiation is decreased.

As in the case of surface temperature, we do not have adequate knowledge on which to make secure judgments as to the practical significance of the effect of water on the ozone. Finally, the increased water content coupled with the natural increase could lead in a few years to a sun shielding cloud cover with serious consequences on climate.

Clearly the effects of supersonics on the atmosphere are of importance to the whole world. Any attempt to predict those effects is necessarily highly speculative at this time. The effects should be thoroughly understood before any country proceeds with a massive introduction of supersonic transports.

There are other potentially adverse environmental consequences of supersonics; for example, the effect of sonic booms over water on ship crews and passengers and on nesting birds on isolated islands. However, I will not discuss these as I have tried to confine my remarks to what I consider the two most important issues; namely, noise in and around airports and atmospheric effects.

In view of the known and potential environmental impacts of the operation of a fleet of supersonic transports, I make three specific, positive proposals for environmental protection at this time.

1. The guidelines with respect to noise certification of the supersonic civilan transport should assure that the noise environment in the vicinity of airports at the time of the introduction of supersonics will not be degraded in any way. As technology advances, permitted noise levels should be reduced and these reductions likewise applied to the supersonic transport.

2. We should increase substantially the level of investment in research on the environmental problems associated with the SST. Our knowledge about the environmental effects of the supersonic is clearly inadequate. Far greater emphasis should be devoted to research and development programs leading to an engine having a substantially reduced noise level. Further, an integrated research should be undertaken as to the effects of the chemical constituents introduced by the supersonic transport into high altitudes. Such a research program should include not only determining current changes in this part of

the atmosphere but projected changes resulting from supersonic transport operations.

3. The United States should take the initiative in discussing present and potential environmental problems of SST operations with other nations. Discussions should certainly take place among those countries currently developing supersonic transport and its environmental consequences should be considered for the agenda of the United Nations conference on the environment to be held in 1972.

This administration endorses my first proposal and regulations to this effect will be issued. I have discussed the second and third proposals within this administration and can report very definite agreement in principle. However, the shortness of time has simply made it impossible, in view of budgetary and related considerations, to obtain final, formal clearance in time for this hearing.

In assessing the feasibility of SST operations we should accept the likelihood that other nations will come to be as concerned about the environmental consequences as we are, and that there will be a "domino effect" from our own environmental protections. Our prohibition against sonic boom over U.S. territory and our concern about airport noise, for example, will surely be echoed abroad.

I think it essential that the SST not be considered simply as a domestic issue. By its very nature, its implications are worldwide in scope, and it is important that we approach the matter as an international concern. Those of us who possess the capacity for developing and introducing new technologies into the world have a very special responsibility for insuring in advance that such technologies do not, on balance, create serious long-term environmental emergencies for the world as a whole.

All of this is to say, as I mentioned at the outset, that we are entering an age when there is a determination that the impact of new technology on the environment be examined closely. We will continue, that is the Council, to keep the environmental aspects of SST development under review and I know that the departments share our concern that degradation of the environment must be avoided.

I repeat that the current program is for prototype development only. The administration remains committed to the view that commercial development of the SST will not be undertaken unless and until the significant environmental problems and uncertainties are satisfactorily resolved.

And that completes my statement, Mr. Chairman.

Chairman PROXMIRE. Thank you, Mr. Train, for a very thoughtful and informative statement, and especially for a blockbuster in your discussion of the effect on the atmosphere, the effect on the ozone, the effect on the sunlight, and the effect on the water content of the atmosphere. All of these things are relatively new and are most shocking and surprising.

I would like to ask you first about what seems to be the tenor of your strategy here. It seems to be unusual. You seem to be saying, go ahead and spend the money, all the money that the Federal Government is permitted to spend—all of it—because after all the Federal Government is not supposed to get into the production part of the SST, the Federal Government is involved in the research, and the Federal Goverment is committed to phases 1 through 3 of the program which would involve, we are told, something like $1.3 billion.

Then you say, when you have gotten this far you should not go ahead with production until you have developed your research as far as the impact on the environment is concerned. But at that point we lose control of it.

Now, we can stop it by simply not appropriating money for research. But once we have gone ahead and the Government has finished its part of the investment, isn't it true not only that you will have the argument—after all you have put in more than a billion dollars into this—you should not walk away from it, you have got a lot in the pot, you have made a big commitment, you are going to look very bad if you stop it, but, number two, even if you desire to restrict it, at that point the private nongovernmental sector of the economy goes ahead with its private financing, according to the witnesses who testified here.

Mr. TRAIN. Mr. Chairman, I believe that the responsibilities of our Council, and certainly my expertise, if any, extends simply to the evaluation of the environmental aspects rather than—as I pointed out at the outset of my statement—an evaluation of the total package of factors involved, including economic, budgetary, foreign policy, and so forth.

Second, I do not say—and I hope I have made this clear—that the satisfactory completion of two prototypes in any way prejudges the final decision by the Federal Government as to commercial production. And I have stressed twice in my statement the commitment of this administration to the view that no decision for commercial production will proceed until and unless these environmental problems and uncertainties are satisfactorily resolved.

As to your third point, I believe that the Federal Government clearly retains control of this situation even though commercial production becomes a matter of private financing. The FAA certification process is intended to maintain in the Federal Government powers over civilian aircraft and the use of airports. And I think that there is no question here——

Chairman PROXMIRE. FAA has control over noise. Does it have control over pollution in the atmosphere? Is the FAA in a position to say that in their judgment this represents a danger to our environment outside of noise?

Mr. TRAIN. In my opinion, yes; very definitely, Mr. Chairman, because of the provisions of the National Environmental Policy Act of 1969. The statute to which I refer requires that a full range of environmental factors must be taken into account by Federal agencies in their decisionmaking. And section 105 of that statute makes it clear that this requirement and policy is supplemental to any existing statutory authority. So that while the specific statutory authority of FAA with respect to certification may be by its terms limited, and not as broad as we would otherwise like to see it, we are of the opinion that they are required by the National Environmental Policy Act to take the fullest range of environmental factors into account as part of the certification procedure.

Chairman PROXMIRE. I am comforted by that. But I am not very comforted by thinking about how power works in the Congress and how power works in the administrative branch. We have had tremendous arguments against the SST all along. But we have gotten feeble votes against it on the floor of the Senate, and we were not able to stop it in the House.

Last year we had the President's own ad hoc advisory committee on the SST which came down as hard as any group of experts I have ever seen against the SST, unanimously against it on every score. Every argument SST proponents made was knocked down by the ad hoc committee.

In spite of that, we were not able to muster a great deal of opposition to it in the Congress. And even more shocking is the fact that the President went ahead over the decision of his own committee.

Now, here you have a group of environmentalists, a new committee, a lot of talk and a lot of concern on the part of American citizens with our environment. But it is a new organization. And it is based primarily on a concern that every American and every person in the world should feel about our environment, it is not based on a hard, tough, economic commercial advantage that seems to be able to prevail in politics regardless of whether you have a Democratic or Republican administration. And what concerns me is that they will now have the argument that you have gone ahead and spent all this money, the Government can through the appropriation process—which is always the strongest tool of the Government to stop anything, whether it is Cambodia, or the development of a plane like this that might hurt the environment—that is gone. And then you have got to rely on the FAA. And the FAA has been the champion of this plane all along. We have argued that this is a conflict of interest, and now they have some kind of a division of responsibility with the Department of Transportation. But still the FAA is closely identified with the aviation industry.

And their constituency they view as the aviation industry. And I think to rely on them is a pretty weak reed, even though we can summon great concern on the part of the Congress, some Members of Congress, and on the part of the great majority of the public, against the program.

Let me ask you about the Environmental Quality Act itself. It was passed last year. It specifies a report on the environmental impact accompany appropriations requests. To date no such report has been received on this year's request of $290 million for the SST. Under Secretary of Transportation Beggs said yesterday it would probably be the end of the year before such a report would be submitted on the SST. By that time Congress will have acted on this additional $290 million. The fund will be gone, as Mr. Beggs said, 70 percent of all the Government is expected to appropriate will have been committed before we receive a report from the Department of Transportation on the environmental impact.

Should Congress wait until we get this report before granting the $290 million?

Mr. TRAIN. I think that is a hard one for me to advise the Congress on, Mr. Chairman. We have endeavored to set out as best we can the full range of environmental factors in my statement. And, of course, they are stated fairly briefly, but I think quite comprehensively. And I would doubt that the Department of Transportation would have anything really to add to the environmental side that would assist the Congress in this matter.

Chairman PROXMIRE. If this act is going to be effective it seems to me you have got to start off right away with enforcement which will

be effective. To permit an agency to get away off the bat with an appropriation this size, this substantial a commitment, I would fear would make the Environmental Quality Act a feeble and ineffective instrument.

Mr. TRAIN. It seems to me that it is entirely within the prerogative of the Congress, obviously, to direct the Department of Transportation to address itself in public hearings to the environmental aspects as it sees them.

Chairman PROXMIRE. It is one thing for you to bring in this kind of a report—and it is very helpful and important, I do not mean to degrade it at all—but it is something else for the Department itself charged with the function of developing a plane to do so. If they will concede that this is going to have an adverse effect on the environment—and I think an honest evaluation would force them to that kind of conclusion—I think it would have a real effect, much more substantial effect frankly than having your agency come in, although your agency undoubtedly does have influence.

Mr. TRAIN. Let me assure you, Mr. Chairman, that this statement that I have made this morning has been fully cleared by the administration. It has been discussed at length with the Department of Transportation. And so far as I know there is no disagreement over any of the facts set out in here. Now, they might have expressed it a little differently in places. But I do not think there is really any basic disagreement with the substance of the statement.

Chairman PROXMIRE. The law—and I am reading from the law—requires the following, section 102, subsection (c):

"Include in every recommendation a report on proposal for legislation, the environmental impact, any adverse environmental effect, alternatives to proposed action," and so forth.

And this is a request that we are getting. And we are not getting the report that is required by the law.

Mr. TRAIN. Let me make clear, Mr. Chairman, that so far as I am concerned I would be of the opinion that the statute technically interpreted would require the filing of a statement with the Council under section 102 in this particular case.

Now, this is a matter of interpretation, clearly.

Chairman PROXMIRE. Your interpretation, however, is that they should file this report along with this request for $290 million?

Mr. TRAIN. It is my view that the statute does require the filing of a section 102 statement in cases such as this. But I recognize that there are differences of opinion. I have made clear in my own statement that the development of a prototype itself does not have significant environmental consequences. And this could be taken as meaning under the very words of the statute that a statement of environmental impact is not required.

Chairman PROXMIRE. I wished you had stopped a sentence or two before that.

Mr. TRAIN. Well, I want to be fair to both sides of this question, Mr. Chairman. But there is no question as to how we interpret the statute.

Chairman PROXMIRE. There is no dispute that if a fleet of 500 American SST's and Concordes fly in this region of the atmosphere that this could increase the water content as much as 50 to 100 per-

cent. They estimate it will be more than 500 in the period that you specify here. So this is a conservative estimate. And you say 50 to 100 percent increase in water content.

What does that really mean, say, in terms of the effect in humidity, or the effect of rain, the effect on vegetation, and so forth?

Mr. TRAIN. As a lawyer I think I shall step aside for a moment and ask Dr. MacDonald to address himself to that question if I may.

Mr. MACDONALD. In the first place, the part of the atmosphere in which the supersonics plan to fly is a very dry part of the atmosphere. Ordinarily it contains about two parts per million of water vapor. Recently, observations have shown that this concentration has increased over the last 4 or 5 years, for reasons we do not understand. It is now about three parts per million. That water vapor stays in the atmosphere for a long time, at least 18 months. It will affect the atmosphere primarily by affecting how much heat reaches the lower atmosphere.

Chairman PROXMIRE. It will have little or no effect in terms of precipitation?

Mr. MACDONALD. In terms of precipitation, direct effect, no. But in terms of how it could affect the climate, it could very well have some effect.

Chairman PROXMIRE. The main effect is on the ozone and the sunlight?

Mr. MACDONALD. The main effect is on the sunlight through its trapping of some of the radiation. And secondly, if the concentration is increased sufficiently it could form high thin layers of cloud in this part of the atmosphere that could persist for a long time and potentially could have a very large effect on climate.

Chairman PROXMIRE. What is the ultraviolet impact?

Mr. MACDONALD. And the effect on the ultraviolet is that the sun gives out radiation over a wide spectrum. Some hard radiation, which we call ultraviolet, can have and does have in sufficient quantities a damaging effect on any living matter: it destroys the cells. The ozone in the upper atmosphere shields us from this damaging radiation. If we decrease the percentage of ozone, the concentration of ozone in this part of the atmosphere, we might have some effect at ground level. We do not know what the practical significance is. We do know that putting water into this part of the atmosphere will decrease the ozone. I think everybody would agree to this.

Chairman PROXMIRE. What physiological effect on man or animals could this have?

Mr. MACDONALD. The principal effects, of course, are fairly familiar. Ultraviolet radiation causes sunburn, the fraction that does reach the surface. And if you increase the percentage of ultraviolet that reaches the surface you can have other adverse biological effects, particularly on leafy plants, and things that are sensitive.

But I must emphasize that we are just beginning to understand these consequences. It is a very iffy subject.

Chairman PROXMIRE. Give us one or two examples of what might happen that would be seriously adverse to a person or animal or a plant.

Mr. MACDONALD. Well, let us suppose that through some other means you stripped the ozone from the atmosphere and exposed the

surface to the full force of the solar ultraviolet. This would effectively wipe out life, except in the oceans, anything that would be exposed. But if you remove only a small fraction of the ozone, the effect might not be noticeable at all. We raise the question. This is potentially such a significant problem that we really must understand it before proceeding in any way to alter the water vapor content of this part of the atmosphere. It would be my judgment as one who has worked in this field that the effects probably would be minor. But I would not be willing to take that risk without having much more available in the way of information.

Chairman PROXMIRE. You stress in your statement, Mr. Train, the separability of the prototype phase and the full production phase of the SST. Are you suggesting that we have to complete the prototype phase before assessing the SST, its environmental impact? Can we not test for airport noise—I should say can we not retest for airport noise or even for water vapor emissions before the prototypes are built, or even if not, can't we wait for evaluation of the tests on the Concorde before going ahead?

Mr. TRAIN. I believe that a great many of these things can be tested as we go along. And I think that is in part what we are urging here, which is a stepped-up research program——

Chairman PROXMIRE. I am asking whether you cannot test before you go ahead, stop the prototype construction, but rely on tests absent prototype construction, Concorde experience, and so forth?

Mr. TRAIN. Of course, that is an alternative, there is no question about it. And I think that alternative is one that has to be appraised in the context of international relationships, the fact of the Concorde, and so forth. Were it not for the Concorde, for example, I would think that this alternative would receive more consideration. But I think the fact of the Concorde and its present state of development is part of the decision mix that must be taken into account.

Chairman PROXMIRE. Doesn't the presence of the Concorde and the fact that the Concorde this summer is being tested flying over parts of England, or near England, offer an opportunity for us to get some information we do not now have that we should have before we invest $290 million of additional money?

Mr. TRAIN. I would hope that we could develop additional information on the performance of the Concorde as the result of those tests, yes.

Chairman PROXMIRE. And we have our own supersonic military planes. Aren't they of some help too in determining what effect supersonic flight will have?

Mr. TRAIN. I would suppose so. But I really just do not know.

Perhaps Dr. MacDonald could address himself to that.

Chairman PROXMIRE. Do you have views on that, Dr. MacDonald?

Mr. MACDONALD. Certainly. Both the experience with the Concorde and the experience with the supersonic military aircraft could provide many of the data that would be required to make an assessment of the environmental problems. On the other hand, none of these aircraft have the same design characteristics as does the proposed U.S. SST. The proposed SST is a very much larger aircraft than any of these that we are considering, and has larger engines. The effect cannot be totally reproduced by looking at the military planes or the Concorde.

Chairman PROXMIRE. Do you have a personal position, Mr. Train, on this, as to whether we should—the alternative, that we should try and determine environmental effect before we build the prototypes? Do you have a position that you would take, or do you simply say, this is the administration's position that we should go ahead and build the prototypes first?

Mr. TRAIN. I am here to testify as a representative of the administration, Mr. Chairman, not in a personal capacity. And I think that this statement that I have read represents the views I would offer the committee, in fact I know it does.

Chairman PROXMIRE. In your statement you indicate that our concern about airport noise will surely be echoed abroad, and that this may give us some assurance that we are not the only ones concerned. But on last Thursday we had testimony from Miss Mary Goldring, business editor of The Economist. And she was an opponent of the Concorde, as you know, and an opponent of the SST. And I asked her specifically how much concern the questions of airport noise, sonic boom, and environmental pollution had created in England. I was surprised to hear her say that this concern was just about nil in England. This is of some concern to me, because it suggests that where strong economic pressures exist, the environmental questions are pushed very much in the background.

Can you comment on this?

Mr. TRAIN. I do not know why the interest has been at as low a level as it has in Europe. This has not been true all over, I might say. I believe that the Swiss, for example, have indicated that they will not permit supersonic flights, overflights.

Chairman PROXMIRE. That is the very point, the Swiss are not developing the planes, so they do not have these economic pressures to stifle the protests.

Mr. TRAIN. I think it is very important, as I recommended in my statement, that we take the initiative for discussions at a very early opportunity with the English, the French and the Russians, among others, but those three countries very specifically, on the environmental aspects of the SST. And if these have not been given adequate attention by those countries, then I think that we should use as much influence as we have in helping direct their attention to these problems.

I do think that this is an international problem, and perhaps can best be approached and dealt with internationally. And I do put a great deal of weight and emphasis on our recommendation for the kind of international discussions that we have suggested.

Chairman PROXMIRE. It was suggested by General Quesada—who, as you know, was the head of the FAA at the time the SST began, and is now very skeptical about the SST—it was suggested by him that we should apply noise standards of a kind that would simply make it impossible for the Concorde to use our airports. This way we eliminate the kind of international competition that seems to have spurred on this development. We do not do so on the basis of banning the Concorde, we just say we want to hold the noise within reasonable limits. And, of course, that kind of approach seems contrary to what you are suggesting.

As I understand it, you are suggesting that we work out a diplo-

matic kind of an agreement with other countries that are interested and concerned rather than some kind of unilateral action on the part of this country to prevent SST's of any nation, the Concorde, or the Russian, from using the airports because of the noise factor?

Mr. TRAIN. Not at all, Mr. Chairman. I think that my statement, the first recommendation, goes to the noise level, and recommends, if I may repeat, that the guidelines with respect to noise certification of the supersonic civilian transport should assure that the noise environment in the vicinity of airports at the time of the introduction of supersonic will not be degraded in any way. And I have indicated that regulations, guidelines and regulations to this effect will be developed shortly. And we expect to participate in the development of those guidelines. And if we accept the principle of nondegradation of the noise environment in and around our airports, I am not at all sure that the Concorde would be able to fly in and out of the United States.

I think the alternative suggested by General Quesada is a very real possibility. It tends to have an arbitrary element to it. But as I say, I am not sure at all that the guidelines which we suggest will not effectively prohibit the operation of the Concorde and the SST as we now conceive of it from most airports.

Chairman PROXMIRE. Does proposal No. 1 of your statement, the one to which you have referred, which you tell us has received formal administrative adherence—or do I misunderstand that?

Mr. TRAIN. No, that is correct, sir.

Chairman PROXMIRE. Does the FAA rule with respect to sideline noise levels of subsonic aircraft also apply to the SST? The limits, as I understand it, are—what, 108, 110 decibels.

I am told 108.

Mr. TRAIN. I cannot answer that specifically, Mr. Chairman, because these guidelines have not been developed yet. And I would hesitate to speculate in advance as to exactly what form they would take. I think——

Chairman PROXMIRE. Here is what you say in your statement: "The guidelines with respect to noise certification of the supersonic civilian transport would assure that the noise environment in the vicinity of airports at the time of the introduction of supersonics will not be degraded in any way."

Mr. TRAIN. That is correct.

Chairman PROXMIRE. If you are not degrading it in any way it seems to me that you must mean that you are going to apply the same kind of standard for the supersonic that you are going to apply for the subsonic?

Mr. TRAIN. I think that could very easily be one of the options that could be considered in the development of the guidelines.

Chairman PROXMIRE. An earlier witness told us that the difference between a subsonic takeoff and a supersonic takeoff was of this order, the effect on the airport, that the supersonic noise is equivalent to 50 subsonic jets taking off at once. And that was not disputed. Mr. Beggs when he appeared agreed that that was about right. He also testified that the present comparison between SST and subsonics, the SST would be several times higher on the basis of what their present estimate of the noise is, several times higher for the supersonic aircraft than the limit that is permitted for subsonic jets. So if we take this

statement of yours literally, it would seem to me that this would make it impossible for the supersonic transport to land at our airports until they have improved the sound factors very substantially.

Mr. TRAIN. There is no question that the EPNdB rating of the SST as presently designed, and of the Concorde, would be substantially in excess of the subsonic sideline noise levels now set by the FAA, namely, 108 EPNdB. And this would be a magnitude of differences. I have set out in my statement, of either three or four or five times, depending upon which aircraft we are talking about.

I have also stated that in terms of noise pressure, which I think is the standard to which Dr. Garwin referred, the supersonic transport and the Concorde would also be very substantially higher than the subsonic jets.

I believe that if we set our standard for the supersonic aircraft in a way which insured that the noise environment in and around our airports will not be degraded, that it will be exceedingly difficult if not impossible for the SST as presently designed and the Concorde as we now know it to operate from U.S. airports.

Chairman PROXMIRE. Under these circumstances, if you were a member of the Senate or the House, and you had $290 million appropriation coming along, could you in good conscience vote for that, recognizing that unless you get a breakthrough—which seems to me at least to be unlikely—that this plane would never fly, it would never be able to use our airports. If it cannot use the U.S. airports, almost everybody would agree, forget it, because here is where the real commercial action is. We cannot expect to produce a plane that will fly from Argentina to Bombay and have any kind of a payload, any kind of a payoff. It has to use the great airports in this country. And you are saying that on the basis of the present development of the SST, unless it is improved by a factor of 3 to 4 times, that is, the noise is reduced to far smaller amount than it is now, that it would not be able to operate. And therefore I wonder whether or not it is provident for a Member of Congress to vote for a $290 million appropriation. It it a big gamble.

Mr. TRAIN. Of course, this involves budgetary, economic and engineering judgments that I really do not feel that I am competent to make, Mr. Chairman.

Chairman PROXMIRE. I think you have made a very helpful point here.

It has been suggested in our earlier testimony that the FAA may feel that it has to set fairly lenient noise standards for diplomatic reasons. This is what I had in mind when I was discussing this with you before, that if we do not let foreign airlines land their Concordes and SST's that we may experience retaliation, and so on. Suppose local airports wished to set more stringent noise standards, than the FAA—which would be very reasonable, with the terrific pressure they get—even one as internationally minded as the Kennedy Airport—do local airports have this authority and should they have it and should they exercise it?

Mr. TRAIN. It is my understanding that they do. I do not believe there is any Federal preclusion of local airports' establishment of noise standards more stringent than those established by the FAA.

Chairman PROXMIRE. That is certainly the view of General Quesada.

it is the view of Mr. Beggs, it is the general view, that local airports could do this. And it would seem that there is a strong likelihood that that would happen. And here is another argument why it would seem to me to be wasteful for Members of Congress to appropriate $290 million for this airplane.

What technological efforts are being made to overcome this airport-noise problem? Do you feel that we could continue to fund the SST program in the absence of a satisfactory technical solution to it?

Mr. TRAIN. As I point out, the present level of research in sideline noise, as well as the other environmental problems and uncertainties to which I have referred, is not at a level that we think it should be. We believe that this research should be increased.

The present research and development with respect to engine sideline noise, I think, is largely being conducted by the engine contractor; namely, General Electric. And how much that is I am not personally aware at the present time. But I think——

Chairman PROXMIRE. Professor Bisplinghoff was the professor who was an expert on the SST and he favors it. He testified in his judgment that there is no substantial technological study or work that has any great promise here. He does not see anything, at least in the immediate future, that is likely to be able to make some breakthroughs that would reduce this noise problem.

Mr. MacDonald, do you have any observation on that? You are a technical expert in this area.

Mr. MACDONALD. I would certainly agree with Professor Bisplinghoff that, using current technology, the chances of obtaining an economical viable airplane and meeting what we propose as the noise criterion are slim. However, there are alternatives ahead that might very well lead to a quieter engine.

Chairman PROXMIRE. I think that is right. I think it is perfectly true; and that is exactly why it would seem to me that it would be a strong argument to wait until we can develop it.

Mr. MACDONALD. We are arguing that you should push the research on the quiet engine.

Chairman PROXMIRE. You are arguing that we should go ahead with a prototype.

Mr. Train, are you fully satisfied with the FAA's proposed rule prohibiting supersonic flight over populated areas? Do you feel there is a danger of the rule being changed if overwater operation does not prove to be an economic success?

We had a study that was made in the Defense Department of the economic feasibility of building a supersonic transport that could fly only over water. And the Defense Department study showed the return would be very low or negative, that only if they could fly overland, especially over this country, would there be a real payoff, the real payoff routes are coast to coast, from Chicago to the coast, and so forth. The other routes are more glamorous and exciting, we think more about them and read more about them. And maybe some years from now they might be successful commercially. But the problem that concerns us is that we are going to get this very strong and powerful economic pressure in the Congress to permit flights over land. And I know how strongly you feel about permitting flights over land until the sonic boom is under control.

Are you concerned about this possible development?

Mr. TRAIN. This is necessarily speculative. But in view of the present public climate on environmental matters, and in view of what I would say is an increasing level of public interest and attention to environmental matters, it would be highly unlikely that the FAA, or anyone else, for that matter, would be in a position to simply give way on environmental standards in order to accommodate the economic pressure that you describe.

Chairman PROXMIRE. I just wonder, when you have the consumer, or the great majority of the people, with a vague, indefinite, but deep concern about the environment on the one hand, and you have people who are determined and who have their jobs at stake or a substantial profit at stake, a real economic interest involved, again and again and again I have seen that those who have a specific economic interest have prevailed.

Wouldn't we be safer if flight over populated areas were controlled explicitly by statute rather than by FAA rulemaking? For instance, there is this quote in the notice of rulemaking. This is what the FAA says:

> A restriction of sonic boom producing flights over populated areas is supported at this time by the inconclusive results of research concerning the effects of sonic boom on the surface environment.

That seems to be a very weak reed to rely on, especially when you have an aviation-oriented agency enforcing it. Wouldn't it be better for us to write this into law?

Mr. TRAIN. I would think that if Congress had a real concern over that question that it would be perfectly appropriate for Congress to write it into the statute.

Chairman PROXMIRE. You would support that?

Mr. TRAIN. Let me make it perfectly clear that I am not saying that I would not support it, Mr. Chairman. But we intend to review this entire process of certification and aircraft noise-standard setting, and to be exploring in great detail with FAA and other agencies and outside sources this whole question. And while I am not trying to put off an answer to your question, I would think it would be the better part of wisdom that we get into this review prior to taking positions on what should be done by legislation.

Chairman PROXMIRE. Of course, if Congress writes this into law it is not like the Ten Commandments, there is nothing that is pounded in with a hammer and chisel for all eternity, we can change the law if we find that the sonic boom problem is getting under control, or if there is some other strong reason. But just to leave this in the hands of the FAA is like leaving it up to Boeing.

Mr. TRAIN. If I could go back to a remark you just made, Mr. Chairman, about the prohibition on overland flights being simply in the hands of FAA, strictly speaking that is not correct. Certainly our Council on Environmental Quality under the National Environmental Policy Act would take a very strong interest in any such proposed change. And I would assure you that we would kick up quite a mighty fuss as a council in the event of any effort to authorize commercial flights over land at supersonic speeds.

Chairman PROXMIRE. You would be very welcome. But the FAA would still make the rule, would it not?

Mr. TRAIN. Yes, of course.

Chairman PROXMIRE. If it made this rule it can modify the rule. And it was very honest in the way it phrased it, I think. It pointed out that at this time we restrict it over populated areas on the basis of inconclusive research.

I think no one can read that without feeling that they certainly would be inclined, if they summoned up what they regarded as more conclusive evidence the other way, to permit flight over populated areas.

Mr. Train, last week we held some hearings which focused on the Federal highway program. Obviously, highways have a pervasive environmental impact. In the future, will requests for highway funds be accompanied by the reports on environmental impact which are required under the National Environmental Policy Act?

This is a very timely question, because this is going to come up this year, the extension of the Federal highway program. And Congress is going to make a decision which is not only going to affect billions and billions of dollars, but also the way this country looks, and the impact of highway building on our country.

Mr. TRAIN. I would suppose that a section 102 statement of environmental impact would be in order in such a case.

Chairman PROXMIRE. When you say it would be in order, now, you have more authority here and more responsibility than anybody else in the Government. You are the Chairman of this Council, are you not?

Mr. TRAIN. That is correct, sir. At the same time the statute does not give us the decisionmaking authority as to when and by whom 102 statements should be filed. It simply says that under the following circumstances a statement shall be filed. And all I can really do is voice an opinion as to whether it should or should not.

Chairman PROXMIRE. It says, include a report in every recommendation or proposal for legislation and other major Federal actions significantly affecting the quality of human environment.

For us to spend tens of billions of dollars on highway development and to build thousands of miles of highway obviously has a significant effect on the environment. I do not know how this law could be interpreted in any other way except as a mandate for a report on the environmental effect of the highway program.

Mr. TRAIN. Perhaps I am not clear. I said I thought it would be required by the statute.

Chairman PROXMIRE. You think it is required?

Mr. TRAIN. I believe it is required by the statute.

Chairman PROXMIRE. What could you do if the highway department does not file this?

Mr. TRAIN. Well, if I feel that if one is required and one has not been required, as has been the case on several occasions, obviously, one can approach this at an informal staff level simply calling attention to the statute and requesting compliance, or we can be somewhat more formal. And I would address myself to the Cabinet officer or agency head, as the case may be.

Chairman PROXMIRE. Would you advise Congress not to appropriate the funds? This is the only muscle we have.

Mr. TRAIN. And in the final analysis if we received what we would

consider an inadequate response, we would make a recommendation to the President that he direct a statement to be filed. But that is our function as part of the Executive Office of the President. And I think we have to carry out this responsibility in that context. I do not think it is our responsibility to advise you as to how you would act on an appropriation.

Chairman PROXMIRE. What reports if anything have you had filed by agencies in compliance with this law to date?

Mr. TRAIN. There has been a statement filed with respect to the proposed road from the Yukon River to Prudeau in Alaska. That has been filed by the Department of the Interior.

There has been a statement filed by the Department of Transportation with respect to the construction of a highway in the State of New Hampshire.

We have had from the Department of the Army, or more specifically from the Corps of Engineers, a statement under 102 with respect to the environmental implications of a legislative proposal with respect to dredging and dumping in the Great Lakes.

I am also informed that we have just recently—and I have not seen these personally—just recently received two statements by the Atomic Energy Commission with respect to proposed nuclear powerplants.

Chairman PROXMIRE. These are all very helpful. And I am delighted to get these reports.

But in the universe of actions taken by Federal agencies, with the colossal amount that is appropriated and spent, and so forth, it seems to me that although this has only been in effect since the first of the year, that there are many agencies that are not making these reports that in all likelihood ought to be.

Mr. TRAIN. Let me say that I agree with you, Mr. Chairman. And I am not saying that critically of the departments, because I think that what is required here is a very new mechanism and a very new way of approaching the problems insofar as the Government is concerned, and not just Government, this would also be true with respect to decisions made in the private sector. And it is going to take time to get what I would consider fully satisfactory compliance.

Chairman PROXMIRE. Have you had any occasions to request an agency to file a report because you think it should be filed and it has not been?

Mr. TRAIN. I know we have had some disagreements as to whether a report was required or not. Whether it was us taking the initiative or not I do not recall.

We have just recently developed what we have called interim guidelines for the agencies to assist them in complying with this requirement of the statute, quite extensive guidelines. This followed a meeting quite recently, I think it was on the 15th of April, with representatives of all the Federal agencies concerned. And I think there were at least 25 agencies represented at that meeting, and probably more.

Chairman PROXMIRE. How about the Defense Department? Now, here is an agency that spends an enormous amount of funds, and engages in actions which many people feel have a serious adverse effect on the environment. We know about many of the tests that are conducted both in the atmosphere and elsewhere. We have stopped the

nuclear testing, but there are other kinds of testing, explosions, and so forth, and a great deal of construction by the Defense Department. Have they ever filed a report under that statute?

Mr. TRAIN. Well, as I mentioned, the Corps of Engineers has.

Chairman PROXMIRE. The Corps of Engineers, that is true.

Mr. TRAIN. You mentioned the construction project.

Other than that I do not recall any being filed. The Department of Defense is, of course, subject to the provisions of the act. And we have had discussions with the Defense Department and with components of the Defense Department, and specifically the Department of the Army, with respect to the requirements of section 102. And we do intend fully to insist on compliance by the Department of Defense as by all other agencies. And so far as I know there is no inclination on the part of the Department of Defense not to comply.

Chairman PROXMIRE. It is not conceivable to me that with the colossal amount of expenditures and projects in which they are involved that the only one that would require a report is dredging in the Great Lakes. I would think that there would be a very large amount of activity that would affect the environment that would require a report.

How about the space agency?

Mr. TRAIN. I am informed that quite a large number of section 102 statements are in the pipeline from the Defense Department at the present time.

Chairman PROXMIRE. They have got the world's longest pipeline. At any rate, none has reached your desk in the more than 4 months that the law has been in effect?

Mr. TRAIN. It is unfair to point a finger at the Department of Defense in this case, because I think you could make the same statement with respect to practically all the agencies.

Chairman PROXMIRE. In other words, nobody is really cooperating on this?

Mr. TRAIN. No, I do not think that is an accurate statement either, Mr. Chairman, because our guidelines were only published, I think, today, or yesterday, in the Federal Register. Not that that fact in any way has excused compliance from the statute.

But I think there has been very real uncertainty on the part of Government agencies and the bureaucracy generally as to just how to comply and as to just what is expected. I do not think there is a desire not to comply, but a very real lack of education as to what is involved. And I think the major task we have is one of education in this case.

Chairman PROXMIRE. It may be that the statute is overdrawn, it may be that it is too comprehensive, and that we ought to limit it. But it would seem to me that it is so generalized now and there seems to be so little compliance that there is a real danger that this is going to be a dead letter. I know that you are going to give it very conscientious attention and do your best to secure compliance. But you have admitted that you do not have any real muscle here. You can eventually go to the President, but you do not like to bother him all the time, you can go to him occasionally under extreme circumstances. But I am very concerned that this is a part of the statute which is so important to our environment, and that we are not going to get any effective action under it.

I would hope that you would consider this, Mr. Train, and perhaps give this subcommittee your recommendations as to what by either legislative action or administration action we could do to insure that we would have a report of this on the really important projects that our Government engages in.

Mr. TRAIN. Of course, I would think it really is a little bit early, Mr. Chairman, for us to be making recommendations in this area.

Chairman PROXMIRE. If they are going to be effective the recommendations had better come early. Once you permit the agencies to feel that there are very few exceptions in which they must file a report, that is going to be something that will be very hard at that point to make effective.

Let me ask you this——

Mr. TRAIN. Let me add also that we have been in constant touch with the legislative committees concerned with this question, because this is a matter of very great interest to them. And we would expect, if we feel the statute is inadequate, very definitely to make proposals.

Chairman PROXMIRE. One way that we could get compliance on the big programs is for the Congress to refuse to appropriate money until we get those reports. If we really care deeply about our environment where we have programs like the SST and others that affect our environment, we should insist on it.

Mr. TRAIN. That certainly is a very powerful weapon.

I might also add that there have been several cases where the Federal courts have granted injunctions against proposed Federal actions because of the failure to file a section 102 statement. So that——

Chairman PROXMIRE. There are some cases?

Mr. TRAIN. Very definitely.

Chairman PROXMIRE. I was going to ask you——

Mr. TRAIN. There is not a total lack of muscle in this situation. But the muscle by and large has to be applied by others rather than by the Council.

Chairman PROXMIRE. As has happened occasionally in recent years, we seem to be an impotent administrative branch and an impotent Congress, and let the courts come in, they have done it on civil rights, and maybe it will save the environment too.

If this were a new program just starting up and you knew only what you now know about the SST's environmental consequences, could you recommend to Congress that it provide any money for development of this plane, prototype or otherwise? This is just an academic question. You do not have to worry about contradicting administration policy, it seems to me.

Mr. TRAIN. Academic questions are the most dangerous, Mr. Chairman.

I am not sure what all the assumptions were of that question, or whether it also involved the existence of the Concorde, and the Concorde coming into production. I think I would prefer not to answer that.

Chairman PROXMIRE. Mr. Hickel has made some progress lately by bringing up tough questions or tough answers or tough disagreements.

I want to thank you very, very much, Mr. Train. You are a great environmentalist, and I am delighted you are in your present position. And I did not mean in any way by my questioning to be critical

of you. This is a very difficult task for anybody. And I think you are doing extremely well. You have been responsive and helpful to us. Thank you very much.

Mr. TRAIN. Thank you, Mr. Chairman.

Chairman PROXMIRE. The subcommittee will stand in recess subject to the call of the Chair.

(Whereupon, at 12:20 p.m., the subcommittee adjourned, to reconvene subject to the call of the Chair.)

APPENDIX

(The following correspondence was submitted for the record of hearings in the context of the supersonic transport development program by Chairman Proxmire:)

U.S. DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., May 12, 1970.

HON. WILLIAM PROXMIRE,
U.S. Senate,
Washington, D.C.

DEAR SENATOR PROXMIRE: Your letter of April 14 seeks any additional comments we may have on the SST program that might modify or expand the views expressed in the report of the Ad Hoc Committee's Panel on Environmental and Sociological Impact and by Mr. Train in his memorandum of March 21, 1969 to Under Secretary Beggs. Mr. Train, who was then Under Secretary of the Interior, had been appointed to represent this Department on the Ad Hoc Committee to review the supersonic transport program.

The report of the Environmental and Sociological Panel of the Ad Hoc Committee, chaired by Mr. Train, pointed out four main areas of environmental consideration. These are (1) sonic boom; (2) airport noise; (3) hazards to passengers and crew; and (4) effects of water vapor in the stratosphere. I feel that Department of Interior remarks should be confined to environmental matters; therefore, my remarks do not address item three.

It is my understanding that an appreciable amount of research has been and is continuing to be expended on exploration of these environmental areas. I would strongly urge that these efforts be continued. There is increasing apprehension that noise pollution, in all its varied forms, may contribute greatly to the erosion of our environmental well being. This is true for the relatively remote areas to which we flee for recreation, as well as the urban complexes. Any development which would add to the noise load now being borne by the U.S. citizen should therefore be examined in detail for its environmental as well as its economic implications.

In short, our concern for the environmental ramifications associated with the development of our SST program remains the same as it was last year. Similar concern was expressed by Secretary Volpe on September 23, 1969 when he stated that the President assured him he "wants the American public to know that this supersonic transport will not be allowed to fly over populated areas unless and until the noise factor comes within acceptable limits."

Sincerely yours,

WALTER J. HICKEL,
Secretary of the Interior.

APRIL 14, 1970.

HON. WALTER J HICKEL,
Secretary, Department of the Interior,
Washington, D.C.

DEAR MR. SECRETARY: Early next month the Subcommittee on Economy in Government of the Joint Economic Committee will begin hearings on Federal transportation policy. The particular focus of these hearings will be on the appropriate level of the direct Federal investment in transportation and the best allocation of this investment among the different modes of transport. One special area of interest will be Federal investment in aircraft development, including the supersonic transport.

In February 1969, Mr. Russell Train, who was then Under Secretary of the

36-125—70—pt. 4——10

Interior Department, was appointed to represent the Department on the Ad Hoc Committee to review the supersonic transport program. The report of that committee, together with the supporting documents which were subsequently made public, raised a number of serious questions regarding continued Federal support of this program. As part of our current study of the program, I am interested in knowing whether there have been any changes in the situation which have caused the Interior Department to revise its views on the SST as they were expressed to the Ad Hoc Committee. In particular, does the report of the Ad Hoc Committee's Working Panel on Environmental and Sociological Impact continue to represent your views on the potential environmental hazards of the SST? Would you want to add anything at this time to the comments made by Mr. Train in his memorandum to Under Secretary Beggs of March 21, 1969?

Any additional comments you may wish to make on the environmental consequences or on any other aspects of the SST program would be most helpful to the Committee in their evaluation of this program.

In order that the background information for our hearings will be as complete as possible, I would appreciate having a reply to these questions no later than May 1, 1970.

Sincerely,

WILLIAM PROXMIRE,
Chairman, Subcommittee on Economy in Government.

THE UNDER SECRETARY OF HEALTH, EDUCATION, AND WELFARE,
Washington, D.C., May 9, 1970.

Hon. WILLIAM PROXMIRE,
Chairman, Subcommittee on Economy in Government,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: This letter is in response to your April 14 letter requesting information as to the Department's views on the supersonic transport (SST).

We have again reviewed the enclosed final report of the Environmental and Sociological Panel of the Ad Hoc SST Review Committee and feel that it states, obviously in summary form, our views on potential health hazards of the SST.

I am also enclosing, at your request, a copy of a study entitled "Supersonic Transport (SST)—Potential Health Hazards to the Crew, Passengers and Population," prepared for the Department's Consumer Protection and Environmental Health Service in March 1969. It was prepared as a background working paper for the above-mentioned Panel and was not intended for publication. We feel that it contains some substantive as well as technical deficiencies.

Coordination with the President's Council on Environmental Quality and other appropriate government agencies has recently been undertaken to assure proper identification and understanding of potential environmental hazards. Additional research deemed necessary as a result of this coordinated effort will be initiated. This Department will lend whatever assistance may be required.

Please let me know if I can be of further assistance to you in this matter.

Sincerely,

JOHN G. VENEMAN.

APRIL 14, 1970.

Hon. JOHN G. VENEMAN,
Under Secretary, Department of Health, Education, and Welfare,
Washington, D.C.

DEAR MR. VENEMAN: Early next month the Subcommittee on Economy in Government of the Joint Economic Committee will begin hearings on Federal transportation policy. The particular focus of these hearings will be on the appropriate level of direct Federal investment in transportation and the best allocation of this investment among the different modes of transport. One special area of interest will be Federal investment in aircraft development, including the supersonic transport.

In February 1969, you were made a member of the Ad Hoc Committee to review the supersonic transport program. The report of that committee, together with the supporting documents which were subsequently made public, raised a number of serious questions regarding continued Federal support of this program. As part of our current study of the program, I am interested in knowing whether there have been any changes in the situation which have caused the

Department of Health, Education, and Welfare to revise its views on the SST as they were expressed to the Ad Hoc Committee. In particular, does the report of the Ad Hoc Committee's Working Panel on Environmental and Sociological Impact continue to represent your views on potential health hazards of the SST?

Could you supply me with a copy of the study by the Consumer Protection and Environmental Health Service entitled "Supersonic Transport (SST)—Potential Health Hazards to the Crew, Passengers and Population" which is referred to in the Working Panel's report?

In order that the background information of our hearings will be as complete as possible, I would appreciate having a reply to these questions no later than May 1, 1970. Any additional comments you may wish to make on other aspects of the SST program would be welcome.

Sincerely,

WILLIAM PROXMIRE,
Chairman, Subcommittee on Economy in Government.

OFFICE OF THE DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING,
Washington, D.C., May 8, 1970.

Hon. WILLIAM PROXMIRE,
Chairman, Subcommittee on Economy in Government,
U.S. Senate, Washington, D.C.

DEAR SENATOR PROXMIRE: As indicated to you in his letter of April 24, 1970, Secretary Seamans was initially nominated to the Inter-Departmental Ad Hoc Committee on the Supersonic Transport (SST) program. Because of the press of work associated with his Air Force duties he was relieved of the assignment, and on March 6, 1969 I was designated by the Secretary of Defense to represent the Department of Defense.

In your letter of April 14, 1970 to Secretary Seamans, which you have now referred to me, you asked if there had been any changes which have caused the Air Force (which I will interpret to mean the Department of Defense) to revise its views as expressed to the Ad Hoc Committee. To date there have been no events which we believe warrant revision of those views.

It has been the Department of Defense position that the technological fall-out from the SST program would not provide a significant portion of the diverse technology required for developing military aircraft, but we have recognized that the SST program will advance several technological areas, such as Flight Control Systems, Structures, Materials, Aircraft Engines, and Aerodynamics. This activity will provide fall-out both to the aircraft industry in general and to other industrial and military applications. While we do not believe this fall-out in itself provides justification for the SST program, it should be considered as a bonus or additional benefit to other programs.

In response to your second question, there are other avenues of research which could develop the technology which would accrue from the SST. The SST program has already contributed significant advances to this technology, however, and considerable momentum would be lost if this activity were transferred to other programs. Because of the emphasis of the widely different mission specifications of military and civil aircraft, the applied technology is also sufficiently different between the two that a single research avenue not guided by a specific design approach would probably be inadequate for either objective. It is believed, therefore, that the SST should pursue its own separate technological program. Data from the SST program and DOD research will continue to be exchanged in accordance with Deputy Secretary of Defense memorandum to the Navy and Air Force on exchange of technological information, dated October 23, 1965.

Your third question relates to the need for a DX priority is not being justified on the basis of military need, but is consistent with the overall National objective of developing a viable and competitive SST in the United States. In view of the significant advancements made in the Soviet Union, Britain and France, it is believed that continuation of this DX priority is both desirable and necessary for the SST to maintain a healthy and competitive pace.

I hope you will find the foregoing information responsive to your inquiry. If I can be of further assistance in this matter, please feel free to call on me.

Sincerely,

T. C. MUSE,
Assistant Director,
Aeronautical Technology.

DEPARTMENT OF THE AIR FORCE,
Washington, D.C., April 29, 1970.

MR. THOMAS C. MUSE,
Department of Defense, Office of the Director of Research and Engineering, The Pentagon, Washington, D.C.

DEAR MR. MUSE: I have been informed by the Secretary of the Air Force that you served in his place as a member of the Interdepartmental Ad Hoc Committee which was appointed by President Nixon in February 1969 to review the supersonic transport program. I am, therefore, enclosing copies of a letter I recently sent to Secretary Seamans and of his reply. I hope that you will be able to provide us with substantive replies to the questions raised in my letter to Secretary Seamans.

I am sorry that this request was not sent to you sooner, and I recognize that it will not at this point be possible for you to respond by May 1. I would, however, be grateful for the earliest possible response.

Sincerely,

WILLIAM PROXMIRE,
Chairman, Subcommittee on Economy in Government.

DEPARTMENT OF THE AIR FORCE,
Washington, April 24, 1970.

HON. WILLIAM PROXMIRE,
Chairman, Subcommittee on Economy in Government, Joint Economic Committee, Congress of the United States.

DEAR MR. CHAIRMAN: This has reference to your letter of April 14, 1970, regarding hearings to be held by our Subcommittee on Economy in Government on Federal transportation policy.

Announcement of the establishment of the Interdepartmental Ad Hoc Committee to review the Supersonic Transport Program was made by President Nixon on February 27, 1969. As this announcement came within less than two weeks of my assuming the duties of this office, I requested that Secretary Laird appoint someone from his office as a working member of the Committee. I understand that Mr. T. C. Muse, of the Office of the Director of Research and Engineering, became the active participant in my stead.

I might add, that I did not become involved with this Committee in any way.

If I can be of further assistance in this matter, please advise.

Sincerely,

ROBERT C. SEAMANS, Jr.

APRIL 14, 1970.

HON. ROBERT C. SEAMANS. Jr.,
Secretary of the Air Force,
Washington, D.C.

DEAR MR. SECRETARY: Early next month the Subcommittee on Economy in Government of the Joint Economic Committee will begin hearings on Federal transportation policy. The particular focus of these hearings will be on the appropriate level of direct Federal investment in transportation and the best allocation of this investment among the different modes of transport. One special area of interest will be Federal investment in aircraft development, including the supersonic transport.

In February 1969, you were made a member of an Ad Hoc Committee to review the supersonic transport program. The report of that committee, together with the supporting documents which were subsequently made public, raised a number of serious questions regarding continued Federal support of this program. As part of our current study of the program, I am interested in knowing whether there have been any changes in the situation which have caused the Air Force to revise its views on the SST as they were expressed to the Ad Hoc Committee.

In particular, do you still endorse the view of the Working Panel on Technological Fallout that the value of the technological fallout associated with the SST is "of relatively minor importance in this program and therefore should not be considered either wholly or in part as the basis for justifying the program"?

Among the specific aircraft technology, general technology, or military technology advances listed in the report of this Working Panel are there any which can, in your judgment, be obtained only through the building of a commercial super-

sonic transport? Are not other avenues of research available for developing any of these technological advances to which we attach sufficient importance to justify the effort?

Finally, in view of the admittedly limited value of the SST program to military technology, is it your judgment that the DX industrial priority rating which has been assigned to the SST under the Defense Production Act of 1950 is either necessary or desirable?

In order that the background information for our hearings will be as complete as possible, I would appreciate having a reply to these questions no later than May 1, 1970. Any additional comments you may wish to make on other aspects of the SST program would be welcome.

Sincerely,

WILLIAM PROXMIRE, *Chairman,*
Subcommittee on Economy in Government.

DEPARTMENT OF STATE,
Washington, May 7, 1970.

Hon. WILLIAM PROXMIRE,
U. S. Senate.

DEAR SENATOR PROXMIRE: Your letter of April 14, 1970 requests that we bring up to date certain statements made in connection with the February 1969 report of the Super Sonic Transport (SST) Ad Hoc Committee in which I participated for the Department of State. I shall respond to your questions in the order in which they appear in your letter.

Assessment of the balance of payments implications of the SST involves judgments in an area of great uncertainty. We do not, however, see any reason so far to object to the views expresed by the Working Panel of the Ad Hoc Committee on Balance of Payments and International Relations.

The most recent information available to the Department indicates that technical aspects of the Concorde program are progressing favorably. Flight tests to date appear to have been satisfactory. In fact, greater speeds than planned were attained with the first generation Mark I engine. As a result, the construction of 12 aircraft has been authorized, including six production models, two prototypes, two pre-production models and one each for static and thermal testing. The economic viability of the Concorde is still subject to payload, fuel, maintenance and performance testing at MACH 2, as well as noise and sonic boom restraints imposed by the United States and other foreign governments. Tests planned for later this spring and summer may answer some of these questions. We understand that consideration is also being given to a second generation Concorde which would be comparable in size and economy to the United States SST. However this would require another $500,000,000 of financing. To obtain these additional funds there may be efforts to interest Germany in joining the Consortium to build Concorde II.

As to noise standards, the Federal Aviation Administration of the Department of Transportation issued a Notice of Proposed Rule Making in January 1969 prescribing standards for subsonic aircraft. Following this in May and again in July, United States, British and French aircraft authorities met in an effort to develop common noise certification standards. In November, pursuant to its Notice of Proposed Rule Making the preceding January, FAA issued FAR 36 which set United States standards for noise certification applicable to all subsonic transport airplanes and all subsonic turbojet powered civil airplanes, whether transport or other types.

Also in November the International Civil Aviation Organization (ICAO) convened a special meeting on aircraft noise in the vicinity of airdromes. It recommended standards for subsonic transport and turbojet civil airplanes of all categories. These proposed noise standards were distributed to ICAO member states for their consideration and will be adopted and promulgated as ICAO standards when a sufficient number of states have agreed to them. Following up on this meeting, in February 1970, ICAO established a new Committee of experts to consider noise standards for the SST and other types of aircraft (for example STOL and V/STOL). Most recently, in accordance with the United States policy expressed by the President, the FAA on April 16 issued a Notice of Proposed Rule Making which would bar civil aircraft from creating a sonic boom detectable on the ground. Criticisms of the proposed Rule have been received from both the British and the French.

With respect to the penultimate paragraph on page two of your letter, I continue to be of the opinion that foreign policy is not an overriding consideration in the decision as to when to build a United States SST. I do not know whether the French and the United Kingdom would be likely to extend their schedule on the Concorde if we were to delay further construction of our SST. The answer to this question may be clearer after further tests on the Concorde have been completed.

Sincerely,

U. ALEXIS JOHNSON.

APRIL 14, 1970.

Hon. U. ALEXIS JOHNSON,
Under Secretary of State for Political Affairs,
Department of State, Washington, D.C.

DEAR MR. JOHNSON: Early next month the Subcommittee on Economy in Government of the Joint Economic Committee will begin hearings on Federal transportation policy. The particular focus of these hearings will be on the appropriate level of direct Federal investment in transportation and the best allocation of this investment among the different modes of transport. One special area of interest will be Federal investment in aircraft development, including the supersonic transport.

In February 1969, you were made a member of an Ad Hoc Committee to review the supersonic transport program. The report of that committee, together with the supporting documents which were subsequently made public, raised a number of serious questions regarding continued Federal support of this program. As part of our current study of the program, I am interested in knowing whether there have been any changes in the situation which have caused the State Department to revise its views on the SST as they were expressed to the Ad Hoc Committee.

In particular, do you still endorse the view of the Working Panel on the Balance of Payments and International Relations that: If the U.S. overall balance of payments is considered, there is substantial reason for delay in proceeding to the next stage of the SST project—prototype production. The reason lies in the large adverse effect on the U.S. travel deficit of a U.S. SST becoming a commercially viable plane.

What is your evaluation of the progress of the Concorde program during the past year? Does your evaluation lead you to in any way revise your views on the balance-of-payments effects of the SST?

To what extent has the Working Panel's recommendation that the United States seek early international agreement on noise standards, including airport noise created by SSTs" been put into effect?

Do you still feel, as you stated in your letter to Under Secretary Beggs, dated March 26, 1969, that it would not be proper to base the decision to go ahead with the project on any generalized concept of enhancement of U.S. prestige . . ."? Would the benefits of delay mentioned in your letter still apply at the present time?

In order that the background information for our hearings will be as complete as possible, I would appreciate having a reply to these questions no later than May 1, 1970. Any additional comments you may wish to make on other aspects of the SST program would be welcome.

Sincerely,

WILLIAM PROXMIRE, *Chairman,*
Subcommittee on Economy in Government.

THE UNDER SECRETARY OF COMMERCE,
Washington, D.C., May 4, 1970.

Hon. WILLIAM PROXMIRE,
Chairman. Subcommittee on Economy in Government, Joint Economic Committee, U.S. Senate, Washington, D.C.

DEAR SENATOR PROXMIRE: This is in reply to your letter of April 14, 1970, acknowledged by Mr. Mosher on April 17, 1970, relative to Federal support of the supersonic transport program. You question whether there have been any changes in the situation which have caused the Commerce Department to revise its views on the SST as they were expressed to the Ad Hoc Committee.

With the possible exception of your question on cost overruns, there have been no developments which would alter our previous position on the SST program. Answers to your specific questions are contained in the following paragraphs.

We continue to believe that only the effect of sales of aircraft and equipment can be taken into account in any meaningful way in evaluating the impact of the SST program on the United States balance of payments. We recognize that there are other areas in which the SST program may affect the balance of payments, including such items as travel, capital transactions, and increased trade. However, these areas involve a highly complex, interrelated set of factors, some of which may be partially offsetting. We do not believe that the effects of the SST program in these areas can be predicted with any reasonable degree of certainty.

The attempts that have been made to assess the future impact of the SST on the travel account, for example, have been severely criticized and the conclusions are, in our view, quite unrealistic. Our travel deficit has long endured and will probably continue irrespective of the introduction of United States or foreign SST's. The era of the Boeing 747, the McDonnell Douglas DC–10, the Lockheed L–1011, prior to the introduction of the Concorde in 1973 and our SST in 1978, will have already established an increased international travel growth rate. The only travel deficit that could be attributed to the United States SST is the additional traffic that can only be developed by this aircraft. Additional trips by international businessmen who already will be travelling on the Concorde or our wide-bodied transports will be an important factor in this increased traffic. However, more travel on United States intercontinental aircraft generates additional travel within foreign countries with the resultant requirement for short-range aircraft—predominantly of United States manufacture.

Therefore, in view of the questionable validity of including the secondary effects of the SST program on the United States balance of payments, we continue to support the position that only aircraft sales should be taken into account.

The Concorde during its five-year lead on the United States SST will operate profitably, having high-load factors on its established prime international routes. Unless severe technical problems develop, Concorde operators should continue to make money even after the more economic United States SST forces them into less important routes. Further delay in a United States commitment to produce the SST would result in another round of substantial orders for the Concorde, and provide greater incentive to develop a second-generation Concorde which would be even more competitive with the United States SST.

We still feel that the analogy of military cost overruns is not applicable to civilian aircraft since military programs have distinctly different problems. The civilian air transport cost history has been much more favorable. However, the recent cost escalation in certain commercial aircraft programs has made us less confident that the current estimated costs of the SST can be maintained so far into the future.

Sincerely,

ROCCO C. SICILIANO.

APRIL 14, 1970.

Hon. ROCCO C. SICILIANO,
Under Secretary, Department of Commerce,
Washington, D.C.

DEAR MR. SICILIANO: Early next month the Subcommittee on Economy in Government of the Joint Economic Committee will begin hearings on Federal transportation policy. The particular focus of these hearings will be on the appropriate level of direct Federal investment in transportation and the best allocation of this investment among the different modes of transport. One special area of interest will be Federal investment in aircraft development, including the supersonic transport.

In February 1969, you were made a member of an Ad Hoc Committee to review the supersonic transport program. The report of that committee, together with the supporting documents which were subsequently made public, raised a number of serious questions regarding continued Federal support of this program. As part of our current study of the program, I am interested in knowing whether there have been any changes in the situation which have caused the Commerce Department to review its views on the SST as they were expressed to the Ad Hoc Committee.

In particular, the report of the Working Panel on the Balance of Payments and International Relations revealed a disagreement among its members as to how the balance-of-payments effects of the SST program should be estimated. Do you still maintain the view that only the balance-of-payments impact of actual aircraft sales should be considered? If so, could you explain why it is that you do not regard the balance-of-payments impact of additional U.S. travel abroad as a relevant consideration? What is your current judgment as to the commercial viability of the Concorde and the effect that competition from the Concorde will have on sales of the U.S. SST?

Your memorandum to Under Secretary Beggs dated March 14, 1969, indicated that you did not anticipate that the SST would experience cost overruns of the sort encountered in the development of military aircraft such as the F–111 and the C–5A. Do you remain confident that large cost overruns are unlikely to be a problem for the SST program?

In order that the background information for our hearings will be as complete as possible. I would appreciate having a reply to these questions no later than May 1, 1970. Any additional comments you may wish to make on other aspects of the SST program would be welcome.

Sincerely,

WILLIAM PROXMIRE,
Chairman, Subcommittee on Economy in Government.

THE UNDER SECRETARY OF THE TREASURY FOR MONETARY AFFAIRS,
Washington, D.C., May 1, 1970.

Hon. WILLIAM PROXMIRE,
Chairman, Subcommittee on Economy in Government, Joint Economic Committee, Congress of the United States, Washington, D.C.

DEAR MR. CHAIRMAN: I am replying to your letter of April 14 inquiring whether there have been any changes in the situation surrounding the development of SST's during the past year which would cause the Treasury Department to revise the views it expressed to the Ad Hoc Review Committee and to the Department of Transportation last spring.

On the balance-of-payments aspects of this question, we have no reason to alter our view that the potentially adverse impact on our travel account from development of a U.S. SST could equal or outweigh the positive impact on the aircraft sales account. I am sure that you will understand that this type of a calculation involves a number of judgments in an area of considerable uncertainty. It seems fairly clear, however, that there would be only limited demand for an SST unless there were good prospects of attracting a large number of American travelers to its use.

If one were fairly sure that a foreign SST would become a viable commercial proposition within the foreseeable future, then the balance-of-payments arguments against proceeding with a U.S. SST lose force. However, I have not kept in close touch with technical and commercial appraisals of the Concorde since my participation last year on the Ad Hoc Committee. I am therefore not in a position to provide you with a up-to-date assessment of the commercial prospects for his plane. Nor have I personally kept in touch wth recent efforts to solve the various environmental problems raised by the SST aircraft.

Sincerely yours,

PAUL A. VOLCKER.

APRIL 14, 1970.

Hon. PAUL A. VOLCKER,
Under Secretary for Monetary Affairs,
Department of the Treasury,
Washington, D.C.

DEAR MR. VOLCKER: Early next month the Subcommittee on Economy in Government of the Joint Economic Committee will begin hearings on Federal transportation policy. The particular focus of these hearings will be on the appropriate level of direct Federal investment in transportation and the best allocation of this investment among the different modes of transport. One special area of interest will be Federal investment in aircraft development, including the supersonic transport.

In February 1969, you were made a member of an Ad Hoc Committee to review

the supersonic transport program. The report of that committee, together with the supporting documents which were subsequently made public, raised a number of serious questions regarding continued Federal support of this program. As part of our current study of the program, I am interested in knowing whether there have been any changes in the situation which have caused the Treasury Department to revise its views on the SST as they were expressed to the Ad Hoc Committee.

In particular, do you still endorse the view of the Working Panel on the Balance of Payments and International Relations that:

If the U.S. overall balance of payments is considered, there is substantial reason for delay in proceeding to the next stage of the SST project—prototype production. The reason lies in the large adverse effect on the U.S. travel deficit of a U.S. SST in the absence of a commercially viable Concorde plus doubt about the Concorde's becoming a commercially viable plane.

Do you still feel as you stated in your letter to Under Secretary Beggs dated March 18, 1969, that "there appear to be substantial doubts that the Concorde will prove to be an economically viable aircraft" or has your evaluation of the **progress of the Concorde program during the past year caused you to revise either** this judgment or your estimate of the probable balance-of-payments effects of the SST?

Do you continue to feel that the balance of public benefits of the SST "may well be negative" and that heavy further commitment of public funds at this stage is not warranted?

In order that the background information for our hearings will be as complete **as possible. I would appreciate having a reply to these questions no later than** May 1, 1970. Any additional comments you may wish to make on other aspects of the SST program would be welcome.

Sincerely,

WILLIAM PROXMIRE,
Chairman, Subcommittee on Economy in Government.

U.S. DEPARTMENT OF LABOR,
OFFICE OF THE ASSISTANT SECRETARY FOR MANPOWER,
Washington D.C., April 30, 1970.

HON. WILLIAM PROXMIRE,
Chairman, Subcommittee on Economy in Government,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: This is in reply to your letter of April 14 in which you directed my attention once again to the supersonic transport program. While the employment situation has changed since I was involved in the evaluation of this program a year ago, we have no evidence which indicates much easing in the overall demand for professional and technical workers who might be involved in SST production. There has been, however, an increase in the supply of semiskilled and unskilled workers due to cutbacks in defense related industries and the space programs, among other industries. In the Seattle area, the cutbacks are beginning to include some professional and technical workers also.

Our field offices have indicated that workers with specialized aircraft skills and extensive experience—instrument, aircraft, and electrical engineers and other technicians—may remain unemployed for relatively long periods unless they migrate to, or seek jobs in, other areas. Workers in professional, technical, and scientific occupations will also suffer unemployment as a result of defense cutbacks in industry and Department of Defense installations, but these will be mostly in such areas as the Washington, D.C., suburbs and Albuquerque, New Mexico. These workers will generally be covered, at least initially, by unemployment insurance.

The local State employment officers are being encouraged to be more responsive to the job placement needs of the more highly skilled workers and of professional and technical workers, particularly to establish more precise procedures to compare job shortages and surpluses among the various labor market areas. The emphasis in recent years has been so heavily directed toward the disadvantaged workers that special capabilities will now have to be developed in some of the local employment offices to handle the needs of higher level workers.

Therefore, although the overall employment situation in the country has certainly shifted since last year, we would still conclude that,

(a) the net employment increase from the SST would be negligible;
(b) the overall national demand for high skill professionals remains strong, and
(c) SST production would do little to benefit those lower skill workers hardest hit by the current downturn.

As you know, the President, after weighting the entire range of views on the SST, has recommended to the Congress that development on an SST should proceed. Obviously, the employment effects of SST development were only one factor among many which he considered in making his final decision.

We have not been involved in any further review or discussions with respect to SST development since March of last year and are therefore in no position to comment on the status of other areas of concern which surfaced in that earlier review.

Sincerely,

ARNOLD R. WEBER,
Assistant Secretary for Manpower.

APRIL 14, 1970.

Hon. ARNOLD R. WEBER,
Assistant Secretary for Manpower,
U.S. Department of Labor, Washington, D.C.

DEAR MR. WEBER: Early next month the Subcommittee on Economy in Government of the Joint Economic Committee will begin hearings on Federal transportation Policy. The particular focus of these hearings will be on the appropriate level of direct Federal investment in transportation and the best allocation of this investment among the different modes of transport. One special area of interest will be Federal investment in aircraft development, including the supersonic transport.

In February 1969, you were made a member of the Ad Hoc Committee to review the supersonic transport program. The report of that committee, together with the supporting documents which were subsequently made public, raised a number of serious questions regarding continued Federal support of this program. As part of our current study of the program, I am interested in knowing whether there have been any changes in the situation which have caused the Labor Department to revise its views on the SST as they were expressed to the Ad Hoc Committee.

Your letter to Under Secretary Beggs, dated March 26, 1969, pointed out that "the net employment increase from SST production would likely be negligible and would occur in the professional and technical categories where shortages already exist." Does your current evaluation differ in any way from this statement?

To the extent that unemployment has risen or may rise among professional and technical workers in the categories which might be involved in SST production, how can this problem best be dealt with? Would the need to sustain employment levels justfy a program which appears to have few, if any, other public benefits?

In order that the background information for our hearings will be as complete as possible, I would appreciate having a reply to these questions no later than May 1, 1970. Any additional comments you may wish to make on the SST program or on the general question of the policies needed to deal with any rise in unemployment among aerospace workers would be welcome.

Sincerely,

WILLIAM PROXMIRE,
Chairman, Subcommittee on Economy in Government.

COUNCIL OF ECONOMIC ADVISERS,
Washington, April 30, 1970.

Hon. WILLIAM PROXMIRE,
Chairman, Subcommittee on Economy in Government, Joint Economic Committee, Washington, D.C.

DEAR SENATOR PROXMIRE: Thank you for your letter of April 14 concerning the supersonic transport. I have not been involved in any evaluation of the SST program since the *ad hoc* committee reported about a year ago, and have not

tried to acquaint myself with all the facts relevant to a reassessment of its prospects. The only major change of which I have become aware from the newspapers is an apparent improvement in the outlook for the Concorde.

One year ago I would have agreed with the statement made by Under Secretary Volcker which you quote. Without further study, I am unable to say whether it would still be correct today.

Yours sincerely,

HENDRIK S. HOUTHAKKER.

APRIL 14, 1970.

DR. HENDRIK S. HOUTHAKKER,
Council of Economic Advisers,
Executive Office Building,
Washington, D.C.

DEAR DR. HOUTHAKKER: Early next month the Subcommittee on Economy in Government of the Joint Economic Committee will begin hearings on Federal transportation policy. The particular focus of these hearings will be on the appropriate level of direct Federal investment in transportation and the best allocation of this investment among the different modes of transport. One special area of interest will be Federal investment in aircraft development, including the supersonic transport.

In February 1969, you were made a member of an Ad Hoc Committee to review the supersonic transport program. The report of that committee, together with the supporting documents which were subsequently made public, raised a number of serious questions regarding continued Federal support of this program. As part of our current study of the program, I am interested in knowing whether there have been any changes in the situation which have caused the Council of Economic Advisers to revise its views on the SST as they were expressed to the Ad Hoc Committee.

Your memorandum to Under Secretary Beggs, dated March 26, 1969, endorsed in full the report of the Ad Hoc Committee's Working Panel on Economics, which the Council chaired. You also endorsed the view of the Treasury Department that the balance-of-payments impact of the SST is likely to be adverse. Has the Council participated in any further studies of the SST since this memorandum was written? Is there any reason to evaluate the SST differently today than you did last March?

As an economist trained in the analysis of public expenditures, would you agree with the statement made by Under Secretary Volcker in his letter to Under Secretary Beggs dated March 18, 1969, that the balance of public benefits or losses from the SST "may well be negative"?

In order that the background information for our hearings will be as complete as possible, I would appreciate having a reply to these questions no later than May 1, 1970. Any additional comments you may wish to make on the SST program or on the more general question of the economic standards by which the value of direct Federal investment in aircraft or other new transportation technology should be measured would be welcome.

Sincerely,

WILLIAM PROXMIRE,
Chairman, Subcommittee on Economy in Government.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
Washington, D.C., April 23, 1970.

HON. WILLIAM PROXMIRE,
Chairman, Subcommittee on Economy in Government,
U.S. Senate, Washington, D.C.

DEAR SENATOR PROXMIRE: In your recent letter you ask if NASA has found any reason to change its views as expressed by the Ad Hoc Committee in the report to Secretary Volpe on the supersonic transport or in the NASA memorandum dated March 24, 1969 to Under Secretary Beggs commenting on the SST development program. The opportunity to provide further comments to your Subcommittee is appreciated.

There appears to be no reason to revise the conclusion reached by the Working Panel on Technological Fallout. It may be useful, however, to re-emphasize the rationale leading to the conclusion that the technological fallout is of "rela-

tively minor importance." The objective of the SST program is to develop a vehicle which can meet economic and operation criteria while maintaining the smallest exposure to technology risks. For this reason the SST design relies heavily on already demonstrated technology assembled in a way to meet these special transportation requirements. Like the subsonic jets, the true national value will probably be measured in economic returns from overseas sales and quick transportation links to new world areas. The program should have, however, a substantial impact on widening the use of already demonstrated technology once operational experience is gained. For example, the use of titanium and composite structures are limited now to special circumstances, largely because production is low and cost high. Extensive use of these materials in the SST should further cost reduction and enable use in many applications which in themselves could not support development of volume production. You will recall that the demand of aluminum for aircraft structures brought that material into widespread use. Consequences such as this example were not judged to be "technological fallout" within the sense of the term as defined by the Working Panel. Viewed in this way, it appears that technology fallout from the program would not be expected to be of major consequence.

Insofar as NASA can determine, the Concorde program continues to meet its objectives. However, the first real test of its success will occur in the next few months when carefully controlled tests off the west coast of England will establish the range-payload relations at design cruise speed. The payload of supersonic aircraft is a smaller fraction of total aircraft weight than is true for subsonic aircraft, although the productivity is high because of short flight times. In an aircraft as small as the Concorde, or TU–144, very small changes in aerodynamic or propulsive efficiency can have a substantial impact on allowable payload. These small changes lie within the accuracy with which small scale data from wind tunnels can be extrapolated to full scale. Thus these up-coming tests are most crucial to the future of the Concorde.

If, however, the Concorde can meet its design payload and range and thereby enter North Atlantic service, the program would have the promise of great success. For a number of years it could provide a service without competition. The relatively slow rate at which aircraft will enter service should assure operation at a high load factor, even if catering only to those few passengers who can or will demand the special service; this would be a repetition of early experience with the first subsonic jets which were economical only when flying near maximum payload. It seems logical that this success would support larger versions of the aircraft designed to operate on a sound economic basis with lower load factors. Experience with the smaller aircraft would remove most of the technical risk of building larger aircraft. As has happened in the past, further development of the initial engine could provide power for the larger aircraft. On the other hand, it would appear difficult to achieve significant advances in the design speed without major design changes; it is here that the U.S. design holds a significant advantage over the Concorde.

It is hoped these comments provide an adequate response to the interest expressed in your letter.

Sincerely yours,

CHARLES W. HARPER,
Deputy Associate Administrator (Aeronautics),
Office of Advanced Research and Technology.

APRIL 10, 1970.

Mr. CHARLES W. HARPER.
Deputy Associate Administrator for Advanced Research and Technology (Aeronautics), National Aeronautics and Space Administration, Washington, D.C.

DEAR MR. HARPER: Early next month the Subcommittee on Economy in Government of the Joint Economic Committee will begin hearings on Federal transportation policy. The particular focus of these hearings will be on the appropriate level of direct Federal investment in transportation and the best allocation of this investment among the different modes of transport. One special area of interest will be Federal investment in aircraft development, including the supersonic transport.

In February 1969, you were made a member of an Ad Hoc Committee to review the supersonic transport program. The report of that committee, together with the supporting documents which were subsequently made public, raised a

number of serious questions regarding continued Federal support of this program. As part of our current study of the program, I am interested in knowing whether there have been any changes in the situation which have caused NASA to revise its views on the SST as they were expressed to the Ad Hoc Committee.

In particular, do you still endorse the view of the Working Panel on Technological Fallout that the value of the technological fallout associated with the SST is "of relatively minor importance in this program and therefore should not be considered either wholly or in part as the basis for justifying the program"?

NASA's memorandum, "Recommendation by NASA on the SST Program, March 24, 1969," emphasizes the importance of evaluating the U.S. SST program in light of the expected performance of the Concorde. What is NASA's current evaluation of the progress of the Concorde? Do you still conclude that the current model is "to small to be considered economically acceptable in the long term?" Would you expect a larger version to follow? If so, can you estimate how soon a larger version might be commercially available?

In order that the background information for our hearings will be as complete as possible, I would appreciate having a reply to these questions no later than May 1, 1970. Any additional comments you may wish to make on other aspects of the SST program would be welcome.

Sincerely,

WILLIAM PROXMIRE,
Chairman, Subcommittee on Economy in Government.

EXECUTIVE OFFICE OF THE PRESIDENT,
OFFICE OF SCIENCE AND TECHNOLOGY,
Washington, D.C., April 22, 1970.

Hon. WILLIAM PROXMIRE,
Chairman, Subcommittee on Economy in Government, Joint Economic Committee, Congress of the United States, Washington, D.C.

DEAR SENATOR PROXMIRE: This is in response to your inquiry in regard to the views of the Office of Science and Technology with regard to the matter of the Supersonic Transport.

As you know, when the President establishes a committee or task force to make recommendations to him on matters such as this, he purposely selects representatives having a broad range of interest and competence in various fields encompassed by the overall program. In the case of the SST, this involved a number of areas of concern: economics, international trade, return on the federal investment, technological fallout, unsolved technological problems, environmental problems, and the overall technological strength of the United States and its position among the nations.

The various representatives on this committee examined the areas within their own fields of competence and submitted recommendations which emerged from their specific studies. It was then the task of the President to put all these matters in perspective and to take a long-range view of the overall best interests of the United States. Needless to say, the President has a broader view of the whole problem after he has studied all of the facts and opinions which have been brought together for his attention. Thus, while each of several of us may have, from our own restricted points of view, recommended against further federal involvement in the SST project, I, for one, believe that the President, in taking a more comprehensive view than any of us could have, came to a sound decision.

My office now stands ready to assist the Department of Transportation in every possible way in trying to implement the President's decision and bring the best technological expertise we can command to bear on the problem of the successful development of this very important project.

On the basis of the knowledge then available to us, we would not change the statements which we submitted to the SST committee. However, I have since had the opportunity of securing more information on the technological problems, and I have also inspected the French Concorde and have been impressed by its promise. I now see more clearly than before the wisdom of the President's conclusion that the United States should not be without its own supersonic transport which, in the long run, will no doubt be superior to the French/British Concorde.

The President recognizes, as we pointed out, that there are still technological

and environmental problems to be solved. But he has the faith, which I now share, that the ingenuity of the American industrial system can eventually solve these problems satisfactorily. It was naturally our duty to point up some of these technological difficulties so that we should all be aware of them. Surely these problems will never be solved if we stop our development work at this stage. Even more stupendous problems than those that lie ahead in the SST were solved in the space program.

Thus, on the whole, I would strongly recommend that your Committee endorse the President's proposal that the United States proceed with the SST project.

Very truly yours,

LEE A. DUBRIDGE, *Director.*

APRIL 14, 1970.

DR. LEE A. DUBRIDGE,
Science Advisor to the President,
Executive Office of the President,
Washington, D.C.

DEAR DR. DUBRIDGE: Early next month the Subcommittee on Economy in Government of the Joint Economic Committee will begin hearings on Federal transportation policy. The particular focus of these hearings will be on the appropriate level of direct Federal investment in transportation and the best allocation of this investment among the different modes of transport. One special area of interest will be Federal investment in aircraft development, including the supersonic transport.

In February 1969, you were made a member of an Ad Hoc Committee to review the supersonic transport program. The report of that committee, together with the supporting documents which were subsequently made public, raised a number of serious questions regarding continued Federal support of this program. As part of our current study of the program, I am interested in knowing whether there have been any changes in the situation which have caused the Office of Science and Technology to revise its views on the SST as they were expressed to the Ad Hoc Committee.

The Office of Science and Technology chaired the Working Panel on Technoolgical Fallout of the Ad Hoc Committee and participated in the Panel on Environmental and Sociological Impact. The first of these panels concluded that technological fallout from the SST program "should not be considered either wholly or in part as a basis for justifying the program." The second panel in which you participated detailed four areas of significant environmental costs associated with the SST. Do the technological and environmental considerations involved in development of the SST currently remain the same as they were at the time these Working Panels reported to the Ad Hoc Committee?

In general, do you still conclude, as you did in your letter to Under Secretary Beggs dated March 20, 1969, that "the Government should not be subsidizing a device which has neither commercial attractiveness nor public acceptance"?

In order that the background information for our hearings will be as complete as possible, I would appreciate having a reply to these questions no later than May 1, 1970. Any additional comments you may wish to make on other aspects of the SST program would be welcome.

Sincerely,

WILLIAM PROXMIRE,
Chairman, Subcommittee on Economy in Government.

○