697

THE ECONOMIC IMPACT OF ENVIRONMENTAL REGULATIONS

HEARINGS

BEFORE THE

JOINT ECONOMIC COMMITTEE

CONGRESS OF THE UNITED STATES

NINETY-THIRD CONGRESS

SECOND SESSION

(Pursuant to S. Con. Res. 93)

NOVEMBER 19, 21, AND 22, 1974

Printed for the use of the Joint Economic Committee

U.S. GOVERNMENT PRINTING OFFICE

51-795 WASHINGTON : 1974

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price $2.15

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THE ECONOMIC IMPACT OF ENVIRONMENTAL REGULATIONS

TUESDAY, NOVEMBER 19, 1974

CONGRESS OF THE UNITED STATES,
JOINT ECONOMIC COMMITTEE,
Washington, D.C.

The committee met, pursuant to notice, at 10 a.m., in room 1318, Dirksen Senate Office Building, Hon. William Proxmire (vice chairman of the committee) presiding.

Present: Senator Proxmire.

Also present: Loughlin F. McHugh and Courtenay M. Slater, senior economists; William A. Cox and Robert D. Hamrin, professional staff members; Michael J. Runde, administrative assistant; George D. Krumbhaar, Jr., minority counsel; and Walter B. Laessig, minority counsel.

OPENING STATEMENT OF CHAIRMAN PROXMIRE

Senator PROXMIRE. Today is the first day of hearings called to examine the question of what economic impacts result from compliance with conservation and environmental regulations. Since the hearings are part of the inflation study which was mandated by Congress to the Joint Economic Committee, their primary focus will be the extent to which there is merit to the argument that compliance with environmental regulations has contributed to the recent inflation.

We will not be neglecting, however, possible recessionary effects such as lowered output, plant closings, production delays, increased unemployment and so forth. Past studies have shown that such effects do not have a significant aggregate impact, but we hope to obtain the latest information. We will also seek to determine the magnitude of the positive effects, such as increased production and employment in the newly created pollution control market.

There have been two distinct sides on this matter. On the one hand, top administration officials and many leading business executives have called for a relaxation of the standards. They have stated that the cost of meeting these standards for industries and municipal governments is simply too burdensome and that they have hindered the development of domestic energy supplies.

On the other hand, some administration officials, as well as economists, environmentalists, and a few business leaders, say we need to go further and faster. One of their principal arguments is that there are significant benefits to be gained now from pollution control measures, and that these benefits would be more difficult to achieve and would be

gained at a much greater cost if compliance with environmental regulations was postponed.

I would like to call the attention of Mr. Sawhill and others to an article that appeared in the New York Times this morning by a very gifted economic expert, Leonard Silk, and I will read very briefly from it. He says:

> The soaring prices of oil and other world commodities, the shortage of food, the heightened tensions between the developed and devolping countries, the new diseases of stagnation, are these manifestations of a transient crisis, or—something far deeper and more enduring—the approaching end of the world's explosive population and economic growth? That is emerging as the basic issue beneath the day to day policies and economics of all nations. The world's cardinal objective appears to be shifting from growth to survival.

Then he quotes from economist Emil Benot from Columbia University. He says this:

> Our earth, we now begin to realize, is not now and cannot supply us with an unlimited amount of usable energy, raw materials, food stuffs, safe dumping grounds for our waste products, or even standing room. It is not an inexhaustible cornucopia. It is much more like an interplanetary vehicle where resources must be carefully conserved, waste products must be minimized and recycled, and where the number of passengers must be carefully limited to those that can be taken aboard without overcrowding.
>
> We have in effect a revolution of rising expectations, superimposed on a population explosion in a world of fixed dimensions and limited productive capacity.

And then Mr. Silk concludes as follows:

> Future economic policy must focus on ending waste, conserving nonrenewable resources, and developing the renewable resources of the earth, safeguarding the atmosphere and oceans and land, shifting habits of consumption from industrial goods to human services, curbing population growth or even reducing the world's population and using technology and science which got us into this crisis to get us out.

I am sure that we will be hearing these different viewpoints expressed over the 3 days of hearings. After having the costs and benefits of environmental regulations clearly spelled out by leading industry executives and Government officials in the environmental field, there will be a much better economic basis from which to consider the question of strengthening, maintaining, or relaxing the present standards.

Today we will be focusing on energy, specifically, the impact of environmental regulations on domestic energy resources and the environmental damage caused by the development of energy fuels. Despite the recent phenomenon labeled the energy crisis, many people argue that the exhaustion of energy resources is not in itself apt to be the crux of the problem. Rather, it is the impact on the air, oceans, rivers, and landscapes when utilizing fuels with present technology which is likely to be most troublesome as the absorptive capacity of the environment is further challenged.

Many of the EPA's regulations were designed to control pollution generated in the development and consumption of energy. Certainly these regulations have had an effect on energy fuel development. They had to if they were to be effective. The critical question is whether they have unduly restricted supply or whether they have yielded environmental benefits which have outweighed any curtailment of supply or increase in fuel costs. I look forward to a full discussion of this question today.

Another area which I hope will be clarified more fully today is how environmental regulations interact with the development of two sources of energy supply: western coal and offshore oil. In later hearings we will inquire about nuclear energy. Both western coal and offshore oil have received much attention as leading candidates for increasing our domestic energy supplies. However, environmentalists and the Governors of many of the States involved have opposed further development on the grounds that either it is not economically justifiable or that there has not been enough time to assess all of the possible environmental damage.

I also look forward to hearing how energy conservation, pollution control and increased quality of economic growth relate to each other. I feel this is particularly important in that energy conservation will almost certainly loom large in legislative proposals in 1975.

All of the above three areas are of critical national concern, and I am pleased that we have Mr. John Sawhill, the Administrator of the Federal Energy Administration with us today to address these questions. He has a reputation of great intelligence and thoughtful consideration in the energy area, which I am sure will bring some insight into the areas I have just mentioned. He has also gained a reputation for being publicly forthright in his own views, and we trust he will feel free to express these views today.

Mr. Sawhill, I look forward to your contribution to our hearing.

STATEMENT OF HON. JOHN C. SAWHILL, ADMINISTRATOR, FEDERAL ENERGY ADMINISTRATION, ACCOMPANIED BY ROGER SANT, ASSISTANT ADMINISTRATOR FOR CONSERVATION AND ENVIRONMENT; AND KENNETH WOODCOCK, DIRECTOR, ENVIRONMENTAL PROGRAMS

Mr. SAWHILL. Thank you very much, Mr. Chairman, and I appreciated the statement you read by Leonard Silk. I also happened to glance at it briefly this morning, and I wish I could have expressed so eloquently the views that I feel. It just seems to me that he summed up very nicely the feeling that I have had for some time about the balance that we need to strike in this country between expanding our resources and using them more intelligently. So I was very delighted to hear you read that.

Second, I was delighted to hear you say that energy conservation would be a priority item for congressional legislation in the coming session. Obviously my views on energy conservation are not shared by all of the administration, but nevertheless, I think they are very important and I hope the Congress will pay careful attention to this important subject.

I have with me this morning Mr. Roger Sant, who is Assistant Administrator for Conservation and Environment in the Federal Energy Administration; and Mr. Kenneth Woodcock who is Director of Environmental Programs who also participated with me in the preparation of this statement which I will summarize.

We would like to address five general topics in response to your letter. First, energy price increases and related energy penalties directly attributable to environmental standards; second, the interaction

of environmental regulations on the development of our western coal; third, the principal environmental factors in regard to future offshore oil leasing and the economic impact of such development; fourth, the relationship between energy conservation, pollution control, and increased economic growth; and fifth, the need for changes in current environmental regulation.

And I might say that these are topics which we will comment on today but which we will continue to explore. We do not feel that we have had enough time to give you the kind of indepth answers you want and we will, over the next several weeks, be continuing to work on these topics, and will make additional information available to you.

To turn to the first topic, while there have been sizable health and economic benefits associated with the implementation of environmental regulations, it is also true that capital expenditures by major energy industries have been substantial and due to the increased levels of pollution control equipment, there has been some diminution of available energy supplies.

We have made various estimates of the cost of pollution control at the macro- and micro-economic level, and in the CEQ report it was estimated that expenditures for air quality will amount to about $39 billion in the 1972–81 period for capital investment, $39 billion, and $73 billion for operation and maintenance. For water pollution control in the same period, the cumulative capital investment costs will amount to about $68 billion with about $50 billion operation and maintenance costs.

Two industries have been particularly impacted by environmental regulations, and they are the electric utility industry and petroleum refining industry.

The electric utility industry, according to an EPA projection, will increase investments in air and water pollution control from $1.6 billion in 1974 to $2.9 billion in 1975 and $2.4 billion in 1976, $1.6 billion in 1977.

So there are some increases, although they are not substantial increases.

There are also energy penalties associated with pollution control for electric utilities. Installations of a stack gas scrubber to control sulfur oxide emissions, for example, cause an energy penalty of approximately 7 percent. And we estimate that the energy penalty to the utilities to control 80 percent of the sulfur dioxide emissions and 98 percent of the particulates would result in the figures that we have quoted here in our statement, relatively small figures in the next few years, with a penalty of about close to 100,000 barrels per day by 1980. So that the near-term penalties are not very large.

Similarly, to comply with thermal pollution control requirements, powerplants will have to install closed cycle cooling systems which we estimate could cost this Nation the equivalent of more than 125,000 barrels of oil per day by 1980. And also a closed cycle cooling system could result in an additional 3 percent energy operational penalty.

So those are the kinds of penalties associated with utility industry.

The petroleum refining industry will have invested by 1976 about

$302 million in environmental controls. We will be spending an additional $218 million in 1977 and $109 million in 1978.

In summary, for these two industries, sizable investments for pollution control have been made. In addition, environmental requirements have clearly increased the demand for certain fuels, and decreased potential supplies. However, we generally feel that the benefits of improved environmental quality more than offset these penalties, and we support the full implementation of these environmental programs.

And I might add, we have worked closely with EPA in developing their regulations which they have promulgated under the Clean Air Act and Water Pollution Control Act.

The second area which I would like to discuss concerns——

Senator PROXMIRE. Before you get into that, let me just ask if there is any way we can quantify these esimates that you have made on the investments that will be required in the operation and maintenance costs for air quality and water pollution?

As I add this up, the total amount of capital investment and operational expenses for air and water add up to about $23 billion—wait a minute, add up to about $230 billion for 10 years, which means about $23 billion a year.

Mr. SAWHILL. Yes.

Senator PROXMIRE. And with an economy that will be between $1½ and $2 trillion, I estimate that to be about a 1½ percent inflation factor.

Is that just roughly about the effect, would you say?

Mr. SAWHILL. Well, I am not sure if I would call it an inflation factor.

Senator PROXMIRE. Well, in the sense that——

Mr. SAWHILL. It depends on the state of the economy. Right now I do not think our economy is operating at full capacity, and so these investments will actually stimulate the economy at a time when it is needed. I am not sure they are adding to inflation.

Senator PROXMIRE. Well, I think you could get an argument on that out of industry. I think there is some logic to it. If they have to spend a certain amount of money for pollution control, that is paid for ultimately by the consumer in higher prices, but you say if you do not have——

Mr. SAWHILL. If you are not operating at full capacity——

Senator PROXMIRE. If you do not have a full capacity economy, they may not have a higher cost to the economy as a whole.

Mr. SAWHILL. Right. You are just employing resources.

Senator PROXMIRE. How does that work out?

Mr. SAWHILL. You are employing resources that would otherwise be unemployed.

Senator PROXMIRE. You are what?

Mr. SAWHILL. You are employing resources that would otherwise be unemployed if the economy is operating at less than full capacity.

Admittedly if the economy is operating at full capacity, if you have to take resources away from a sector producing productive investment and put it into a sector producing investment for pollution control, which does not add the productive capacity, that is an inflationary effect. However, an economy operating like ours is now, and I would

project would be, for the next year or so, these kind of investments I would not regard as inflationary because while it is true they are nonproductive in a sense investments except that they are productive of cleaner air and cleaner water. They are not really taking resources away from anything else.

Senator PROXMIRE. Well, I wonder about that, though. You never really operate at full capacity. You compare our operations with that of other countries. Germany is operating with less than 1 percent unemployment and has for the last 10 years.

Mr. SAWHILL. Sure.

Senator PROXMIRE. Our unemployment has been at least 3 percent, and usually much higher than that.

Now, as you know, it is twice as high as that. We operate at well below our full capacity utilization. Even in the 1967, 1968, the height of the Vietnam war, we were operating at only about 85, 90 percent of our preferred rate of capacity. So, I think that on that basis I suppose you could argue that the cost, while some fraction of this $23 billion a year would be less but, I just wonder if there is any way we can make any kind of a quantifying estimate.

Are they any other elements involved in this?

I'm sorry to interrupt your statement here, but I think this is so critical, if we are going to meet the argument that the consumer has to pay every nickel of this in higher prices.

Mr. SAWHILL. That is all right.

I think one way we could help in doing this would be to develop some information on exactly what kinds of equipment is needed and what the capacity is in those industries that are being called upon to create this equipment, to see if in fact they really are operating at full capacity or whether there is enough slack there that really the incremental costs are not nearly as high as the actual costs.

We would be glad to try to do some analysis of this for you.

Senator PROXMIRE. I wish you would. It would be very helpful if you could do that.

Mr. SAWHILL. I think I can look at the other side, too, though.

Senator PROXMIRE. Yes.

Mr. SAWHILL. That the consumer is getting benefits from this. I mean, after all, the consumer presumably, with cleaner air, is not paying the medical bills that he would otherwise pay, so while on the one hand it might be pushing up the price of electricity, it is pushing down the price of medical bills, or let us say, pushing it up less rapidly.

So I think if we could demonstrate to you that the savings from better health and less property damage more than offset the cost in terms of the pollution control equipment, that there really is not any inflationary argument, regardless of the capacity situation.

Senator PROXMIRE. Well, of course, we do not know whether there is or not. We just have to make guesses in that area, is that not right?

Mr. SAWHILL. Well, I think there is some evidence to show, you know, that the incidence of respiratory disease is much less in a cleaner environment. I am not quite sure of how you analyze the water situation. I think that has got perhaps a more aesthetic quality associated with it.

Senator PROXMIRE. There certainly are benefits, there is no question about it.

Mr. SAWHILL. No.

Senator PROXMIRE. Let me ask you this.

Are you aware of the total figure of the Council on Environmental Quality which is $274 billion, which is about what you have given us, that $121.5 billion represents money that would have been spent even without Federal Government environmental regulations?

Mr. SAWHILL. I did not know that specific figure, but I am sure a substantial amount would have been, yes.

Senator PROXMIRE. That is their estimate, about 35 percent of this total would be spent anyway.

Mr. SAWHILL. Yes.

We will work on this area, though.

Senator PROXMIRE. I would appreciate it very much. Whatever you can give us on that would be very helpful.

Mr. SAWHILL. All right, moving now to the environmental regulations and western coal development, environmental regulations, and particularly the Clean Air Act, have been very significant in the push for development of low sulfur coal in the West. Although 60 percent of our Nation's coal reserves, or 255 billion tons, contain 1 percent or less sulfur by weight, about 80 percent of this low sulfur coal is in the West. Most of the rest, or 40 billion tons, is in Southern Appalachia, but the problems with exploiting this coal include such things as the 5-year lead time that is necessary to develop a deep mine producing at full capacity, and the fact that deep mining is more labor intensive than surface mining. Thus, there is pressure in the industry to develop western low sulfur coal, at least until the economic and technical problems associated with sulfur removal technology have been solved.

So clearly the environmental movement has given an impetus to western coal development, as you pointed out in your opening statement. If full reclamation of western strip mined areas takes place, and I think, incidentally, that it is absolutely essential that it does take place, the estimated cost will range from 1 to 10 cents per ton. This would result in a maximum increase in the price of electricity of about one tenth of 1 cent per kilowatt hour, and I certainly think that that cost is much more than offset by the benefits of preserving the very previous resource we have in the West.

The differences in delivered costs of eastern and western coal to eastern markets vary greatly depending upon the exact location of the user and the mine, the type of mine, and other factors. Recent price estimates for delivered eastern coal from existing underground mines to eastern markets range from 67 to 130 cents per million Btu's.

The costs of complying with sulfur dioxide emission regulations must frequently be added. The annual costs of scrubbers varies from 30 to 35 cents per million Btu's. Thus, high sulfur eastern coal used with scrubbers shows a range of costs from $24 to $32 per ton for underground mines, and $19 to $27 per ton for surface mines, compared to $13 to $28 per ton for western low sulfur coal delivered to the east when no scrubber is required. However—and this is an important point that we sometimes forget, because of the lower Btu value of

western coal, and thus the higher sulfur to Btu relationship, there are instances where scrubbers could be required in conjunction with the burning of western coal. In other words, you have just got to burn a lot more western coal to get the same Btu's, and so the sulfur content per Btu may end up being about the same.

Senator PROXMIRE. On the basis of your best estimates, is the sulfur content for the same Btu roughly in the same area, or do you know whether it is or not?

Mr. SAWHILL. Well, I think actually the sulfur content for many western coals, the sulfur content per Btu is higher than for some eastern coals. It varies, but you just cannot make a general statement that western coal is preferable to eastern coal because it is lower in sulfur content. You have also got to look at the energy content in the coal as well.

Senator PROXMIRE. All right.

Mr. SAWHILL. So the statements we hear about having to develop the West have to be tempered with this understanding of the energy content of the coal as well. And, incidentally, last summer I conducted public hearings in the western part of the country on the blueprint for Project Independence, and I found a very strong feeling among people in that part of the country that they are just not going to develop their resources in a way which will spoil their land and disrupt the—or let's put it this way, will cause social problems for people in that area. They are quite concerned about this, and I think the Federal Government is going to have to turn its attention to an orderly development of that area and perhaps some kind of programs which will permit the development of the basic structure in towns of that area, transportation, education, sanitary systems, prior to the development of the coal itself. So that it is not only an environmental problem, it is a problem of community planning and development as well.

I would now like to discuss the third area, and that is the environmental aspects of the development of the Outer Continental Shelf. This is obviously one option for achieving our national energy goals, rapid development of this area, because if we are to increase domestic oil and gas production, much of it will have to come from the Outer Continental Shelf.

The degree of environmental risk associated with this development varies greatly from one region to another. Historically, some of the most serious, though infrequent, damages have resulted from major oil spills which have either occurred in shallow waters or have been carried into shallow waters by winds and currents.

Marine organisms are generally more abundant in shallow areas than in deeper water, so from an ecological point of view, the shallow water spill would usually be more serious that a spill that would occur further out to sea. In terms of potential economic damage to beaches and recreation areas, a deep-water spill is apt to be less hazardous than one occurring immediately offshore.

Thus, to assess the hazards for a particular region, one must consider the likelihood of a major offshore spill and probability of its being carried onshore. Here it should be noted that the actual number of large spills has been quite small, and we state some of the figures in the testimony, suggesting that other problems relating to Outer Continental Shelf development, such as a chronic low-level oil pollu-

tion and onshore secondary impact, are probably of greater significance than the risk of major spills.

The secondary impacts could be divided into several categories. One concerns possible changes in the natural environment which would affect selected local industries. The possibility of a major spill has also been mentioned above. Local commercial fishing might also be affected, though not necessarily. These are essentially site-specific questions and should be treated in the environmental impact statements which would precede offshore development in any particular region.

Another category of impact is that of what we call secondary development. Extensive Outer Continental Shelf development is likely to stimulate permanent onshore development, including refineries, storage facilities for crude oil and refined products, petrochemical plants, new residential communities, new commercial centers. These effects of Outer Continental Shelf development would be quite desirable and beneficial in certain regions, particularly where unemployment is a problem. But it is important that they be made the object of careful land-use planning by the appropriate state and local officials, and a vital element in this process will be the State coastal zone management plans.

Therefore, it is important that these become developed quickly, and that State and local institutions be developed which can channel secondary development as it occurs, and this way environmental damages can be avoided.

A third category of secondary impact involves the capacity of State and local governments to cope financially with the additional burdens resulting from on-shore development, such as expansion of the—obviously the secondary development will lead to an expansion of the tax base over a longer term; however, there is a legitimate question as to whether the growth of the tax base will keep pace with the increased demand for social services. It's the same thing I was talking about in the West a moment ago, but I believe that there is a real important issue involved here in what role the Federal Government should take in providing these services in advance, as well as in providing planning funds to insure that appropriate plans are made for new communities that would be created as a result of Outer Continental Shelf development.

I would now like to comment briefly on the 10 million acre figure which you raised questions about. My understanding is that it is only an objective and that it is not sacrosanct. Modifications can be made if it seems appropriate at some future time. Secondly, no leases will be sold or explorations begun before environmental impact studies are performed. Whether we lease 10 million acres is not as important as whether we take prompt action to get better knowledge about the magnitude and location of our off-shore reserves. Leasing and exploratory drilling are the first steps in this process.

In other words, one conclusion is that we developed from the blueprint for Project Independence is that we have got to find out whether in fact we do have substantial reserves on the Outer Continental Shelf or not, and we think that the Government's program should be targeted at finding out through the drilling of exploratory wells whether in fact we have large reserves or don't have large reserves, because

that can have a very important impact on other policies we adopt regarding conservation and also on our international situation.

If we have large reserves, that will obviously have a big impact on ability to deal effectively with the oil-producing countries, so I would urge a program of rapid exploration, not necessarily, rapid development, but rapid exploration of the Outer Continental Shelf areas.

I would now like to turn to the fourth area, energy conservation and increased economic growth. Obviously, there have been questions raised about whether energy conservation limits econmic growth. It certainly is a fact that nations with the lowest levels of economic activity have the lowest energy consumption per capita. Also the reverse is true. Countries with the highest gross national products have the highest per capita energy consumption. However, this does not mean that economic growth cannot occur without a corresponding growth in energy. For example, three nations, Sweden, Denmark, and West Germany, each have a per capita gross national product comparable to that of the United States, yet each uses only about 40 to 50 percent of the energy per person that we do.

This surprisingly low figure suggests that energy growth may not necessarily be a prerequisite for economic growth.

Senator PROXMIRE. Let me just interrupt at that point to say that they are comparable, but they are not the same by any means. Our per person, per capita GNP is about 10 percent higher than Sweden, and as I calculate it, 25 to 30 percent higher than Denmark or West Germany. The figures I have are United States per capita GNP: $5,643; Sweden: $5,092; Denmark: $4,257; West Germany: $4,177.

As I calculate that, you are right, they do a better job, more efficient job on a comparable basis; but nevertheless, we do have a substantially higher per capita——

Mr. SAWHILL. Yes; but there are countries that have a higher per capita income than we do that have a lower energy usage per capita.

Senator PROXMIRE. Per capita, what——

Mr. SAWHILL. The United States does not have the highest per capita income of the world, and I think I could show you examples of countries. I do not have the data here in front of me, but I believe that there are.

Senator PROXMIRE. Well, maybe the Middle East sheikdoms might have more, Kuwait——

Mr. SAWHILL. No; I think there are Western European countries.

Mr. SANT. Our figures show that West Germany, Mr. Chairman, has a higher per capita income, but we do not have the figures here. We would be happy to submit them.

Senator PROXMIRE. Well, the figures we got for West Germany from the Library of Congress was, West Germany: $4,177; United States: $5,643.

Mr. SANT. What year is that, Mr. Chairman?

Senator PROXMIRE. The latest comparable year, I think was 1973.

Mr. SANT. We will get together. We ought to be able to reconcile that.

Senator PROXMIRE. We do have problems. There is a change in exchange rates, fluctuating all over the place.

Mr. SANT. That's right. We try to make those adjustments in our calculations, and it is a difficult task, but we came out with the conclu-

sions that their per capita income was higher than that of the United States, but it is worth working on.

Senator PROXMIRE. OK.

Mr. SAWHILL. That difference that you expressed there, that's——

Senator PROXMIRE. Still, I don't mean to try to—I agree it's a point. I was just trying to get this as precise as I can so that——

Mr. SAWHILL. I will make sure that we get it precise for you because that seems like an awfully wide gap between Germany and the United States.

Senator PROXMIRE. Well, there also is a question that we are geographically different, more dispersed, and for that reason we require transportation of people and goods to a greater extent than a more compact country. That might be the——

Mr. SAWHILL. Yes, I think that might be.

[The information referred to follows:]

PER CAPITA ENERGY CONSUMPTION AND PER CAPITA INCOME: A COMPARISON OF THE UNITED STATES WITH OTHER WEALTHY WESTERN COUNTRIES

(By Jeffrey S. Milstein—Systems Studies, Office of Energy Conservation and Environment—based on previous research of David Edelman and Louis Krezanosky—Office of Energy Conversation and Environment—October 1, 1974.)

We often hear the assertion that if the United States should reduce its growth in energy consumption, it will also have to reduce its economic growth and the growth in the wealth of its citizens. An examination of the statistical facts, however, comparing U.S. per capita income (PCI) and per capita energy consumption (PCEC) with that of five other Western countries whose *per capita income is approximately equal to our own (averaging 97% of U.S.)*, shows that on the average their *per capita energy consumption is only about half (52%) of our own*. We must conclude that the assertion is false, and that it is possible for the United States, as has already been demonstrated by Canada, Switzerland, Sweden, West Germany, and Denmark, to maintain its standard of wealth while making major reductions in its energy consumption.

Table I shows the comparative statistics on per capita income and per capita energy consumption.

TABLE I

Nation	PCI (1973 dollars)	1973 PCEC (kilograms of coal equivalent)
United States	[1] 5,515	13,114
Canada	5,275	11,657
Switzerland	[1] 3,925	[2] 3,681
Sweden	6,000	7,650
West Germany	5,613	[2] 5,710
Denmark	6,000	5,600

[1] 1972 dollars.
[2] 1972 PCEC.

As shown in Table I, the United States (and its close geographic and economic neighbor, Canada) have an average of approximately twice the average per capita energy consumption of the four European counties (219%) in spite of an equal average per capita income (100%).

Some might argue that the countries listed in Table I really do not have approximately the same per capita income as the United States because inflation and monetary revaluations in the last few years distort the per capita income statistics in Table I. However, by adjusting the 1973 PCI figures to reflect different inflation rates and currency re-evaluations since 1971, as shown in

Table II, we still find the per capita incomes of the five Western countries to be approximately equal (89%) to that of the United States while the average per capita energy consumption is about half (52% that of the United States).

TABLE II

Nation	Adjusted 1973 PCI in 1971 dollars	1973 PCCE (kilograms of coal equivalent)
United States	4, 160	13, 114
Canada	3, 968	11, 657
Switzerland	2, 596	[1] 3, 681
Sweden	4, 214	7, 650
West Germany	3, 676	[1] 5, 710
Denmark	4, 141	5, 600

[1] 1972 PCEC.

Of course, per capita energy consumption has changed as well as per capita income since 1971. Table III shows the 1971 PCEC and the 1971 PCI.

TABLE III

Nation	1971 PCI	1971 PCEC
United States	4, 160	11, 241
Canada	3, 968	9, 327
Switzerland	2, 596	3, 577
Sweden	4, 214	6, 090
West Germany	3, 676	5, 226
Denmark	4, 141	5, 330

Thus we find virtually no change in 1971: per capita income of the average of the five Western countries was 89% that of the United States, while their average per capita energy consumption was only 53% that of the United States.

Another argument one might hear is that the differences in per capita energy consumption are due to the fact that the United States is more industrialized than the other five Western countries. Table IV shows data on two measures of industrialization: a "manufacturing intensity ratio" of the output in manufacturing per unit of national income, and an "electrical intensity of manufacturing ratio" of electricity consumed to unit of gross output.

TABLE IV

Nation	Manufacturing intensity ratio (gross output in manufacturing—total national income)	Electric intensity of manufacturing ratio (electricity consumed 10^9 kWh—gross output 10^9)
United States [1]	0. 635	0. 903
Canada	. 776	1. 186
Sweden	. 668	1. 501
West Germany [2]	. 849	. 837
Denmark	. 484	. 483

[1] All U.S. figures are 1967. All others are 1970.
[2] For West Germany, gross output is given in producers' values. For all others, gross output is given in factor values.

Note: Data for Switzerland were not available.

The data in Table IV refute the contention that the United States is significantly more industrialized than these other Western countries. Only Denmark is significantly less industrialized than the other four countries in the table,

including the United States. Indeed, the average manufacturing intensity ratio of Canada, Sweden, and West Germany is 120% that of the United States; and the average electric intensity of manufacturing ratio of those three countries is 130% that of the United States.

It may be that an industry-by-industry comparison of the energy intensity of manufacturing in the United States and in the other Western countries would show some differences in energy intensity, particularly in those European industries rebuilt since World War II that may be more *efficient* in their energy use than similar U.S. industries. Further research and data collection would have to be done to test this hypothesis, and much of the necessary data on differences in industrial process efficiencies are unavailable. But on the whole, differences in degree of industrialization do not account for the large difference between the per capita energy consumption in the United States as compared to those of the other Western countries in Table IV.

How then can we account for the major differences in per capita energy consumption between the United States and the other wealthy Western countries, as shown in Table I? A major general difference lies in the *energy intensity of consumers' life styles.* Two major aspects of these life style differences can be seen in perhaps the two most important manifestations of the lifetyles of American consumers: widespread use of *big cars* for transportation and living in and *heating and cooling of single-family dwellings.*

TRANSPORTATION BY BIG CARS

Among the countries shown in Table V, the United States is clearly the largest user of energy in the transportation sector, both in comparative and absolute terms. Twenty-five percent of the total energy budget in the United States is used by the transportation sector, whereas the comparable figure for the countries of the European Economic Community is only about 17%. Moreover, the data in Table V show that the average per capita gasoline consumption in the five other countries is only 36% that in the United States.

TABLE V.—TRANSPORTATION COMPARATIVE ENERGY CONSUMPTION STATISTICS

Country	Percent households owning cars [1]	Per capita gasoline consumption, (kilograms) 1971	Average car annual fuel consumption (tons)
United States	80 (1970)	1,387	2.01
Canada	78 (1970)	939	NA
Switzerland	46 (1965)	394	NA
West Germany	62 (1970)	282	1.06
Denmark	50 (1965)	410	NA
Sweden	75 (1970)	507	NA

[1] Data source: "Environmental Implications of Options in Urban Mobility," September 1973.
NA=Not available.

There is an even greater difference in the number of families owning two or more cars in the United States than in EEC countries. For example, in West Germany only about 5% of the households own two or more cars, while *30% of U.S. households own two or more cars with 10% having three or more.*

While widespread American auto ownership partially explains the first set of consumption figures, two other factors contribute to understanding more fully the first set of figures, as well as to explaining the second set. One, of course, is the *larger size* and therefore greater rate of *gasoline* consumption in American cars. That is, fuel consumption and auto weight are directly related. A 5,000 pound car for instance, uses twice as much gasoline as a 2,500 pound car. Therefore, the fact that each model car has crept upward in weight over the years is important. 1974 "intermediate" size cars, for example, weigh about the same as 1972 "full-sized" models. Typical American options (e.g. air-conditioning and power steering) and emission control devices also reduce gas mileage. Thus, while the average American car got 14+ mi/gal in 1958, by 1973 this figure had dropped to less than 12. By contrast, the average French car gets 20.5 miles per gallon, the average British car 20.6 miles per gallon, and the average Italian car 25.8 miles per gallon.

The second important factor in explaining greater American energy consumption in auto transportation is the more substantial uses to which the American car is put. The more energy-efficient urban public transport modes have steadily declined so that today automobiles account for over *95% of all urban passenger traffic.* They also carry about 85% of all inter-city passenger traffic, while railroads and buses carry only about 3% of the traffic.

Americans have to pay for their transportation by big cars not just with added fuel consumption, but with their income as well. In 1971, Americans paid 5.3% of their private final consumption expenditures on personal transportation equipment, whereas West Germans paid only 3%. Paying for big cars leaves less personal income for other things in America.[1]

HEATING AND COOLING OF SINGLE-FAMILY DWELLINGS

The second main feature of American consumers' lifestyles that accounts for a significant difference in per capita energy consumption as compared to other wealthy Western countries is the heating and cooling of single-family dwellings. Single-family dwellings, because they have more surface area exposed to the elements, are simply less thermally efficient than multi-family dwellings ("flats"). Table VI shows that Americans and Canadians have a relatively larger fraction of their people housed in single family dwellings (as compared to flats) than do the equally wealthy Swedes and Danes.

TABLE VI

Nation:	*Single family dwelling/flat ratio*
United States	2.49
Canada	2.31
Sweden	.74
Denmark	1.36

Of course, other factors also contribute to the level of energy consumption for home heating and cooling, such as annual degree days, comfort levels, quantity and quality of insulation, type of construction, fuel costs, efficiency of heating and cooling systems, and number of individuals per household.

In these two major examples—big cars and single-family dwellings—we have evidence that it is the American consumers' lifestyle that contributes so much to American per capita energy consumption. Energy consumption can be reduced by greater efficiency (in industrial processes, automobile engines, heating and cooling systems, for example), and by reduction of waste (turning off unneeded appliances and lights, for example). These things should obviously be done so as not to detract from the American standard of living. But the comparisons in this paper of energy consumption for industrialized wealthy countries show that lifestyle changes—as exemplified in the American home and car—may also be required if the American energy consumption per capita is to be reduced in half to bring it to the level of other equally rich industrialized Western countries.

CONCLUSION

There may be other factors which account for the differences in per capita energy consumption among the wealthiest countries in the world. For example, in the smaller European countries, distances traveled are less than in the United States on the average, and thus energy consumed in transportation is less. Also, further research will have to be done to see if the European countries import more energy per capita in an indirect form, such as finished or semi-finished products, or whether they export less indirect energy per capita than does the United States. In addition, further research would have to be done to calculate the actual purchasing power of the per capita income in each country, taking into account such factors for each country as the purchase of imported goods and services as compared to *domestically* produced goods and services.

Nonetheless, one can conclude from this analysis that in spite of other studies that show on a cross-national and time-series basis that energy consumption does rise with a nation's economic development and growth in gross national product, at a *particular level* of economic development other factors are involved in energy consumption. In highly developed, sophisticated economies such as the

[1] Data from UN Yearbook of National Accounts Statistics 1971 and U.S. Statistical Abstract 1971.

United States, Canada, West Germany, Sweden, Denmark, etc., it is clear that economic growth and the enjoyment of a high per capita income need not entail as high a per capita energy consumption as exists in the United States. There *are* real opportunities in the United States to make *significant* energy savings without reducing the per capita income of Americans. After all, we must not forget the basic fact that these other countries are as wealthy as the United States on a per capita income basis and use only *half* the per capita energy of the United States.

Mr. SANT. As a matter of fact, the greatest difference we have between West Germany and the United States is that per capita gasoline consumption is about 20 percent of that of the United States, whereas their overall per capita energy consumption is about 42 or 43 percent. Therefore, I don't think we can explain the total difference just by geographical dispersions. It's a major——

Mr. SAWHILL. A lot of it is just by more efficient automobiles and better public transportation systems.

Mr. SANT. A gasoline tax of 79¢ a gallon.

Senator PROXMIRE. Are you advocating that now? [General laughter.]

Mr. SAWHILL. Well, it shows what happens when you have a tax like that.

Senator PROXMIRE. The last time you advocated a 30¢ tax, and that apparently was not a great success with the administration.

Mr. SAWHILL. No, it certainly was not. [General laughter.]

Senator PROXMIRE. Go ahead, sir.

Mr. SAWHILL. Well, we talk here about some of the work that we have been doing with the six major energy-consuming industries in this country. We have met with the head of companies in those industries. We have set up energy conservation plans. We have set up a process for monitoring their Btu's per unit of output, and they have set goals which indicate efficiency gains of at least 1½ percent a year, and in many cases higher.

I do think, of course, that there are substantial savings in the building area. This will be an area I hope that Congress will consider legislation in and also in the transportation sector, but we are continuing to study the impacts of obtaining such energy efficiencies on employment, inflation, and the environment.

However, I think, by and large, conservation programs have a positive effect. There is no—undoubtedly, some temporary dislocations did occur. I think we are seeing some of this in the automobile industry right now. But over the long term, employment can actually increase as a result of energy-reduction efforts as companies shift from making large automobiles, for example, to making buses, and I think government action can help in this area too.

Senator Percy last weekend proposed a tax credit for the purchase of energy-efficient cars, which would perhaps stimulate automobile production and, at the same time, provide for more energy-efficient automobiles in this country. Programs to insulate houses, for example, stimulate employment in the insulation and building industries with no offsetting decreases in other industries.

And I think the conservation programs have two, at least two positive effects on inflation. First, by reducing industrial energy consumption, they partially offset increased costs of energy and reduce the price of the manufactured goods. And, secondly, increasing efficiency

of industrial processes has the effect of increasing capacity, and capacity constraints, at least in some industries, are causing inflation.

Finally, there is no doubt in my mind that conserving energy has a very positive effect on the environment.

The last topic I would like to address is the need for modifications to existing environmental regulations. I will focus primarily on the Clean Air Act which is implemented by EPA.

First, we indicate in our statement that we strongly support the goals of the act. We are concerned with certain provisions of the act which are causing adverse impacts on effective development and efficient use of energy and which do not necessarily contribute to the attainment of health and welfare protection goals.

I think it is important for the Congress to understand that the emission limitations in the State implementation plan has created a situation where the use of as much as 200 million tons per year of domestic coal production by June 1975 will violate existing environmental regulations. EPA has begun to take steps to reduce the projected clean fuels deficit, which is what they call this 200 million tons. However, the EPA program was established in December 1972 and their success in achieving major reductions in the clean fuels deficit through revisions in the State plans has been limited.

Accordingly, we continue to support, as does the EPA, the amendment proposed by the Administration on March 22d of this year, which would affirm EPA's authority to extend enforcement orders beyond the act's statutory deadline.

Further, we are working closely with EPA—and this is probably the toughest area—concerning the use of alternative or intermittent control measures versus flue-gas desulfurization for existing electric utilities. In certain cases, we feel it is appropriate to use these intermittent control systems for some period of time as long as ambient air quality standards can be maintained because there are significant energy and economic benefits associated with the intermittent control utilization.

First, relative to stack-gas scrubbers, intermittent control systems with tall stacks are a relatively inexpensive form of air pollution control with capital investment costs of between $0.5 million and $1.5 million, compared to $25 to $35 million for the retrofit of a typical scrubber on a 500-megawatt electric utility plant. In addition, stack-gas scrubbers have higher operating costs and fuel penalties of as much as 7 percent. Thus, particularly in rural areas, it might be desirable to delay the implementation of scrubbers and use intermittent controls and tall stocks on an interim basis.

We can only manufacture so many scrubbers in this country, and it would seem to me it would be desirable to put them first in the urban areas and delay the implementation in rural areas in the meantime, permitting the intermittent control strategy and tall stacks to be used.

So that is the first issue that I think the Congress has to address in the Clean Air Act. The second is the litigation on the nonsignificant deterioration interpretation of the Clean Air Act. This will create uncertainty with regard to optimal locations for powerplants and energy resource development projects.

In addition, there are serious questions as to the adverse effects

which a nonsignificant deterioration policy will have on State and local governments in the areas of economic development and land-use matters. Accordingly, we feel that Congress should carefully consider whether, and under what circumstances, the Clean Air Act requires the establishment of air quality standards more stringent than primary or secondary standards, and that is, of course, what this nonsignificant deterioration interpretation does.

The last area is the mobile source requirements of the Clean Air Act. We continue to assess the impacts on the refinery industry resulting from the regulations requiring the phase reduction of lead in gasoline. On the one hand, we are encouraged with the 13.5 percent improved fuel economy forecast that has been projected for this year's automobiles. However, from a long-term energy conservation point of view, one of the most important provisions of the Clean Air Act is the standard for nitrogen-oxide emissions from automobiles.

Last June I met with the heads of the domestic automobile manufacturers for the purpose of establishing fuel economy goals for the next decade. The trade off between the level of nitrogen emissions and the vehicular fuel economy is frequently a prime topic for discussion. It certainly was in those meetings. Accordingly, I would support amending the Clean Air Act to leave the ultimate establishment of the nitrogen-oxide auto emission standards in the hands of the EPA Administrator, who, after careful review, could reach that decision. I do not think it should be legislatively mandated.

In summary, we agree with you that we need to balance environmental, energy, and economic objectives. It is difficult; it requires analysis, more than we have been able to present to you this morning. We look forward to working with you as we continue to study these problems.

That concludes my statement.

[The prepared statement of Mr. Sawhill follows:]

PREPARED STATEMENT OF HON. JOHN C. SAWHILL

Good morning, Mr. Chairman and members of the committee, I welcome this opportunity to discuss with you the economic impact of environmental regulations.

I would like to limit my remarks in this opening statement to five general topics of major importance to this committee. First, I will discuss energy price increases and related energy penalties directly attributable to environmental standards. Second, the interaction of environmental regulations on the development of our western coal resources. Third, the principal environmental factors in regard to future offshore oil leasing and the economic impact of such development. Fourth, the relationship between energy conservation, pollution control, and increased economic growth. And fifth, the need for changes in current environmental regulations.

While there have been sizeable health and economic benefits associated with the implementation of environmental regulations, actual capital expenditures by major energy industries for pollution control equipment have also been substantial. Due to increased levels of pollution control involvement, there has been some diminution of available energy supplies.

Various estimates have been made of the cost of pollution control at the macro- and micro-economic levels. For the period 1972–81, according to the President's Council on Environmental Quality, total pollution control expenditures for air quality will amount to $39.9 billion for capital investment and $73.2 billion for operation and maintenance. For water pollution control, cumulative capital investment costs will amount to $68.0 billion, with $49.5 billion operation and maintenance costs.

Two industries have been particularly impacted by environmental regulations. They are the electric utility industry and the petroleum refining industry.

The electric utility industry, according to an EPA projection, will increase investments in air and water pollution control from $1.6 bililon in 1974 to $2.9 billion in 1975, $2.4 billion in 1976 and $1.6 billion in 1977.

There are also energy penalties associated with pollution control for electric utilities. Installations of a stack gas scrubber to control sulfur oxide emissions, for example, will cause an energy penalty of approximately 7%. We estimate that the energy penalty to the utiliites to control 80% of the sulfur dioxide emissions and 98% of the particulates would result in the equivalent of 1,000 barrels per day in 1973, a 7,650 barrels per day penalty in 1975, and a 97,250 barrels per day penalty by 1980. Thus, these penalties over the next few years will not be large.

Similarly, to comply with thermal pollution control requirements, power plants will have to perate closed cycle cooling systems, which, we estimate could cost this Nation the equivalent of more than 125,000 barrels of oil per day by 1980. A closed cycle cooling system for a typical power plant would result in an additional 3% energy operational penalty.

The petroleum refinery industry will have invested by 1976 $302 million in environmental controls, an additional $218 million in 1977, and in 1978, $109 million.

In summary, sizable capital investments for pollution control have been made. In addition, environmental requirements have clearly increased the demand for certain fuels and decreased potential supplies. However, we generally feel that the benefits of improved environmental quality more than offset these penalties and we support the full implementation of these environmental programs.

The second area which I would like to discuss concerns environmental regulations and western coal development.

Environmental regulations, and in particular the Clean Air Act, have been very significant in the push for development of low sulfur coal in the west. Although 60% of our Nation's coal reserves, or 255 billion tons, contain one percent of less sulfur by weight, about 80% of this low sulfur coal is in the west. Most of the rest, or 40 billion tons, is in southern Appalachia but the problems with exploiting this coal are the 5-year lead times necessary to have a deep mine producing at full capacity and the fact that deep mining is more labor intensive than surface mining. Thus, there is pressure in the industry to develop western low sulfur coal, at least until the economic and technical problems associated with sulfur removal technology have been solved.

If full reclamation of western strip mined areas takes place, and I think it absolutely essential that it does take place, the estimated cost will range from one to ten cents per ton. This would result in a maximum increase in the price of electricity of about one tenth of one cent per kilowatt hour.

The differences in delivered costs of eastern and western coal to eastern markets vary greatly depending on the exact location of the user and the mine, the type of mine, and other factors. Recent price estimates for delivered eastern coal from existing underground mines to eastern markets range from 67 to 130 cents per million BTUs ($13 to $28 ton).

The costs of complying with sulfur dioxide emission regulations must frequently be added. The annual cost of scrubbers varies from 30 to 35 cents per million BTU ($7 to $8 per ton). Thus, high sulfur eastern coal used with scrubbers shows a range of costs from $24 to $32 per ton for underground mines ($19 to $27 per ton for surface mines if available) compared to $13 to $28 per ton for western low sulfur coal delivered to the east when no scrubber is required. However, because of the lower BTU value of western coal and thus the higher sulfur to BTU relationship, there are instances where scrubbers would be required in conjunction with the burning of western coal.

I would now like to address the third area—environmental aspects of development on the outer continental shelf, OCS.

Development of our OCS oil and gas resources is one option for achieving our national energy goals. If we are to increase domestic oil and gas production, much of it will have to come from the OCS. The degree of environmental risk associated with OCS development varies greatly from one region to another. Historically, some of the most serious—though infrequent—damages have resulted from major oil spills which have either occurred in shallow waters or have been carried into shallow waters by winds and currents. Marine organisms are generally much more abundant in shallow areas than in deeper waters, so

that from an ecological point of view, a shallow water spill would usually be more serious than a spill which occurred further out to sea. In terms of potential economic damage to beaches and recreation areas, a deep-water spill is apt to be less hazardous than one occurring in the immediate off-shore vicinity.

Thus, to assess the hazards for a particular region, one must consider the likelihood of a major offshore spill (whether from earthquake, iceberg, collision, equipment failure, blowout, etc.) and the probability of its being carried ashore. Here it should be noted that the actual number of large spills has been quite small. During 1972, for example, 96% of all reported spills were less than 25 barrels, and 85% were less than 2½ barrels. Those figures suggest that other problems related to OCS development, such as chronic low-level oil pollution and on-shore secondary impact, could be of greater significance than the risk of major spills.

The secondary impacts of OCS development may be divided into several categories. One category concerns possible changes in the natural environment which would affect selected local industries. The possibility of a major spill (with adverse impact upon local recreation industries) has been mentioned above. Local commercial fishing might also be affected, although not necessarily. These are essentially site-specific questions, and they are suitable for treatment in the environmental impact statement which would precede off-shore development in the region in question.

Another category of impact is that of secondary development. Extensive OCS development is likely to stimulate permanent onshore development, including refineries, storage facilities for crude oil and refined products, petrochemical plants, new residential communities, and new commercial centers. These effects of OCS development would be quite desirable and beneficial in many regions, but it is important that they be made the object of careful land-use planning by the appropriate State and local officials.

A vital element in this process will be the State coastal zone management plans. It is important that the States move ahead swiftly in the development of these plans. If the State and local institutions are not able to channel secondary development as it occurs, Environmental damages will be increased, aggregate economic benefits will be reduced, and the general pace of OCS development could be retarded.

A third category of secondary impact involves the capacity of State and local governments to cope financially with the additional burdens resulting from onshore development. Secondary development will undoubtedly lead to an expansion of the tax base over the long term. However, there is a legitimate question as to whether the growth of the tax base will keep pace with the increasing need for social services (roads, schools, sewage treatment, fire protection, etc.): The need to provide for these services in advance is an issue which the Federal Government must deal with both in potential OCS areas as well as in the western energy producing States.

I would like now to make several points concerning the suitability of the 10-million acre figure is only an objective and it is not sacrosanct. Modifications can be made if that seems appropriate at some future time. Secondly, no leases will be sold or explorations begun before environmental impact studies are performed. Whether we lease 10 million acres is not as important as whether we take prompt action to get better knowledge about the magnitude and location of our off-shore reserves. Leasing and exploratory drilling are first steps in that process.

I would now like to turn to the fourth area—energy conservation and increased economy growth.

One of the most important energy conservation questions is whether America can afford to substantially reduce energy growth without having negative economic effects. It is a fact that Nations with the lowest levels of economic activity have the lowest energy consumption per capita—nations such as India, Pakistan, South Vietnam, and Thailand. It is also true that the nations with the highest GNP's have the highest per capita energy consumption. Now, one might conclude from this that economic growth and energy growth are inseparable—that economic growth cannot occur with a corresponding growth in energy.

However, this is not necessarily so. Take, for example, three nations: Sweden, Denmark and West Germany. Each have a per capita GNP comparable to that of the United States, yet each uses only about 40 to 50 percent of the energy per person that we do.

This surprisingly low figure suggests that energy growth may not necessarily be a prerequisite for economic growth.

Let's assume, for example, that we want a healthy GNP growth rate of 3½% and an energy growth rate of 2%. All that is needed is a yearly 1½% increase in energy efficiency. At that rate it would take 30 years before we approached the efficiency already achieved by the three countries mentioned above. All the six major energy consuming industries that we have been working with have indicated the feasibility of efficiency gains of at least 1½% and many much higher. Our studies indicate that the building and transportation sectors have equally high potential.

We are continuing to study the impacts of obtaining such energy efficiencies on the areas of employment, inflation; and environment. However, conservation programs, in general, appear to have a positive impact. There is no doubt that some dislocations and temporary unemployment will occur as we take the energy waste out of our economy but in the long term, employment will actually increase as a result of energy reduction efforts. Programs to insulate homes, for example, will stimulate employment in the insulation and building industries with no offsetting decrease in another industry. Conservation will have two positive effects on inflation. First, reducing industrial energy consumption will at least partially offset increased costs of energy and reduce the price of manufactured goods. Second, increasing efficiency of industrial processes has the effect of increasing capacity, and capacity constraints are one of the chief underlying causes of inflation.

Finally, there is no doubt that conserving energy will have a very positive effect on the Nation's environment.

The last topic I would like to address is the need for modifications to existing environmental regulations. I will focus primarily on the Clean Air Act which is implemented by the Environmental Protection Agency.

Let me first make it clear that FEA stands firmly behind the goals of the Clean Air Act, which are to establish and achieve ambient air quality that protects the public health and welware. Whereas we have identified some energy and economic problems in the short-term with controlling existing pollution sources, we strongly support the fundamental provisions of the act that were established to minimize new pollution. In particular, FEA is concerned with certain provisions of the act that are causing adverse impacts on the effective development and efficient use of energy, and which do not necessarily contribute to the attainment of health and welfare protection goals.

The emission limitations in the State implementation plans have created a situation where the use of as many as 200 million tons per year of domestic coal production by June 1975 will violate existing environmental regulations. We recognize that EPA has begun to take steps to reduce the projected clean fuels deficit. However, since the EPA program was established in December 1972, their success in achieving major reductions in the clean fuels deficit through State plan revisions has been limited. Accordingly, we continue to support the amendment proposed by the administration on March 22 of this year which would affirm EPA's authority to extend enforcement orders beyond the act's statutory deadlines.

Further, we are working closely with EPA in an attempt to resolve the controversial issue concerning the use of alternative or intermittent control measures vs. flue-gas desulfurization for existing electric utilities. In certain cases we feel it is appropriate to use intermittent control systems for some period of time as long as ambient air quality standards can be maintained because there are significant energy and economic benefits associated with their utilization. First, relative to stack gas scrubbers, intermittent control systems with tall stacks are a relatively inexpensive form of air pollution control with capital investment costs of $0.5 to $1.5 million compared to $25 to $35 million for the retrofit of a typical scrubber on a 500 megawatt electric utility plant. In addition, stack gas scrubbers have higher operating costs and fuel penalties up to as much as 7%. Thus, particularly in rural areas, it might be desirable to delay the implementation of scrubbers and use intermittent controls and tall stacks on an interim basis.

We are also concerned that litigation on the nonsignificant deterioration interpretation of the Clean Air Act will continue for some time, thus creating industry uncertainty with regard to optimal locations for power plants and energy resource development projects. In addition, there are serious questions as to adverse effects which a nonsignificant deterioration policy will have on State and local govern-

ments in the areas of economic development and land use matters. Accordingly, we feel that Congress should carefully consider whether (and under what circumstances) the Clean Air Act requires the establishment of air quality standards more stringent than primary or secondary standards.

Turning to the mobile source requirements of the Clean Air Act, FEA continues to assess the impacts on the refinery industry resulting from the regulations requiring the phase reduction of lead in gasoline. On one hand, we are encouraged with the 13.5% improved fuel economy forecast that has been projected for the 1975 model year automobiles. However, from a long-term energy conservation point-of-view, one of the most important provisions of the Clean Air Act is the standard for nitrogen oxide emissions from automobiles. I have met with the heads of the domestic automobile manufacturers for the purpose of establishing fuel economy goals for the next decade. The trade-off between the level of nitrogen oxide emissions and the vehicular fuel economy is frequently a prime topic of discussion. Accordingly, we support amending the Clean Air Act to leave the ultimate establishment of the nitrogen oxide auto emission standard in the hands of the EPA Administrator.

In summary, the need to balance environmental, energy, and economic objectives of our Nation is a very difficult task. FEA fully supports the need to internalize the cost of pollution control, so that energy prices fully reflect reasonable social cost.

We look forward to working with Congress as we strive toward viable solutions to these complex problems.

At this point, I would be happy to answer any questions you or other members of the committee may have.

Senator PROXMIRE. Thank you very much, Mr. Sawhill.

Mr. Sawhill, to clear the air, I am going to ask a question which I think is in the mind of many, and it might be useful for you to say whatever you would like to say in connection with that.

There have been many statements I suppose some true and some false, that your resignation was caused, at least in part, by pressures from the oil industry. Many of us in the past have been concerned that in all administrations, Democratic as well as Republican, the oil and gas industry has had too much power in industry. They run the office of oil and gas. They have a powerful influence over the regulatory agencies and tax-writing committees in Congress.

Let me ask two questions. First, do you believe the oil industry exercises undue influence in Government?

Mr. SAWHILL. Well, it certainly does exercise a lot more influence than I realized when I came down here as a businessman to work in the Government. There is no question that there is a tremendous oil lobby here in Washington that I had not previously been aware of. Whether that constitutes undue influence or not is a little difficult for me to say, but it is a very considerable influence and something that I think should be watched carefully.

Senator PROXMIRE. Would you like to say a little bit more about how considerable it is, in view of your experience, what effect it had on your ability to do what you feel is in the public interest?

Mr. SAWHILL. I felt very strongly that FEA had to be a very open agency, and from the beginning we adopted policies to insure that we could regulate in the public interest, not in the interest of any particular group. We developed freedom-of-information regulations, for example, which were among the most stringent in the Government. We developed conflict-of-interest regulations and standards of conduct for our employees, which went so far as to require that our employees not be permitted to have lunch with anyone connected with

an industry that our Agency was regulating and to have that person pay for their lunch.

We developed lobbying regulations which required lobbyists to register with the FEA and required all top management of FEA to record any contacts they had with people that had regulatory matters before the Agency and to make those contacts and conversations public.

Finally, I published my financial statement which turned out to be not very interesting and said that I would not go to work for the oil industry when I left the Government, purely to try to set the tone and pattern for the Agency. And we, incidentally, in forming advisory committees, were careful to include not only industry members, but consumer and environmental groups on these committees so that we could have an open and public discussion of issues before the Agency with all groups represented.

I feel very strongly that a regulatory agency regulating something as sensitive and as important to the lives of every American as energy has got to be run in this fashion, and I hope that at least I will leave a legacy of this kind of management in the FEA because I think it would be very unfortunate if we lost this, and I would hope that the Congress would continue to encourage this kind of open decision-making. We certainly made a lot of mistakes, but they were not mistakes or errors that were committed because we were being unduly influenced by one group or another. They were frankly simply administrative errors and problems that are always encountered in starting a new agency.

But I think it very important that the Congress pay careful attention to a regulatory agency like FEA, particularly one that is not independent of the executive branch, but resides in the executive branch because there is always a danger that one group or another can capture the agency and exercise undue influence.

Senator PROXMIRE. Well, I think that is excellent advice, and I certainly commend you on your conduct. I think there has been a pattern which Dean Landis of Harvard Law School observed in 1960 when Landis was asked by President-elect Kennedy at that time before Kennedy took office to study the regulatory agencies, and Landis found that when they were first started, they often operated with considerable force and in the public interest, but quite regularly they were taken over by the industries that they were designed to regulate.

At the same time, there has been talk, and there has been some documentation, that a large number of the people who make policy in the Energy Agency are from the industry, and that most of them go back to the industry after they leave the Agency. Is that not the case?

Mr. SAWHILL. We have not had anybody that I know of that has left the Agency and gone back to the industry. Of course, I publicly said that I would not do that and tried to set a standard of conduct for the other employees in the Agency.

We have some employees that have come from the industry, but we have employees that have come from consumer groups and environmental groups and all other——

Senator PROXMIRE. In proportion, though, in positions of the most significance, does the industry not have a very considerable influence

in this way. Are not many of the people in the top levels from the industry?

Mr. SAWHILL. No; I would not say that. Of the senior management in the Agency, of the 10 to 15 people that most closely work with me, there are two or three that are identified with the industry, but most of the rest have varied backgrounds. Some are economists; some are engineers; some are lawyers. I do not think there is an undue industry influence, but I think it is something that we have to continue to watch carefully.

Senator PROXMIRE. Now you said, in response to my initial question on this, that you were surprised at the power and force of the oil lobby. How did it demonstrate itself? Can you give us two or three examples of how they were able to make their will effective?

Mr. SAWHILL. In our Agency they were not able to make their will effective, but I was just surprised at the tremendous number of people here in Washington that were connected in one way or another with the oil industry.

Senator PROXMIRE. In your Agency they were not able to make—well, certainly some of the decisions were made with respect to, for example, the price of old oil, et cetera.

Mr. SAWHILL. That was not made by our Agency, initially anyway.

Senator PROXMIRE. Well, there was one in which your Agency had an interest and could have had a considerable influence in?

Mr. SAWHILL. Yes; but that decision was made by the Cost of Living Council, and as you will recall, President Nixon——

Senator PROXMIRE. Were you not consulated in that?

Mr. SAWHILL. I was not, no, on that decision. That was made prior to the time our Agency was formed.

Senator PROXMIRE. Then I would like to ask you, did the oil industry have any influence in your resignation?

Mr. SAWHILL. Well, I do not know. I know that various newspaper people around town have told me that the oil industry lobbied heavily against me. No question I took a lot of actions that were particularly counter to the interests of the major oil companies. Some of the independent oil companies, I think, actually supported me, because we were trying very hard to protect that independent sector of the industry, so I have no direct knowledge that this was done. I only have indirect knowledge that there may have been——

Senator PROXMIRE. What indirect knowledge do you have?

Mr. SAWHILL. Well, as I say, there were a number of newspaper reporters, for example, that told me that they had understood that there was heavy lobbying against me.

Senator PROXMIRE. Secretary Kissinger has recently called for drastic conservation in energy consumption. The energy policy project of the Ford Foundation stressed energy conservation as a primary need in the energy field, and your Agency's Project Independence blueprint formally urged a mandatory cut in energy demand.

These are the most high level, the most substantive and most current reports but still the administration, particularly President Ford and Secretary Morton, refuse to acknowledge the necessity of mandatory energy conservation.

Now why are mandatory conservation measures so consistently blocked by the administration?

Mr. SAWHILL. I do not really know the answer to that question. I mean I do not mean to be facetious but I certainly have advocated these measures.

Senator PROXMIRE. When you advocate them, is there not somebody who rebuts it? What do they say?

Mr. SAWHILL. Yes; I think probably the reason most often given is the concern that the impact of these measures on the economy, but it seems to me that you can develop a package of conservation measures which contain both a carrot and a stick.

For example, a tax credit to encourage the purchase of smaller, more efficient automobiles could be a carrot, whereas as a tax on larger, less efficient automobiles would be the stick. A tax credit for people to insulate their homes more efficiently could be a carrot. It seems to me that we could fashion a program which would not have serious economic impacts; as a matter of fact, I would argue, could stimulate the economy and at the same time reduce our wasteful consumption of energy.

Senator PROXMIRE. I think that is right and I think you have documented that very well. These studies which consumed literally tens of thousands of man-hours in the preparation have done this and yet the decision comes down against this kind of mandatory conservation measure.

Do they have any studies to contradict the documentation that I have indicated here?

Mr. SAWHILL. I have not seen them.

Senator PROXMIRE. That is most unfortunate. Here we have the facts developed by people who spend, as I say, literally tens of thousands of hours in some of these studies and they indicate we need mandatory conservation, and there is no rebuttal evidence on the other side, just a decision which serves the interests of the powerful lobby.

Secretary Kissinger also said that the United States is prepared to cut oil imports 85 percent, from 7-million to 1-million barrels in the next decade.

What analysis did he base his statement on? What assumptions are necessary and how exactly is this going to be achieved? Do you have any idea?

Mr. SAWHILL. No; I do not.

Senator PROXMIRE. It seems to me extraordinary that the Secretary of State, who is a very—we all know he is one of the most intelligent and able people we have had in public life and he has the respect of all of us, but that he would make this kind of an assertion without consulting with the principal office that has the responsibility, the information, the knowledge, to determine whether this is feasible and what has to be done.

Mr. SAWHILL. The Project Independence blueprint shows that if oil remains at $11 a barrel and we undertake a series of steps to accelerate energy supplies and cut back energy demand, that we could achieve the goals that Secretary Kissinger has outlined. So it is perhaps based upon his reading of this report.

Senator PROXMIRE. Finally, a more specific, short-range question is how is the President's goal of 1-million barrels-per-day reduction in oil imports by the end of next year going to take place?

Mr. SAWHILL. I think by and large they are a series of voluntary conservation programs which the administration is proposing. I do

not have the specifics, but they include reduction of driving by 5 percent, turning down thermostats to 68 degrees, and a variety of other actions that were contained in the President's statements, such as asking people to wash clothes in cold water.

Senator PROXMIRE. Any indication that these programs, which to some extent were proposed by President Nixon last year, and of course were buttressed very strongly by the actual shortage.

Mr. SAWHILL. Yes.

Senator PROXMIRE. And by the closing down of filling stations on Sundays and so forth and by the long lines, that these voluntary actions by themselves can achieve that goal?

Mr. SAWHILL. Well, last winter I think we did get some impact from our voluntary conservation programs.

Senator PROXMIRE. It is hard to say how much so because, as I say, so much of it was a matter of actual shortage.

Mr. SAWHILL. Right, and price, and we were in the middle of an embargo and people were obviously responding to a crisis situation.

Right now we are in a somewhat different kind of situation and we are really asking for conservation for somewhat different reasons. And my feeling is that it is going to be difficult to achieve that million-barrell-a-day reduction with voluntary measures alone.

Senator PROXMIRE. Was there a detailed study of the economic impact completed before the President set this goal?

Mr. SAWHILL. There were some economic studies done by the Council of Economic Advisers.

Senator PROXMIRE. Are those available?

Mr. SAWHILL. I suspect they are. I do not know, I mean, our office participated in the studies.

Senator PROXMIRE. You mean the Council of Economic Advisers. That is the group for which this committee has specific statutory oversight. We will certainly try to get a hold of that.

Now despite the President's virtual burial of the gasoline tax idea, I would like to raise one issue with you which has concerned me all along.

Simply put—would it be effective, would that gasoline tax be effective? How great a tax is necessary for significant cutbacks in gasoline consumption to occur? Let me say I ask this because most studies have shown that the price elasticity of demand for gasoline is quite small. That is, demand would decrease by a much smaller percentage than a given percentage price increase. It seems to be borne out by the fact that the price of gasoline has risen by about 60 percent to 70 percent in the last 18 months, and we see only a slight drop in demand.

In light of this I am a little puzzled as to why you uphold the gas tax idea so strongly and why should the next 20-cent or even 30-cent increase have any more effect than that resulting of the increases we have just experienced?

Mr. SAWHILL. Well, as you know, the tax that we have talked about was a refundable tax so that people would receive a refund of some amount of money, $50 or $100 or $150, and so, in effect, they would have gotten to drive the first 10,000 miles free of the additional tax.

Senator PROXMIRE. Then it would have less effect.

Mr. SAWHILL. Pardon me?

Senator PROXMIRE. Then it would have less effect.

Mr. SAWHILL. Yes; it would have less effect. In other words——

Senator PROXMIRE. And then if you follow up on what other people advocate, that is, if the lower income people were to get a refund——

Mr. SAWHILL. That is what we were suggesting, in effect, because lower income people by and large drive less than 10,000 miles, and so we would give everybody the first 500 gallons tax free.

In other words, we would refund, on a 20-cent tax we would refund $100 to everybody.

Senator PROXMIRE. Well there, you see, is where the elasticity would almost disappear. It would seem to me the real bite would come when people thought they just simply could not afford it. There is no way they could drive that. They either have to get other jobs or——

Mr. SAWHILL. It is not only that they cannot afford it. There is a great deal of driving that I think could be cut out in this country or it could be eliminated through greater use of public transportation or by carpooling. So that there is obviously the refundable feature that we had in our proposal, would have offset, to some extent, the price impact of the tax.

Nevertheless, we feel that the tax would have resulted in a reduction of 25,000 barrels per day, so that a 10-cent tax would have meant a reduction of 250,000 barrels per day and a 20-cent tax a reduction of 500,000 barrels a day. And it also—you see, it seems to me it would have had the combined benefits of providing an inflation dividend to lower-income groups that have been hard hit by inflation and at the same time it would have been taxing heavily upper-income groups that can afford to give up gasoline consumption.

Senator PROXMIRE. How much of a bureaucracy would have been required to administer this kind of a program?

Mr. SAWHILL. Well, I cannot honestly answer that question, but you could refund it through the withholding system for those who are covered by taxes. Then you could go to social security and other systems to catch those that are outside of the tax system.

It would certainly be a lot less bureaucracy than would be needed for a rationing system. You see, I think the important thing is that we are trying to work through the price mechanism; yet we are trying to offset the bad redistributional effects through this refunding device.

Now some of the other proposals that have been advanced have been to, say, put a tariff on crude oil and products coming into this country. It seems to me that that would have the problem of taxing fuel oil and gasoline at the same rate and I do not think that makes sense because people can give up gasoline a lot easier than they can give up fuel oil.

And another thing to remember is that there is really a short- and long-run elasticity associated with gasoline, and the short-run elasticity is probably 0.15 or 0.2, but over time, as people change their lifestyles to place greater emphasis on public transportation, as they begin carpooling, as they trade in their big cars for smaller cars, this elasticity probably goes up.

I think my associate has got something to say on this.

Mr. SANT. Well, I just want to be sure we understood that the refund did not have to be used for gas tax. That is, the refund could be used for food or it could be used for local transit or it could be

used for anything anybody wanted. So indeed, all it did was shift the demand from gasoline, which then was more expensive, to something else. But it could be used in gasoline if you wanted to.

Senator PROXMIRE. Did you make an analysis of the various options on taxation? That is, a possibility of a broader energy tax, not just gasoline?

Mr. SAWHILL. Yes, we looked to the broader energy tax, but as I say, the concern that I had with that was that it taxed all petroleum products at the same rate, and I do not think that is fair to tax heating oil the same rate that you tax gasoline.

Mr. SANT. It is interesting in a comparison——

Senator PROXMIRE. Well, if you have the same kind of refundable provision——

Mr. SAWHILL. You could, yes.

Senator PROXMIRE. It is very important that we do consider the fact, as you imply in the question there are many, many older people in my State—I got a lot of complaints last year—who were just in serious straits. They had big old frame homes in the rural areas and that increased cost of fuel oil was very painful to them. And I think there would have to be more kind of a refundable provision, but in the same way, it would seem to me that you can make the same kind of an argument that if you refund it to the low-income people, that you might apply this to fuel oil as well as gasoline.

Mr. SAWHILL. Yes.

Mr. SANT. Mr. Chairman, we found in comparing with other countries, that even though most other countries have a high gasoline tax, they have a 1-cent or 2-cent fuel oil tax. There is good rationale for that. There is not the flexibility. There is not the slack in the fuel oil consumption as there is in gasoline consumption. People pretty much can cut back maybe 15 percent, as we found last winter, but beyond that you really have a very cold house.

So our feeling on that score was that you could be much more aggressive in terms of providing free insulation or of tax incentives for insulation, and storm windows, and caulking, and so forth, and be more effective in those programs than you would be in putting a tax on fuel oil.

Senator PROXMIRE. Let me ask a very critical question in regard to all of these top-level administration energy goals.

In Secretary Kissinger's statement, environmental statements and so forth, what specific role did you play? Is the FEA Administrator supposed to play an important role in such decisions in the Ford administration, or he is just waiting until they get more of a yes man or teamplayer in the top FEA position?

Mr. SAWHILL. I really do not know. We did not play much of a role in developing Secretary Kissinger's statement.

Senator PROXMIRE. Well, I think this is unfortunate. It would seem to me that the efficient way to operate is to call on your most expert agency and most expert people. You do not have to accept their advice but to find out what they know and what they think, they feel, and they have learned. Apparently that has not been done.

You mentioned last week that some mandatory conservation measures are needed. You specifically cited increased taxes and tax credit for home insulation, as we have just discussed.

Could you give us more details on the necessary tax increases you envision and what are the nontax mandatory measures you advocate?

Mr. SAWHILL. Well, I think basically there are two areas we have to look at. One is the automobile and transportation and the other is our buildings, commercial and residential buildings.

In the building area I think we need to give tax credits for insulation. For existing buildings and for new buildings I think we should probably set standards for insulation.

As far as the transportation is concerned, obviously, I do favor some kind of a tax or a refundable tax on gasoline and some kind of tax credit, tax penalty combined mechanism to encourage people to buy more energy-efficient cars.

I would think a program of these four points probably could go a long way toward reducing our energy consumption without having a serious economic impact.

Senator PROXMIRE. Let me get now into the off-shore oil question.

Governor Edwards of Louisiana has said that accelerated development of offshore oil is "absolutely essential," is the words he used, for the Nation's economy and security.

Do you agree with that assessment?

Mr. SAWHILL. I think it is important that we find out what oil we have on the Outer Continental Shelf. Actually, we have not drilled any wells out there and we really do not know what is there. The only evidence we have are based on geological and geophysical information, which is not very good.

We thought there were significant oil reserves down in the so-called Mafla area down off Florida. Several wells have been drilled there and they have been dry. This does not mean that oil is not there, but it means we have not found it yet.

So I would encourage a program of rapid exploration of the Outer Continental Shelf to see exactly what reserves we have and then once we have determined that, we will be in a better position to know how to develop them.

Senator PROXMIRE. How practical is that, though? Is it not true, would the oil companies not argue that if they are going to spend all of the funds necessary for exploration, that they ought to have an opportunity to use what they find and produce?

Is that not the reason for exploration and incentive for it?

Mr. SAWHILL. Yes, I guess that means that maybe you have to, maybe the government has to become more involved in the exploration process.

Senator PROXMIRE. President Ford has recently backed down from a firm commitment to lease 10 million acres for offshore drilling and you indicated this morning that that was not sacrosanct, that it was more or less of a goal.

I am not sure, though, what position you take. Specifically, do you feel that only the more environmentally safe areas, as indicated in the recent Council on Environmental Quality studies shall be developed in the near future?

Mr. Sawhill. Yes.

Senator PROXMIRE. It has been estimated that the cost of the offshore oil production has ranged from $1.40 to $1.50 per barrel.

How do you reconcile that with new oil prices around $10 a barrel?

Mr. SAWHILL. I think those estimates are too low, frankly. I do not

have a good alternative figure for you, but our estimates are significantly higher than that one.

Senator PROXMIRE. Do you feel that oil companies need further incentive by removing controls in the price of old oil?

Mr. SAWHILL. No. I have not advocated that.

Senator PROXMIRE. How about rolling back the price of old oil at the cost basis plus incentives to drill, or keep the price at the present level and tax away the difference so that the public, not the oil companies, get the profits from the higher prices?

In other words, rationize the whole thing.

Mr. SAWHILL. Well, of course, cost based regulation in the natural gas industry has caused some of our current energy problems, so I would be somewhat reluctant to recommend a continuing price control program with cost based regulations.

Senator PROXMIRE. But I do not understand why they should not have a situation where they get the cost back and adequate incentive, but not a price that is not related to their cost. It gives them these profits that everybody argues are so X-rated.

Mr. SAWHILL. I think the problem is that when you get into a government regulatory mechanism like the FPC, you find that you regulate prices at such low levels that you just discourage development.

Clearly, this happened in the natural gas industry. Maybe it is a part of the malaise of bureaucracy.

Senator PROXMIRE. There is a very, very serious dispute about that. A lot of people do not agree that that is a problem in the natural gas industry.

Mr. SAWHILL. Yes, that is true.

Senator PROXMIRE. Last week the governors of various coastal states asked to receive special financial technical assistance to soften the impact of offshore drilling. Specifically, they requested an extra $3.35 million—in planning grants under the 1972 Coastal Zone Management Act and $6 million in emergency grants.

Do you in the FEA favor these allotments?

Mr. SAWHILL. I do not know if we have studied these specific figures or not, but I would agree. As I said in my statement, that the Federal Government is going to have to deal with the issue of insuring states of the capability to plan for resource development, not only the coastal States but also the states in the Rocky Mountain area. And the government is going to have to provide some kind of program to insure that as new areas are developed, that the necessary school transportation facilities and sanitary facilities are there in advance of the time when the tax base is high enough to support these facilities.

Senator PROXMIRE. Let me go back for a minute to that 10 million acre figure.

If we do not really know what is there—as you say, we want to find out what is there—where did the 10 million acre figure come from?

Mr. SAWHILL. I really do not know.

Senator PROXMIRE. It did not come from the FEA?

Mr. SAWHILL. No, this was a program administered by the Department of Interior.

Senator PROXMIRE. Where would they get this? Would they get this from Interior?

Mr. SAWHILL. Yes. This is a Department of Interior program. I do not know where the 10 million acre figure came from.

Senator PROXMIRE. Let me ask something about oil shale. The recent American Petroleum Industry meeting in New York, there was a marked decline in interest for oil from shale and tarsand, as in coal gassification. In October, in fact, Colony Development announced that its plan to be the first commercial oil shale plant was cancelled.

Do you feel that environmental regulations have really played a significant part in this diminution of industry enthusiasm or are there other factors more dominant?

Mr. SAWHILL. I think there are other factors more dominant.

Senator PROXMIRE. Such as——

Mr. SAWHILL. In the Colony case it seemed to me from what they said they were looking for some kind of a Government price guarantee program before they continued on with their project and they were also concerned about the impact of inflation on their cost. Their costs have gone up very substantially and unless they were sure that they could sell their product at $10 or $11 or $12 per barrel, they did not feel it made sense to continue on with the investment.

Senator PROXMIRE. And they felt that there were some commitments made in some of these areas. Do you think that is softening now with respect to oil shale?

Mr. SAWHILL. I think somewhat, yes. I think people are beginning to recognize that there are significant problems associated with the development of oil from shale and perhaps until we have improved technology it is going to be difficult to really have a significant industry there.

Senator PROXMIRE. Many industry people have argued that if the synthetic fuels industry would be established, the Federal Government must offer price supports.

Do you agree, and if you do, what should be the magnitude and duration of such support?

Mr. SAWHILL. We are studying the question of price supports. I really have not reached any conclusion yet. On the one hand it seems to me that part of the risk that businessmen have to bear in order to justify their profits are the risk of fluctuating prices. On the other hand, if we are really serious about expanding our energy supplies, perhaps we will have to give some guarantees.

I would be careful about going into any program of this type because once you get into it, you marry the Government and the industry so closely that it would be hard to separate it. We will find ourselves supporting the energy industry like we do the farm industry.

Senator PROXMIRE. Well, I am very concerned about the enormous size of this proposal. Let me be specific. A recent proposal submitted to the Project Independence team by Commerce Secretary Dent called for almost $100 billion for indirect development of the synthetic fuels industry. It would involve the Government guaranteeing the price of synthetic oil and gas for 14 years, from 1978 to 1992.

The Federal Government already paid out about $100 billion in subsidies, according to a study this committee has made overall, and of course this would be, a 14-year new proposed subsidy of $100 billion or $6 or $7 billion a year.

But is that really being given serious consideration by those associated with Project Independence?

Mr. SAWHILL. Not in our agency, no. Nothing of that magnitude.

Senator PROXMIRE. Do you think that investments could be better spent on solar energy and methods to burn coal more cleanly without burning gas?

Mr. SAWHILL. I think we should also consider coal conversion processes. I would not rule those out.

Senator PROXMIRE. They are not of this colossal cost.

Mr. SAWHILL. Not at $100 billion, no. I do not think we—on the other hand we are spending a significant amount on solar energy, and I do not think we could productively spend a great deal more right now because solar energy is not at the demonstration project stage.

Senator PROXMIRE. Solar energy has a tremendous amount of appeal because it is inexhaustible, it is clean, it is safe.

Mr. SAWHILL. Yes.

Senator PROXMIRE. It has such advantages over these other sources.

Mr. SAWHILL. Well, we are spending $50 million a year on solar energy. Really, the problem with solar is it is too expensive. Generating solar central power stations are 50 times as expensive as generating electricity from these other sources.

Senator PROXMIRE. Well, this is exactly why research is, of course, called for. It is that expense.

Mr. SAWHILL. And we are spending. We are spending $50 million a year but it is not at the stage where we are ready to go out and build big plants, and that is why the expenditures are not higher.

Senator PROXMIRE. At $50 million a year, it would compare with the proposal here of $7 billion, so it would be a very tiny fraction, less than 1 percent.

Mr. SAWHILL. Well, I do not know about the proposal you have, but my own assessment is that we are spending significant amounts on sulfur and you will see that escalate, as it has over the last few years.

Senator PROXMIRE. Let me ask you a few questions about coal, western and eastern. One of the major arguments of the electric utilities has been that western coal must be developed in order to meet the clean air standards on sulfur dioxide emissions. The reason is there simply is not enough low sulfur coal in the East.

Do you feel this is true, and how much of low sulfur coal in the East is already tied down by steel companies, either under long term contract or ownership relative to the amount of reserves still available for development and use by eastern powerplants?

Mr. SAWHILL. Unfortunately, we will have to get you the answer to that question, because we do not know exactly what it is, the part about eastern coal.

I mean the fact is, however, the alternative to burning low sulfur western coal is to burn higher sulfur eastern coal and use a scrubber.

Senator PROXMIRE. Well, if there are substantial eastern reserves, as I believe various regional studies have indicated, should we consider eliminating the subsidies for western coal and/or subsidize eastern coal development?

Mr. SAWHILL. I do not know. How do we subsidize western coal development?

Senator PROXMIRE. Let me spell out, just take a minute to spell out what I mean by subsidies. I am referring to the leasing of Federal coal lands in the west for a fraction of what they are worth as well as lopsided coal research budgets with nearly all of the funds going for research applied to western coal development.

Mr. SAWHILL. Well, I think the leasing, I think the Department of Interior is now working on a revised leasing policy which probably will be a stricter policy than we have had in the past.

Senator PROXMIRE. Can you give me an idea of what percentage of coal research money in recent years has gone for the development of eastern coal?

Mr. SAWHILL. I could not give you the mix between eastern and western. I mean we could find out but we do not have it.

Senator PROXMIRE. Why does the Government not provide more substantial assistance for further eastern coal development? The unemployment problem in the already depressed Appalachian region will become even worse. In addition to declining payrolls, tax revenues in secondary industries will also decline in that region.

What do we do, just write off an entire region or does the administration have some plan to alleviate the burden for the Appalachian region if western coal development becomes the wave of the future?

Mr. SAWHILL. I do not think we should write off an entire region, no. I would think that investment in scrubber technology would enable us to burn eastern higher sulfur coal and burn it cleanly. And in my statement I discuss the fact that it probably was a good idea to begin requiring scrubbers, particularly on eastern utilities.

Senator PROXMIRE. As I understand it, if western coal movement continues, there would have to be some kind of a shift in industrial plant relocation closer to the major energy sources, especially if coal gassification plants were established throughout the West.

Has there been any study of whether the West can accommodate this potentially massive change and whether the present residents would desire it?

The evidence of the recent election is that there is protest in Colorado and I think from some of the other States against this intense industrialization.

Mr. SAWHILL. Yes, there is no question about that. As a matter of fact, after the election I went out and spent some time with the new Governor-elect in Colorado and he feels very strongly that while development should take place, it should certainly take place in a moderated fashion so that the environmental values are preserved. And it is not only the environmental values, as I said earlier, it is making sure that another Appalachia is not created on the western slope of Colorado. It is making sure that adequate schools are there so that when communities are developed, children have a place to go.

Mr. SANT. We have undertaken an internal study with the CEQ on this subject and I am not sure when that study is going to be completed.

Mr. WOODCOCK. We undertook the study about 3 or 4 months ago. It will be finished sometime early 1975, at least the first phase. That is looking at the environmental implications on a number of different scenarios which would include the development of the coal resources

in the West and then shipping it directly to the various markets, Chicago or other places.

Our tentative scenarios would look at the environmental consequences and the costs of gasifying it or converting that energy into a different form before shipping it to other demand locations.

We intend to look at everything from trace metal effects to water consumption and a number of other aspects of western resource development in subsequent phases. But we are looking seriously at the environmental consequences of western development, including secondary impacts.

Senator PROXMIRE. I think you might have answered this question in your opening statement. There has been so much that has transpired, I am not sure. But do you believe that the use of western coal by eastern powerplants will be more expensive than using eastern coal with scrubbers?

If so, are some utilities and coal companies taking advantage of the Clean Air Act to bring about displacement of eastern coal markets by low-grade western sub-bituminous coal?

Mr. SAWHILL. It is approximately the same. The use of eastern coal with scrubbers versus western coal and the transportation required, and when you consider that some western coal may also require scubbers because of its Btu, sulfur content per Btu, I think it is just about a standoff.

Senator PROXMIRE. Well, overall, then, do you feel that the development of western coal, largely by strip mining, on a substantial scale is absolutely mandatory, if the United States is to achieve some meaningful energy conservation?

Mr. SAWHILL. I think we should develop our western coal, but I think we have to do it in a careful and deliberate way. I would not want to preclude the development of western coal.

On the other hand, I think we are going to have to avoid developing it so rapidly that we neglect environmental and social values.

Senator PROXMIRE. Well, now, in the first part of your testimony, you mention, and I quote, "pressure in the industry to develop western low-sulfur coal."

Do you feel that some of this pressure may come from the following two factors: first, it is much easier for the energy industries to obtain large tracts of land from a single owner, namely, the Federal Government, rather than obtaining land in the East from a fragmented pattern of ownership; and No. 2, the fact that the companies will not have to deal very much with the United Mine Workers Union in the West, or not as much.

Mr. SAWHILL. I think the first is probably true. The second I am really not informed on. I think the important point probably is that——

Senator PROXMIRE. In other words, by the first you mean the fact that the Federal Government is easier to deal with than the fragmented ownership in the East?

Mr. SAWHILL. Yes; there is no question about that. I do think that the real issue, though, is the question of productivity and there is a lot greater productivity in the western strip mines with 125 foot thick seam than there is in an eastern deep mine or even an eastern strip mine.

Senator PROXMIRE. I want to thank you very, very much, Mr. Sawhill. You have been an excellent witness this morning, and I certainly very much regret your departure. We have had our differences.

Mr. SAWHILL. Yes, sir.

Senator PROXMIRE. I greatly admire you, and respect your intelligence, and am grateful to you, as I am sure all citizens should be, for the excellent service that you gave this country in a time of serious crisis.

Thank you very much.

Mr. SAWHILL. Thank you very much.

Senator PROXMIRE. The committee will reconvene at 10:30 Thursday morning to hear the vice president of the American Petroleum Institute, the president of E. I. du Pont, and chairman of the board of Tennessee Valley Authority, on the same subject.

[Whereupon, at 11:25 a.m., the committee recessed, to reconvene at 10:30 a.m., Thursday, November 21, 1974.]

THE ECONOMIC IMPACT OF ENVIRONMENTAL REGULATIONS

THURSDAY, NOVEMBER 21, 1974

CONGRESS OF THE UNITED STATES,
JOINT ECONOMIC COMMITTEE,
Washington, D.C.

The committee met, pursuant to recess, at 10:35 a.m., in room 1318, Dirksen Senate Office Building, Hon. William Proxmire (vice chairman of the committee) presiding.

Present: Senators Proxmire and Javits.

Also present: Loughlin F. McHugh and Courtenay M. Slater, senior economists; William A. Cox and Robert D. Hamrin, professional staff members; Michael J. Runde, administrative assistant; George D. Krumbhaar, Jr., minority counsel; and Walter B. Laessig, minority counsel.

Senator JAVITS [presiding]. The committee will come to order. I am presiding today over the hearing by the Joint Economic Committee by designation of its vice chairman, Senator Proxmire, who cannot be here momentarily but will hope to join at a later stage of the hearing.

Senator Proxmire proposed the following statement as opening the second day of hearings in this particular series.

OPENING STATEMENT OF SENATOR PROXMIRE

This morning the Joint Economic Committee is pleased to have three industry witnesses to testify on the economic impact of environmental regulations. We will thus be hearing from those who are on the receiving end of the regulations as to the ways in which their industries meet the standards and the intraindustry impacts generated in doing so.

Specifically, we will be looking for answers to the following questions as well as many other related ones:

What has been the ultimate price changes in your products due to environmental regulations? What impact has there been on expenditures for new plant and equipment? Has there been any significant construction delays, plant closings, increased layoffs, et cetera, due to compliance with the regulations? Have there been any positive effects for industry, such as more efficient processes, productivity increases or conservation of materials?

Since two of the three witnesses are from energy-related industries, I anticipate quite a bit of discussion concerning the impact of the environmental standards on the future supply of energy.

As in Tuesday's hearing with John Sawhill, FEA Administrator, we will hopefully have a thorough discussion of the question of whether

environmental regulations have unduly restricted supply or whether the environmental benefits have outweighed any curtailment of supply or increase in fuel costs.

With $274 billion estimated as the expenditure for pollution control in the 1972–81 decade, this is simply an area that must receive much closer attention since it has critical implications for both the economy and the supply of energy in the near future.

The three industries being represented today are the three which have experienced, and are currently experiencing the greatest total dollar expenditures for pollution control. I am sure they will be open and frank on the cost side, but I also hope that we will hear their viewpoints as to the possible benefits to be gained from pollution control measures.

Providing the industry perspective will be P. N. Gammelgard, vice president of Industry Affairs, American Petroleum Institute, E. R. Kane, president of Dupont and Aubrey Wagner, Chairman of the Board, Tennessee Valley Authority.

That is the end of Senator Proxmire's statement.

Mr. Kane, I gather you are sitting in the middle with a name card; is it the intention that you would go first?

Mr. KANE. That is perfectly agreeable with me.

Senator JAVITS. Well, no, whatever you gentlemen wish.

Mr. KANE. That will be fine.

Senator JAVITS. Mr. Kane.

Mr. KANE. Thank you.

Senator JAVITS. And I hope you will accept Vice Chairman Proxmire's apology but it is a matter entirely beyond his control. Please proceed.

STATEMENT OF EDWARD R. KANE, PRESIDENT, DU PONT CO., ACCOMPANIED BY WILLIAM J. DRIVER, PRESIDENT, MCA; AND JOHN F. SCHMUTZ, CHIEF COUNSEL FOR ENERGY AND ENVIRONMENT

Mr. KANE. Mr. Chairman and members of the committee, my name is Edward R. Kane. I am president of the Du Pont Co. I am also chairman of the board of the Manufacturing Chemists Association, a nonprofit trade association of 170 U.S. members representing more than 90 percent of the productive capacity of basic industrial chemicals within this country. I am accompanied today by Mr. William J. Driver, president of the MCA—on my left, and by Mr. John F. Schmutz, Du Pont chief counsel for energy and environment—on my right.

I. INTRODUCTION

At the outset I would like to make it clear that Du Pont, and the chemical industry in general, are dedicated to the control of pollution in a progressive and responsible manner. Du Pont, among others, instituted a pollution control effort more than 15 years before it was required by the enactment of major Federal legislation. During this period, Du Pont capital spending for pollution control facilities averaged 2 to 3 percent of capital spending for plants and properties.

Now, new efforts are needed and the chemical industry has accepted that challenge. In analyzing the scope of the task that lies ahead, I

would like to emphasize four points that I consider both relevant and important:

1. The absolute amount of expenditure for pollution control is very large;

2. The costs of pollution control are borne disproportionately by different segments of the economy;

3. We are just beginning to feel the economic impact of laws and regulations promulgated during the last 4 years; and

4. We do not yet know the level of environmental improvement economically, technically and socially attainable.

My first point is directed toward a recent attempt to minimize the inflationary implications of pollution control by stating that pollution control expenditures are currently only 0.7 percent of the GNP. We have not been able to determine the basis for this number, but we do not agree that this level of expenditure should be belittled. Even if this figure is a fair estimate, it still translates into $10 billion for the economy as a whole this year, one-third more than the total new investment in plant and equipment by the entire chemical industry this year. It also completely ignores my next point, that these expenditures do not apply evenly to the economy.

Pollution control expenditures are heavily concentrated in a relatively few basic industries, such as electric utilities, refining, chemicals, metals, and paper, industries already short of long-range capacity. These five industries will spend 6 percent of the total outlay by U.S. industry for air and water pollution control in 1974. Unless these basic industries are allowed adequate time to adjust to the concentrated impact of such large spending requirements, the disruptive effect on them will be passed rapidly through the economy.

With respect to my third point, the investment and operating costs of pollution control facilities have escalated substantially during the last few years. The more demanding requirements of the Clean Air Act and the Federal Water Pollution Control Act Amendments of 1972 are just beginnig to take effect. Thus, the full impact of this major legislation is yet to be felt, and the cost of environmental management will continue to rise.

We do not yet know, for example, what level of technical effort, economic expenditure, or social cost is required to reach a zero discharge, a goal which is highly questionable in its technical and economic realities. We do know that the cost estimates have been consistently understated and have increased each year. In 1973, EPA estimated that $60 million of investment was required for municipal treatment works and sewer construction.

The estimate 1 year later for that same work is $114 billion—a very large increase admittedly even with inflation.

The standards to be met also require technology not yet invented.

II. INFLATIONARY IMPLICATIONS OF POLLUTION CONTROL

Chemical industry and Du Pont pollution control data since 1970 are shown in exhibits 1 and 2.

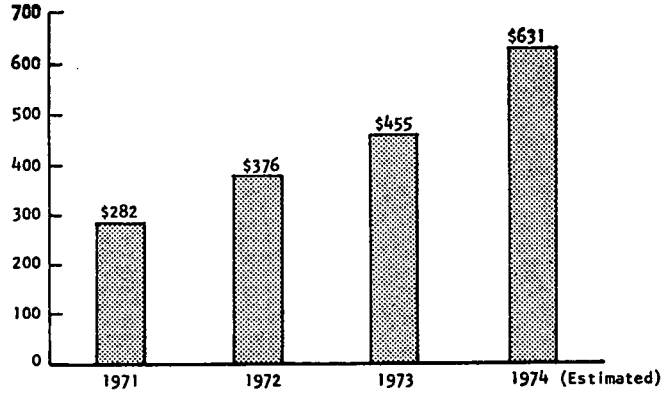
Senator JAVITS. They will be received and incorporated in the record.

[The exhibits referred to follow:]

EXHIBIT 1

CHEMICAL INDUSTRY - U.S.

TOTAL NEW INVESTMENT FOR AIR AND WATER POLLUTION CONTROLS
(in millions of dollars)



Detail of Investment:

	Actual						Estimated	
	1971	% of Total*	1972	% of Total*	1973	% of Total*	1974	% of Total*
Air	$124		$162		$183		$285	
Water	158		214		272		346	
Total	$282	8.2%	$376	10.9%	$455	10.2%	$631	10.4%

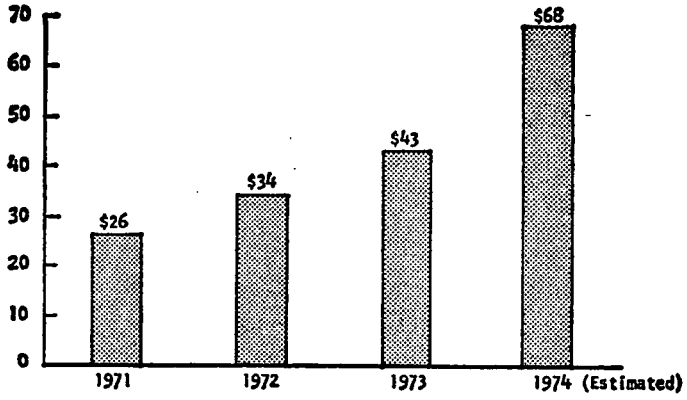
*Total U.S. capital expenditures.

Source: 7th Annual McGraw-Hill Survey of Pollution Control Expenditures released May 17, 1974, and prior McGraw-Hill releases.

EXHIBIT 2

DU PONT COMPANY

TOTAL NEW U.S. INVESTMENT FOR POLLUTION CONTROL
(In millions of dollars)



Detail of Investment:

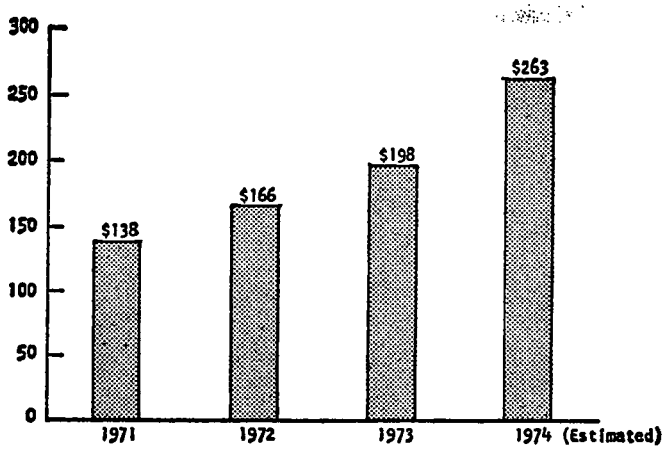
	Actual						Estimated	
	1971	% of Total*	1972	% of Total*	1973	% of Total*	1974	% of Total*
Air	$ 5		$ 14		$ 10		$ 26	
Water	20		17		30		37	
Solid	1		3		3		5	
Total Investment	$26	6.6%	$ 34	7.7%	$ 43	6.7%	$ 68	7.9%
Annual Cost of Operating & Maintaining:								
Air	$13		$ 12		$ 15		$ 20	
Water	22		22		37		50	
Solid	6		4		7		10	
Total Operating	$41		$ 38		$ 59		$ 80	
R & D, etc.	11		28		34		35	
Total Operating, R & D, etc.	$52	13.1%	$ 66	14.9%	$ 93	14.4%	$115	13.4%
Total Pollution Costs	$78	19.7%	$100	22.6%	$136	21.1%	$183	21.3%

*Total U.S. capital expenditures.

EXHIBIT 2.—Continued.

DU PONT COMPANY

TOTAL CUMULATIVE U.S. INVESTMENT FOR POLLUTION CONTROL
(In millions of dollars)



Detail of Investment:

	Actual						Estimated	
	1971	% of Total*	1972	% of Total*	1973	% of Total*	1974	% of Total*
Air	$ 40		$ 54		$ 59		Not Available	
Water	91		105		129			
Solid	7		7		10			
Total	$138	2.9%	$166	3.2%	$198	3.5%	$263	4.1%

*Total gross U.S. plants and properties.

Mr. KANE. In general these data show that capital expenditures will have more than doubled in the 4-year period from 1971 through 1974. Du Pont's experience generally confirms this projection.

Although no reliable industry data for operating expenditures are available for the 1971–74 period, we estimate that they followed a trend similar to investment expenditures and, again, Du Pont's experience confirms that estimate. Since year-end 1970 Du Pont operating costs for pollution control have about doubled.

Pollution control investment as a percent of total capital investment has also escalated rapidly since 1970. Du Pont capital investments for pollution control are currently about 13 percent of our total capital investment budget and we believe this percentage is representative of the chemical industry. Du Pont's capital budget for pollution control facilities over the next 3 years will approach $400 million.

Let me illustrate the importance of this point with a specific example. Next year Du Pont plans to authorize $175 million for new pollu-

tion control facilities. For this sum, the fiber industry could build capacity to produce about 250 million annual pounds of fiber, yarn and staple. This plant would employ approximately 2,500 people. More importantly, its output would create about 60,000 jobs in "downstream" industries, and we estimate annual retail value of the finished products would be in the range of $2 billion dollars.

The unusual economic conditions experienced since 1970 by the chemical industry—and by industry generally—make it exceedingly difficult to determine the extent to which increased pollution control expenditures have been recovered through price increases. The task is further complicated by the fact that price and price structure data are understandably not available from other companies. For these reasons, my comments to this question are necessarily limited to Du Pont.

During this unusual period, the profitability of Du Pont's operations was first dominated by wage-price controls and then, in the last year, by spectacular rises in raw material prices. Because of the prenotification requirements of the control regulations, Du Pont found it impossible to fully recover increases in operating costs including, of course, pollution control costs. Since the beginning of 1974 Du Pont's raw material costs alone have increased 82 percent, and our selling price index has gone up only 27 percent. As a result, it would be meaningless to speculate that one category of cost increase has been recovered to the exclusion of another.

Although the impact of higher costs varies across the breadth of the chemical industry, in a number of cases our markets currently will not stand further selling price increases. In those cases, there is no opportunity to raise selling prices due to higher pollution control or any other costs. It is therefore, with particular concern that I turn to your question as to what industry can expect in terms of pollution control expenditures in the next 3 to 5 years.

By the end of 1975 Du Pont's investment for pollution control facilities, both in place and authorized, will be nearly $600 million. This amount is almost double the corresponding investment figure at the end of 1973. Toward the end of this decade the impact of investment to meet 1983 Water Act requirements will begin to be felt. Because the conditions we must meet and the technology to meet them are as yet undefined, we cannot forecast the investment that will be required. However, make no mistake, it will be large and is of great concern. We forecast Du Pont's operating costs for pollution control will rise steadily over the period and double by 1977, and believe the trend will be matched by the chemical industry.

The major reasons for these increases in pollution control expenditures will be:

1. The requirements under the Water Act that we achieve "best practicable control technology" by 1977 and "best available technology" by 1983.

2. The requirements to be met under the Clean Air Act within the next 3 years.

3. The probable need to develop within the next 5 years alternatives to such practices as ocean disposal, the alternatives to which are expected to be much more costly.

4. Inflation.

Let me give you two examples of why industry's environmental costs are rising sharply and how a balanced approach would help. At one of our plants we could invest $1.2 million in equipment which collects 94 percent of the particulates from powerplant emissions. But because of air pollution regulations we are installing equipment which collects 97 percent. The incremental 3 percent requires an additional investment of $1.8 million, and air quality will not be improved by a detectable amount.

The Academy of Natural Sciences made tests at one of our plants which has a $6 million biotreatment unit. With this treatment, measurements show no detectable differences at points above and below the plant outfall, and it has been clearly established that the receiving water is healthy. Nevertheless, rigid imposition of best available control technology will require investment of an additional $6 million for further treatment of effluents, but will result in negligible environmental benefit.

The chemical industry includes a wide range of companies producing for a variety of domestic and international markets. The ability of chemical companies to pass on higher pollution control costs during the next 3 to 5 years will vary widely depending on their competitive positions and market conditions in both United States and export markets. It is perfectly clear that in the long run, these costs, like any other costs, must be passed on to the consumer in the form of higher selling prices.

In looking to the future, we see an important trend in our industry. To date, most standards for pollution control have been met by end-of-line treatment, although some process changes as well as new uses for waste materials have been developed. However, the costs of end-of-line treatment will become increasingly and, in some cases, prohibitively high. Our innovative industry, given time, is certainly going to solve some of these problems through equipment redesign and process modification. However, in many cases the standards will only be met through higher investment and operating costs for more sophisticated equipment, heavier research expenditures, the consumption of more energy and scarce raw materials and, finally, I am afraid, the obsolescence of some existing plants. In some cases, the money to do this simply may not be available.

III. RECESSIONARY IMPLICATIONS OF POLLUTION CONTROL

The chemical industry is one of those industries affected by the severe shortage of capital for new investment. This situation has not always been apparent because of the rising absolute trend of our capital outlays. However, long-term demand for the industry's products is very great and more funds could be spent if they were available at a reasonable cost. We have projects that are being delayed because of a shortage of funds. Whenever the demand for capital exceeds the supply, any dollars spent for pollution-control facilities are dollars that cannot be spent for productive plant and equipment. In Du Pont's case, spending 13 percent of our capital budget for pollution control means we're getting 13 percent less capacity for our investment dollar.

As the proportion of investment in pollution control rises, there will be increasing pressure to obtain higher returns on the remaining share

of productive investment. Thus, the cost of pollution-control investment must ultimately be reflected in higher prices in the marketplace or in reduced levels of capital investment as the return on investment falls below the cost of money.

The impact of environmental standards varies markedly among the many companies in our industry. Their ability to manage the technical and financial problems involved depends on such factors as the nature of their businesses, their location, the size of their technical forces, and the age of their plants. Our industry will continue to spend the funds needed for meaningful environmental improvement but we are concerned when, as in the examples I mentioned earlier, large sums are spent without significant improvement in environmental conditions.

IV. OTHER CONSIDERATIONS

Financing of environmental management has varied markedly among companies. Du Pont has funded pollution-control investments primarily out of internally generated funds. Others have used general borrowings. To date, Du Pont has not financed pollution control through industrial revenue bonds, although applications have been made. The administrative complexities in dealing with separate State and local governments make such funding a rather long, drawn-out procedure. The chemical industry and MCA have testified that investment tax credits are an effective way to help encourage investment in pollution-control facilities.

While it is true that in some cases benefits other than environmental have been obtained, investment in environmental facilities has not yielded the chemical industry a financial return. As progress is made and operations tightened up, there will be fewer opportunities to realize savings in materials, energy, and costs. In fact, much of this progress was made years ago through improvement programs. In Du Pont, despite our best efforts very few of our environmental projects recover operating costs. Another important aspect of operating pollution-control equipment is the consumption of scarce natural gas and petroleum products. In Du Pont we used the equivalent of 2.5 million barrels of oil last year for pollution control. This was approximately 6 percent of our total energy usage. This number will more than double by 1977.

V. CONCLUSIONS AND RECOMMENDATIONS

In conclusion, I would like to emphasize that Du Pont and the chemical industry are committed to controlling pollution and improving the quality of life. We believe that any waste of resources, manpower, or dollars that results from laws or regulations that do not balance the benefits to be gained with the cost to achieve is a luxury this country can ill afford. We have spent large sums and have made substantial progress but candor requires that I say that I believe a much more effective job could have been done at less cost if the country had not been bent on simplistic laws, easily administered regulations and timetables that did not allow for the development of more alternatives and a full evaluation of them.

I would like to make two suggestions:

1. The focus of regulation and accomplishment should be squarely on balancing the costs of compliance against the benefits to be gained, rather than on what may be technically possible.

Senator JAVITS. The Chair wishes to add that all the witnesses make their statements and then be questioned. I cannot stay for that.

Senator PROXMIRE [presiding]. I am perfectly happy to have Senator Javits, he was so helpful in accommodating us, and I am sure that the witnesses would be glad to respond to Senator Javits' questions at this point and you can resume and complete your statement.

Senator JAVITS. I have to go to another committee and it is the one that you have just read.

Wouldn't I gather that it would, according to your own thesis, require to be cranked into that suggestion, also the economic conditions at the time. In other words, your problems now are raising capital, which is very hard to raise and highly excess costs, considering the price level and therefore, that you would have to say you not only wish us to balance compliance, that is, the cost/benefit ratio, but also wish us to crank in whether under existing conditions you can do it at all; is that correct?

Mr. KANE. That is an excellent point and it is one that is well taken and has to do with the rate at which some of these things are accomplished.

Senator JAVITS. In other words, the industry's main case for a stretch-out is the economic situation and the inflationary situation which also make it impossible even with the best will in the world to do what is required by law; is that correct?

Mr. KANE. That is right.

Senator JAVITS. Thank you, Mr. Vice Chairman.

Senator PROXMIRE. Go ahead.

Mr. KANE. Thank you.

Certain time limitations in current laws and regulations should be revised to allow the development of better solutions to the complex problems involved in the management and protection of our environment.

I am not saying the best solution or ideal solution, I am saying the best solution, this is involved in the management and protection of our environment.

With respect to my first point, I believe that too frequently technical feasibility, rather than environmental quality, is used as a standard with the result that resources are expended without sufficient environmental benefit. The use of emission, rather than ambient air quality standards under the Clean Air Act is an example. Requiring economic impact statements for major environmental actions would help focus attention on how much improvement will be obtained and what its cost will be to our economy.

As to the second point, adjusting timetables to permit more efficient development and application of technology will aid in striking a better cost-benefit balance. For example, we believe the time frame for moving from 1977 levels of water control to the 1983 levels is much too short. The attainment of post-1977 requirements is dependent upon technology, some of which is not yet developed. While we are an innovative industry, our experience tells us that some of our research programs do not produce results as rapidly as one might like.

We are now at a crucial point in our history and must decide how we use our resources and what technical solutions will be offered to solve complex environmental problems. Shall we take advantage of industry's expertise or will we leave it to the machinery of Government? I submit that it will take the best of both.

I will now be glad to answer questions.

Senator PROXMIRE. Thank you very much, Mr. Kane.

Gentlemen, we have used about almost half an hour, I understand, from the time the hearing started, and I would appreciate it very much if we could abbreviate the testimony as much as possible.

Mr. Gammelgard, if you would proceed, and I would hope you could confine your testimony to the first 12 pages, if possible, and the entire statement will be put in the record, and any way you could abbreviate or summarize that we would appreciate, too. You have been very accommodating in making your statement available to use in advance.

STATEMENT OF P. N. GAMMELGARD, VICE PRESIDENT, AMERICAN PETROLEUM INSTITUTE

Mr. GAMMELGARD. The Institute continues to support sound laws and regulations that aim at improving the quality of the Nation's air, water, land, and other natural resources.

We have long been fully aware that they can have substantial benefits for society. Much of the Institute's testimony on environmental matters before Federal agencies and congressional committees like this one has been concerned with the question of just what a sound environmental regulation is.

Allow me to cite some examples of the kinds of regulatory questions that have been of concern to us:

Is a regulation so "technology forcing" that it leads to adoption of one solution, but in doing so stifles or even temporarily excludes the development and application of other possible solutions? This has been the case with controlling automotive emissions of hydrocarbons and carbon monoxide by the adoption of oxidizing catalysts.

Do regulations needlessly overlap? Such is the case with the regulations calling for both the availability of unleaded grades of gasoline to protect the catalysts and, additionally, the phasedown of the lead content of leaded grades of gasoline.

Are regulations more stringent than they need to be in order to protect the public health? This appears to be the case with the nitrogen oxides standards and may well be the case with the hydrocarbon standards.

Are regulatory deadlines too tight to permit compliance, despite the best good-faith efforts?

Does a regulation have a built-in energy penalty in this time of severe energy shortfalls?

Whenever the answer to any one of these and other similar regulatory questions may possibly be "yes," then there is reason to believe that waste of natural resources, unnecessary expenditures, and undue socioeconomic disruptions may also be involved.

I will turn now to the specific questions posed in your invitation:

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1. Pollution abatement expenditures since 1970. The Institute has recently published the fourth in a series of reports, Environmental Expenditures of the U.S. Petroleum Industry, for the years 1966–1973.

For the period of immediate interest of the Joint Committee, 1970 through 1973, these environmental expenditures totaled just over $4 billion.

If you will refer to figure 1 in my prepared statement, you will see that the breakdown falls into three categories, capital, operating and maintenance, and administration and research and development and further, into expenditures in the areas of air, water, land and other, all expressed in millions of dollars.

At the lower right hand corner of the tabulation appears 4,029, which being expressed in million of dollars, comes to $4,029 million for that 4-year period.

For that same period, the petroleum refining industry capital outlays for new plants and equipment totaled $22 billion. Of this amount, $2.3 billion environmental capital expenditures, and that is the top bracket on the right-hand column, $2,272, or $2.3 billion, which would represent 10.4 percent for the 4-year period.

This percentage reached a high point of 12.5 percent in 1973.

I know of two new relatively new grassroots refineries built several years ago in which the capital investment in pollution-control facilities ran from 15 to 17 percent of the total capital investment of the plant.

This upward trend is expected to continue into the early 1980's.

2. Passed-through environmental costs. Generally, the petroleum industry believes that environmental costs are one of the costs of doing business that will ultimately have to be recovered in any economically viable operation.

3. Future abatement expenditures. The petroleum industry is in compliance with current regulations and expects to remain in compliance, in answer to one part of your question.

Concerning the cost of compliance with environmental regulations during the next 3 to 5 years, the institute embarked upon an extensive study of the "economic impact of environmental regulations on the petroleum industry" in June 1973. The first phase of that study, by the Stanford Research Institute, was completed in January 1974 and is available for your use. This is a study of all environmental regulations affecting the petroleum industry and compliance cost data available in the literature. There are plenty of gaps.

The second phase of this study, by the Battelle Memorial Institute, has been underway since April of this year and will be completed in the first quarter of 1975. We will make that report available to your staff when it is completed.

This second phase will forecast environmental costs to the industry for present and future regulations through 1983, when best available treatment will be required.

The costs of compliance, of course, depend heavily on the level of control sought, rising more and more sharply with efforts to control pollutants to greater and greater degree, down to the last few percentage points. As an example, under the Federal Water Pollution Control Act, the Administrator of the Environmental Protection

Agency—or EPA—must require what is, in his judgment, the best practicable control technology currently available by 1977 and the best available technology economically achievable by 1983. Beyond that date, the act sets a national goal of elimination of discharge of pollutants (EDOP) for 1985. Implicit in these dates and in the increasingly stringent requirements for each is a rapidly rising cost forecast that is a matter of considerable concern to the industry.

Figure 2, in my prepared statement, taken from an API-sponsored study by Brown & Root, Inc. (August 1973), "Economics of Refinery Wastewater Treatment," illustrates such costs, I think, quite graphically.

If you will look at that table for a moment, the column headed "1977, first level," is best practicable treatment column. The next column is headed "Second level (1983)" calls for best available, and the last column, 1985, is an elimination of discharge of pollutants. You will see these are cumulative as you go across; 12.4 million barrels a day represents, I guess, about 90 percent of the refining capacity of the industry, so that is pretty typical of what we are looking at overall, with best practicable estimated to cost $952 million. By the time you get into the best available that will rise another billion to $1.920 billion, and the estimate for elimination of discharge of pollutants another $800 million for a grand total of $2.711 billion in capital costs.

As to the second part of question 3, again the institute is not in a position to comment on company pricing policies.

4. Types of treatment and research and development expenditures. The most cost-effective way to comply with most regulations is through a combination of plant modifications, process changes, and end-of-pipe treatment.

Figure 3 in the prepared statement shows the industry's expenditures on research and development for the period 1970 to 1973, and there is a gradual buildup, almost, well not quite, doubling.

Over a 4-year period these expenditures did not include the institute's environmental research program, which runs about $3 million per year, and has done so for the last 8 or 9 years.

5. Effect of regulation on capital expenditures. To our knowledge, no capital project has been abandoned exclusively because of specific environmental regulations. Environmental regulations or actions, however, have created extensive delays in a large number of petroleum operations. For example, the construction of several new refineries on the east coast has been blocked. Offshore exploration and production have been delayed from a few months to several years.

Exhibit II, attached to my prepared statement, tabulates the number of these delays with the time of each. The most widely known project, of course, is the Alaska pipeline, which was delayed for more than 3 years as a result of environmental considerations.

As a result of the delay and changes in design, the estimated cost of the Alaska construction in 1969 of $900 million soared to an estimated cost of more than $5 billion in 1974, with construction now underway. As a result of the delay, too, the Alaskan oil that would have been available to us by mid-1973 will not be available until 1977, at the earliest. It is conceivable that had the project gone ahead on schedule and had the oil in the Santa Barbara Channel not been shut

in following the blowout in 1969, then the energy shortages in the United States last winter might not have occurred.

Another potential environmental requirement, which could reduce the industry's ability to add new facilities, is the proposal that would require most new tankers to be built with double bottoms. While this proposal is not yet law, its passage could drive up the cost of construction of very large crude carriers by as much as 8.75 percent.

When you consider that one of these tankers, built in a U.S. yard, would probably run $80 million, the 8.75 percent is not inconsequential.

6. Adverse economic impacts of standards. To our knowledge, to date environmental regulations have not forced the closing of any plant. Earlier I referred to the Alaska pipeline, which involved delay, idle capital, and layoffs, and in a State like Alaska, which had the highest unemployment rate of all 50 States, that should be noted. It should be noted, too, that many major environmental expenditures remain to be made, and what the effects will be is not clear.

Environmental regulations have greatly increased the need for imported oil. It has been estimated that environmental measures will increase U.S. petroleum imports in 1975 by some 4 million barrels per day above what they otherwise would have been. This figure includes 2.2 million barrels of increased oil demand resulting from a combination of these three factors, automotive emission controls, delay in obtaining natural gas from Alaska, and replacement of coal with oil to meet sulfur emission standards.

Those figures in parentheses after each of the numbers are expressed in millions of barrels per day and they will, as you see, add up to 2.2 million.

The other 1.8 million barrels of the 4 million barrels I mentioned in increase will be increase in imports resulting from a reduction in domestic oil supply stemming primarily from the Alaska delay, 1.4 million barrels, and offshore drilling delays, 0.4 million barrels per day.

In citing these effects of environmental constraints on the oil supply-demand balance, I am not passing judgment on whether they were good or bad. We are simply pointing them out as something which needs to be recognized. At an assumed value of $11 per barrel, this increase in imports would reduce our trade balance by some $16 million in 1975, unless, of course, some trade in the reverse direction was stimulated.

7. Financing to meet pollution control measures. In the petroleum industry, the principal source for financing pollution-control equipment has been internally generated funds. Several companies have financed such equipment with industrial development bonds. Some $278 million in such bonds had been approved as of September 1974 and $600 million was pending or planned.

There was an error in the draft I gave you yesterday. There was a typo, and 278 did not come out 278 million.

We understand that there have been delays in obtaining rulings from the Internal Revenue Service for such financing. I think Mr. Kane touched on that and I will not go into it.

I have here from the magazine or publication, The Money Manager, not only the tax-exempt industrial-pollution-control financing for the oil industry, but for all others, covering January 1, 1974, through Sep-

tember 1974 and then the pending amounts, which are quite substantial; they add up to $4 billion for all industry on pending issues.

8. Positive effect of compliance. Oil companies do not feel, as was indicated at the outset of these comments, that environmental regulations must be justified on purely economic grounds. There are societal benefits, such as protection of health, which cannot be measured in economic terms. When regulations are economically justifiable, of course, they can strengthen a company and benefit the buyers of that company's products.

As an example, I point to floating-roof tanks, which have long been in use because they retard evaporation and thereby conserve the more volatile crudes and products. In the refining segment of the industry, carbon monoxide boilers—which convert the pollutant CO to the nonpollutant CO_2 and generate usable heat in the process.

9. Industry views on current standards and compliance schedules. You have asked that I skip this part here and I would be glad to do that. I hope that it will be read and considered.

Senator PROXMIRE. Yes, I have had a chance to read that and it will be printed in full in the record.

Mr. GAMMELGARD. There is a lot of money involved.

Senator PROXMIRE. Thank you very much.

[The prepared statement of Mr. Gammelgard, together with exhibits I and II follow:]

PREPARED STATEMENT OF P. N. GAMMELGARD

My name is P. N. Gammelgard. I am a vice president of the American Petroleum Institute. On behalf of the Institute and its member companies, I would like to express appreciation for this opportunity to comment on the matter before the Joint Committee today—namely, the economic impact of environmental regulations.

Before addressing the specific questions posed in your invitational letter, Mr. Chairman, I would like to affirm that the institute continues to support sound laws and regulations that aim at improving the quality of the nation's air, water, land, and other natural resources. We have long been fully aware that they can have substantial benefits for society. As a consequence, over the past several years, much of the Institute's testimony on environmental matters before federal agencies and Congressional committees like this one has been concerned with the question of just what a sound environmental regulation is.

Allow me to cite some examples of the kinds of regulatory questions that have been of concern to us:

Is a regulation so "technology forcing" that it leads to adoption of one solution, but in so doing stifles or even temporarily excludes the development and application of other possible solutions? This has been the case with controlling automotive emissions of hydrocarbons and carbon monoxide by the adoption of oxidizing catalysts.

Do regulations needlessly overlap? Such is the case with the regulations calling for both the availability of unleaded grades of gasoline to protect the catalysts and, additionally, the phasedown of the lead content of leaded grades of gasoline.

Are regulations more stringent than they need to be in order to protect the public health? This appears to be the case with nitrogen oxides standards and may well be the case with the hydrocarbon standards.

Are regulatory deadlines too tight to permit compliance, despite the best good-faith efforts?

Does a regulation have a built-in energy penalty in this time of severe energy shortfalls?

Whenever the answer to any one of these and other similar regulatory questions may possibly be "yes," then there is reason to believe that waste of natural resources, unnecessary expenditures, and undue socio-economic disruptions may also be involved. In seeking to eliminate or at least minimize such

effects, and at the same time protect the environment, we at the Institute believe that our objectives do not differ greatly from those of other interested groups, including government bodies themselves. We all seek sound environmental regulations.

I will turn now to the specific questions posed in your invitation:

1. *Pollution Abatement Expenditures Since 1970.* The Institute has recently published the fourth in a series of reports, *Environmental Expenditures of the United States Petroleum Industry,* for the years 1966–1973. A copy is attached as Exhibit I. Based on a survey of companies with the capability to process 13.8 million barrels of crude oil per day—or almost 90 per cent of total domestic processing capacity—the report states that for the period 1966–1973 the participating companies spent a total of $5.5 billion on environmental protection. During this period such environmental expenditures increased to 457 per cent of the 1966 level—that is, for every dollar in 1966, $4.57 was spent in 1973.

For the period of immediate interest to the Joint Committee, 1970 through 1973, these environmental expenditures totalled just over $4 billion. Figure 1 breaks down this total into three categories—capital, operating and maintenance, and administration and research development—and, further, into expenditures in the areas of air, water, and land and other.

FIGURE 1.—TOTAL ENVIRONMENTAL EXPENDITURES/YEARS

[In millions of dollars]

Categories	1970	1971	1972	1973	Totals
Capital:					
Air	181	391	305	436	1,313
Water	163	224	184	194	765
Land and other	34	57	51	52	194
Total	378	672	540	682	2,272
Operating and maintenance:					
Air	87	116	169	215	587
Water	110	153	160	171	594
Land and other	21	35	31	36	123
Total	218	304	360	422	1,304
Administrative, Research, and Development:					
Air	52	64	76	86	278
Water	30	38	35	37	140
Land and other	5	9	9	12	35
Total	87	111	120	135	453
Grand total					4,029

The Department of Commerce reports that, for the 1970–1973 period, the petroleum refining industry's total capital outlays for new plant and equipment totalled $22.2 billion. Of this amount, $2.3 billion in environmental capital expenditures noted in Figure 1 represents 10.4 per cent. This percentage reached a high point of 12.5 per cent in 1973. It is estimated that the industry's total 1974 environmental expenditure will be substantially higher than those in 1973, in order to meet 1975 air quality and 1976 water quality regulations. The upward trend in amount of environmental expenditures, both in absolute dollars and as a percentage of total capital, is expected to continue into the early 1980's.

2. *"Passed-Through" Environmental Costs.* Generally, the petroleum industry believes that environmental costs are one of the costs of doing business that will ultimately have to be recovered in any economically viable operation. As a trade association, the Institute is not privy to and does not collect company pricing data except on an historical basis.

3. *Future Abatement Expenditures.* The petroleum industry is in compliance with current regulations and expects to remain in compliance, in answer to one part of that question of yours.

Concerning the cost of compliance with environmental regulations during the next three to five years, the Institute embarked upon an extensive study of the "Economic Impact of Environmental Regulations on the Petroleum Industry" in June 1973. The first phase of that study, by the Stanford Research Institute, was completed in January 1974 and is available for your use. This

is a study of all environmental regulations affecting the petroleum industry and compliance cost data available in the literature. The second phase of this study, by the Battelle Memorial Institute, has been underway since April of this year and will be completed in the first quarter of 1975. This second phase will forecast environmental costs to the industry for present and future regulations through 1983.

The costs of compliance, of course, depend heavily on the level of control sought, rising more and more sharply with efforts to control pollutants to greater and greater degree, down to the last few percentage points. As an example, under the Federal Water Pollution Control Act, the Administrator of the Environmental Protection Agency—or EPA—must require what is, in his judgment, the best *practicable* control technology currently available by 1977 and the best *available* technology economically achievable by 1983. Beyond that date, the Act sets a national goal of *elimination* of discharge of pollutants (EDOP) for 1985. Implicit in these dates and in the increasingly stringent requirements for each is a rapidly rising cost forecast that is a matter of considerable concern to the industry.

Figure 2, taken from and API-sponsored study by Brown and Root, Inc. (August 1973), "Economics of Refinery Wastewater Treatment," illustrates such costs.

FIGURE 2.—ESTIMATED COSTS TO REFINERIES NECESSARY TO ACHIEVE INDICATED LEVELS OF WASTEWATER TREATMENT [1]

Refinery category	Capacity in millions of barrels per day	Cumulative capital costs (millions)		
		1 level (1977)	2 level (1983)	EDOP (1985)
Existing refineries with greater than 10,000 bbl/d crude capacity	12.4	$952	$1,920	$2,711
Existing refineries with less than 10,000 bbl/d crude capacity	.5	116	226	323
Grass root refineries built between 1972 and 1985	1.8	274	338	437
Refineries expansions at existing sites built between 1972 and 1985	7.2	490	910	1,370
Total	21.9	1,832	3,394	4,841

[1] Estimates are based on EPA interim guidelines available in 1972. These estimated costs (1972 dollars) include those for all of the existing U.S. refineries as well as anticipated capacity expansions through the year 1985.

As to the second part of question 3, again the Institute is not in a position to comment on company pricing policies.

4. *Types of Treatment and Research and Development Expenditures.* New regulations governing the petroleum industry are very restrictive and the add-on or end-of-pipe treatment facilities to meet regulations are very costly. The most cost-effective way to comply with most regulations is through a combination of plant modifications, process changes, and end-of-pipe treatment. The plant and process changes may reduce the amount of pollutants generated; however, end-of-pipe treatment is usually also required to meet the regulations. As a result, the industry is using a combination of both methods in most instances.

Figure 3 shows the industry's expenditures on research and development for the period 1970 to 1973.

FIGURE 3.—ENVIRONMENTAL RESEARCH EXPENDITURES/YEARS

[In millions of dollars]

Areas	1970	1971	1972	1973	Totals
Air	$31	$37	$47	$50	$165
Water	4	6	8	7	25
Land and other	2	3	3	5	13
Total	37	46	48	62	203

As can be seen from Figure 3, the trend is upward. I should be pointed out that the total expenditure on research and development for this period does not

include the cost of the Institute's own environmental research program, which is supported by member companies at an average annual cost of about $3 million. It is worth pointing out, too, that an undetermined, but considerable amount of environmental research and development work applicable to the U.S. petroleum industry is carried on by groups outside the industry, including government agencies and companies that build pollution control equipment.

5. *Effect of Regulation on Capital Expenditures.* To our knowledge, no capital project has been abandoned exclusively because of specific environmental regulations. Environmental regulations or actions, however, have created extensive delays in a large number of petroleum operations. For example, the construction of several new refineries on the East Coast has been blocked. Offshore exploration and production have been delayed from a few months to several years. (See Exhibit II for specific instances.) The most widely known project, of course, is the Alaska pipeline, which was delayed for more than three years as a result of environmental considerations.

As a result of the delay and changes in design, the estimated cost of the Alaska construction in 1969 of $900 million soared to an estimated cost of more than $5 billion in 1974. As a result of the delay, too, the Alaskan oil that would have been available to us by mid-1973 will not be available until 1977, at the earliest. It is conceivable that had the project gone ahead on schedule and had the oil in the Santa Barbara Channel not been shut in following the blowout in 1969, then the energy shortages in the U.S. last winter might not have occurred.

Another potential environmental requirement which could reduce the industry's ability to add new facilities is the proposal that would require most new tankers to be built with double bottoms. While this proposal is not yet law, its passage could drive up the cost of construction of very large crude carriers by as much as 8.75 percent. In the industry's judgment, the use of double bottoms in tank vessels would not necessarily increase the safety of the vessel and, indeed, could constitute an increased danger. I call your attention to a recent booklet published by the American Institute of Merchant Shipping: "Tanker Double Bottoms: Yes or No?" (July 1974).

6. *Adverse Economic Impacts of Standards.* To our knowledge, to date environmental regulations have not forced the closing of any plant. Earlier I referred to the Alaska pipeline, which involved delay, idle capital, and lay-offs—all of which are recessionary factors. It should be noted, too, that many major environmental expenditures remain to be made, and what the effects will be is not clear.

Environmental regulations have greatly increased the need for imported oil. It has been estimated that environmental measures will increase U.S. petroleum imports in 1975 by some four million barrels per day above what they otherwise would have been. This figure includes 2.2 million barrels of increased oil demand resulting from emission controls (0.6), delay in obtaining natural gas from Alaska (0.7), and replacement of coal with oil to meet sulfur emission standards (0.9). The other 1.8 million barrels per day increase in imports results from a reduction in domestic oil supply, stemming primarily from Alaskan delay (1.4), and offshore drilling delays (0.4). In citing these effects of environmental constraints on the oil supply-demand balance, I am not passing judgment on whether they were good or bad. We are simply pointing them out as something which needs to be recognized. At an assumed average value of $11 per barrel, this increase in imports would reduce our trade balance by some $16 billion in 1975.

7. *Financing to Meet Pollution Control Measures.* In the petroleum industry, the principal source for financing pollution control equipment has been internally generated funds. Several companies have financed such equipment with industrial development bonds. Some $278 million in such bonds had been approved as of September of 1974 and $600 million was pending or planned. We understand that there have been delays in obtaining rulings from the Internal Revenue Service for such financing.

8. *Positive Effects of Compliance.* Oil companies do not feel, as was indicated at the outset of these comments, that environmental regulations must be justified on purely economic grounds. There are societal benefits, such as protection of health, which cannot be measured in economic terms. When regulations are economically justifiable, of course, they can strengthen a company and benefit the buyers of that company's products. Indeed, some of the environmental equipment in use in the petroleum industry was installed on economic grounds long before regulations required its use.

Floating-roof tanks, for example, have long been in use because they retard evaporation and thereby conserve the more volatile crudes and products. In the

refining segment of the industry, carbon monoxide boilers—which convert the pollutant CO to the non-pollutant CO_2 and generate usable heat in the process—have also long been in use on many catalytic cracking units. In these days of escalating energy costs, these boilers are economically justifiable on more units than they were in the past.

The same point may be made about refinery waste gas—or tail gas—that some refineries once flared to the atmosphere. This gas now goes to a compressor and is reinjected into the refinery's fuel gas system. The recovered energy just about pays for the equipment required to save it.

9. *Industry Views on Current Standards and Compliance Schedules.* While it is supportive of the *direction* of current environmental regulation, the Institute at times must express objection to the *degree* of control demanded by some environmental regulations. We sincerely believe the nation is embarked upon some environmental programs that ask industry to do too much, too fast, in light of economic and technological limitations.

AUTOMOTIVE EMISSIONS STANDARDS

Some of our environmental laws contain serious internal inconsistencies. The 1970 Clean Air Amendments, for example, required that national ambient air quality standards be met in the first year that the stringent statutory 1975–1976 automobile emissions standards were to take effect—clearly an impossibility—even though EPA calculations assumed that it would take 10 years to meet ambient standards once the tailpipe standards took effect. The tailpipe standards have since been postponed twice, first for one year by the EPA Administrator and then for another year by Congressional action this past winter. The possibility of a further one-year extension by the EPA Administrator could mean that it will be 1979 before all the statutory tailpipe standards take effect. Yet there has been *no* postponement in the date for compliance with the ambient air quality standards. It is to be hoped that Congress will rectify this inconsistency in the Act at an early date.

What will happen if this is not done is that the burden of meeting the ambient standards will fall more heavily on stationary sources. Much of the burden also will fall on the general public, who will be asked to curtail private vehicle use severely. In Los Angeles, which is the worst example, meeting the standards by 1977 would virtually require banning automobiles altogether.

NITROGEN OXIDE EMISSIONS

The point is that it may not be necessary to control some pollutants to the degree originally thought. Take the standards for nitrogen oxides. It is now recognized by many both in and out of government that because of instrumentation that gave too high readings at low nitrogen oxide concentrations, the standards may be more stringent than necessary to meet ambient air quality standards and to protect public health, with a margin of safety.

The use of a second catalyst, plus exhaust gas recirculation, on automobiles to control nitrogen oxides emissions down to the 0.4 gram per mile 1976 standard would involve a sacrifice in fuel economy. Reported estimates of the penalty involved range from a few per cent to well over 30 per cent, depending upon the basic engineering assumptions converning the type of nitrogen oxides control technology that might become available. Such a penalty would come at a time when the nation will badly need to get increased, not reduced mileage. As a result of Congressional action earlier this year, the 0.4 gram standard has been postponed until the 1978 model year and hopefully will be considered again before that time.

HYDROCARBON EMISSIONS

Hydrocarbons may offer a parallel case of overcontrol. You will remember that just over a year ago, in August of 1973, we had a six-day air pollution alert here in Washington. A Naval Research Laboratory study of that period is of special interest to all of use who live in this area, and it has much broader implications. There is, of course, reason to be concerned about automotive emissions in metropolitan areas, but the study suggests "that automobile emissions may have played a minor role in the production of the mid-August smog."

Navy researchers analyzed rain water which purged the pollutants from the air and found an absence of those hydrocarbons associated with gasoline but measurable concentrations of hydrocarbons of vegetative origin. The smog alert

of mid-August, therefore, "could have been caused by terpene-like hydrocarbons volatized from Appalachian vegetation" to the west of Washington. Vegetation in certain areas has been calculated to be a far more prolific source of unsaturated hydrocarbons than is the automobile.

By the same token, in the light of the Naval Research Laboratory's findings, hydrocarbon emissions from service stations may not need the stringent degree of control being proposed in various regions of the country, including the Washington area. Some proposals call for control of 90 per cent of these emissions, which would require refrigeration, vacuum-assist, and other recovery equipment. Depending on just what type of equipment were to be installed, the cost per station could range between $5000 and $15,000. Since there are approximately 200,000 service stations in this country, total costs could range between $1 billion and $3 billion. The large costs associated with the more sophisticated equipment, in our judgment, should be weighed against the costs of a balanced recovery system, which is far more cost-effective, is immediately available, and will recover at least 80 per cent of such hydrocarbon emissions.

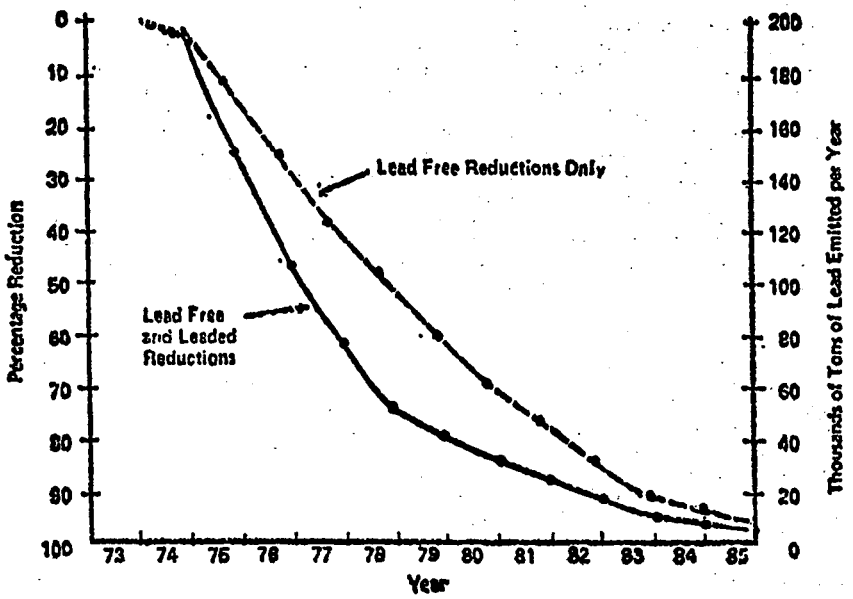
MARGINAL COSTS AND TECHNOLOGICAL ASSESSMENT

The example cited above illustrates a problem which is of increasing concern to us—namely, the consistent failure, in EPA economic studies, to look at the marginal cost of incremental differences in performance of alternative technologies. In other words, there has been a failure to give adequate consideration to cost-effectiveness in technological assessment. As a result, the most expensive alternatives frequently are chosen, even though their pollution control performance, compared to that of some more cost-effective method, may be only negligibly better. Moreover, in assessing the cost of impact of environmental regulation to industry, there has been a tendency to consider each regulation in isolation, rather than to consider the aggregate effect of all environmental regulations on industry economics.

UNLEADED GASOLINE

At the outset, I mentioned the requirement for the availability of an unleaded grade of gasoline and the requirement calling for a phasedown of the lead content of leaded grades of gasoline. My point was that the first would dramatically reduce lead emissions and that the second, accomplishing virtually the same thing, was therefore economically wasteful, as shown in Figure 4.

FIGURE 4.—Reductions in lead emissions resulting from EPA lead regulations[1]



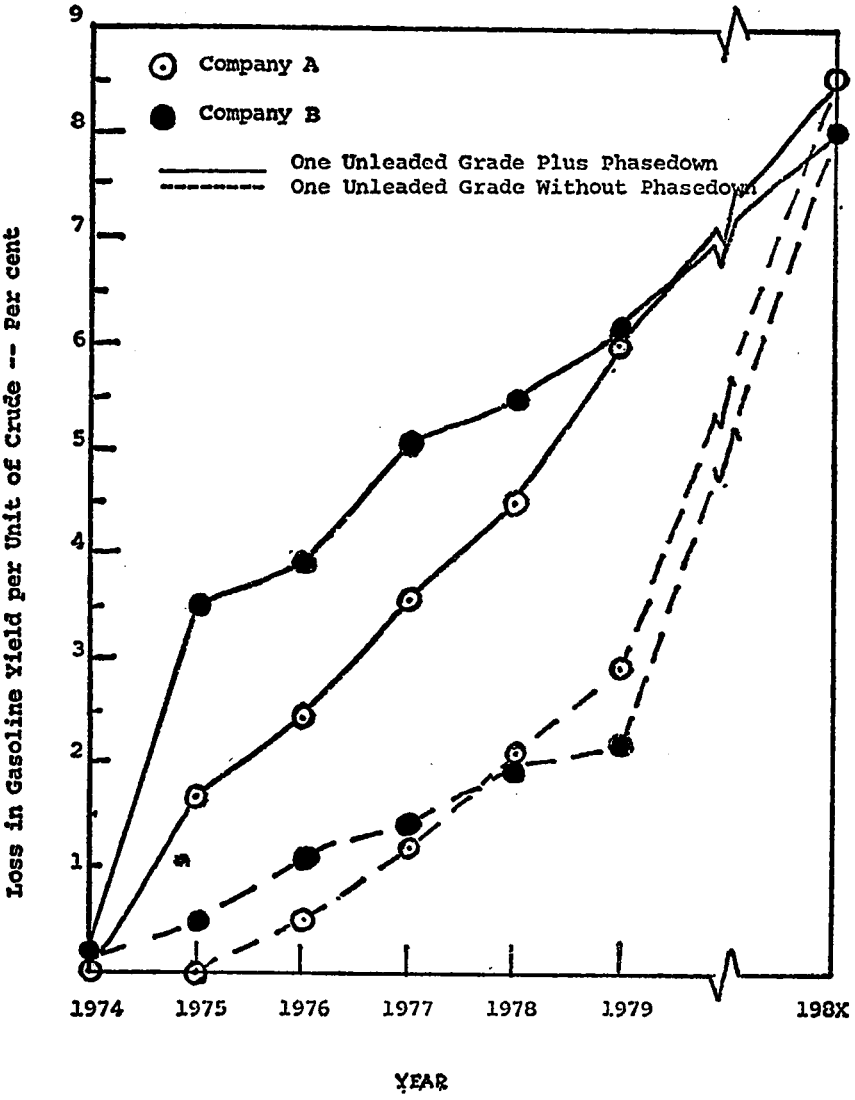
[1] Based on data disseminated by EPA Administrator William D. Ruckelshaus at a press conference held in Washington, D.C., on Dec. 27, 1972.

As shown in the Figure 4 chart, which is based on EPA's own data, lead emissions will reach the same negligible level in the 1980's *without* the lead phasedown.

PHASEDOWN OF LEAD IN LEARED GRADES OF GASOLINE

There are gasoline yield penalties associated with the requirement for the lead phasedown and the requirement for an unleaded grade of gasoline. They are shown in Figure 5.

FIGURE 5.—Estimated losses in motor vehicle fuel yield with and without lead phasedown (1974 base).



As the data in Figure 5 show, as a result of the phasedown, some refineries can anticipate additional losses in gasoline yield (the difference between the solid and dashed lines) at least as high as three percent in 1975. The estimated loss in 1979 is even more dramatic. In that year, the phasedown could penalize motor fuel production by as much as four percent. In short, the lead phasedown regulation may well seriously aggravate energy short-fall problems in the U.S.

EPA analyses, based on the increasing use of lighter, catalyst-equipped automobiles, show a net benefit with regard to fuel economy—a benefit that would more than make up for the loss of the gasoline production resulting from the lead phasedown regulation. It is misleading, however, to use the expected fuel economy gain on the 1975 model cars as justification for the energy penalty associated with the lead phasedown regulation. These are two separate and distinct issues. Lumping them together only clouds the basic fact that the phasedown regulation, if fully implemented, will cause a significant, tangible loss in gasoline production.

Still another consideration associated with the lead phasedown regulation is that it will require substantial and expensive modifications of refinery operations in order to manufacture the high-octane blending stocks needed to replace lead. This investment is in addition to funds which must be allocated to new refinery construction and expansion needed to keep pace with the nation's energy needs.

It is worth pointing out, too, that there are serious doubts about the ability of those highly specialized firms in refinery design and construction to meet the deadlines associated with the lead phasedown regulations. These firms are already strained, trying to meet existing and new construction contracts. It simply may be impossible to complete the construction needed for 100-percent compliance with the lead phasedown regulation which goes into effect on January 1, 1975, and runs through 1979.

EPA has predicted that some 12–20 small refineries—those that process 30,000 barrels of oil or less per day—may eventually be forced to shut down as a result of the phasedown regulation, because they will be unable to secure the capital required to make the necessary modifications. The United States—like many of the industrialized countries—needs more, not less refining capacity. This country currently is importing about three million barrels of refined products daily to meet demand.

It is true that EPA, recognizing the financial hardships involved, has granted a two-year delay in compliance for small refiners. But the delay does not extend to those small refineries operated by major oil companies, despite the fact that all small refineries will face similar severe problems.

An across-the-board delay would provide additional time for attracting and accumulating necessary capital. It would provide more badly needed lead-time for the highly specialized refinery design and construction industry. It would help alleviate some of the difficulties stemming from the energy shortage. It would help free more funds more quickly for exploration activities. Finally, an across-the-board delay would allow time both for more definitive research into the health significance of airborne lead and for developing alternatives that will control lead emissions.

DESULFURIZATION OF GASOLINE

Other possible regulations—not even proposed yet, but being given serious consideration by EPA—could have similar economic impacts. On example is further desulfurization of gasoline to extremely low levels. Automotive catalysts, while their purpose is to control exhaust emissions of HC and CO, also convert the very small amount of sulfur in gasoline to sulfur trioxide (SO_3). When combined with water, which is always present in the exhaust, SO_3 creates sulfates and sulfuric acid mists. It therefore appears possible that regulations requiring further desulfurization of gasoline—to levels of 0.01 percent or lower—may be proposed in the near future, perhaps later this year, since EPA is already conducting feasibility studies in this area.

The National Petroleum Refiners Association recently documented the difficulties that would be encountered in the event of such regulation with a survey which covered 148 U.S. refineries with 13.2 million barrels per day crude charge capacity. The survey data are based upon more than 90 per cent of the U.S. domestic petroleum refining industry crude processing capacity and approximately 95 per cent of the finished gasoline manufacturing capacity. The survey drew these conclusions, among others:

It would require $3.7 billion (in 1974 dollars) to construct the additional units necessary for manufacturing very low-sulfur unleaded gasoline.

The per barrel cost of desulfurization of unleaded gasoline at small and medium-sized refineries would be more than double that at a large refinery.

Ultimately many small refineries could be forced out of business due to a lack of capital, thus aggravating the energy situation even more.

In view of the tremendous construction burdens and the limited capacity of the few specialized process design and construction firms, getting desulfurization equipment into some 250 gasoline producing refineries within a reasonable time would be a virtual impossibility, even if there were no limit on the availability of investment capital. It is well worth adding that even if the necessary equipment were already installed more severe processing to remove sulfur could mean less gasoline per barrel processed, aggravating this country's already serious energy supply shortage.

Thank you. That concludes the Institute's prepared comments. I will be glad to try to answer any questions you may have.

EXHIBIT I

Environmental Expenditures of the United States Petroleum Industry 1966-1973

Publication No. 4233

Compiled by Haskins & Sells
Washington, D.C.

Based on a Survey
Conducted by
The Division of Environmental Affairs

AMERICAN PETROLEUM INSTITUTE

Introduction

This is the fourth report on environmental protection expenditures of the petroleum industry within the United States prepared by the American Petroleum Institute's Division of Environmental Affairs. The first report covered actual expenditures for 1966 and 1967, and estimated expenditures for 1968. The second and third reports each added two additional years of data. This report summarizes all previous reports and adds data for 1973.

The same general format was used for each of the four surveys so that the annual expenditures for each reporting period could be compared with previous annual expenditures. It should be noted that each of the four studies has had a slightly different reporting base, because the number of cooperating companies varied from survey to survey. The "totals" reported here are the sums of the expenditures reported to API rather than the total expenditures of the industry. The partial expenditures have not been extrapolated to represent 100 per cent of the expenditures.

It will be noted that expenditures in the category of "Land and Other" were only reported starting in 1970.

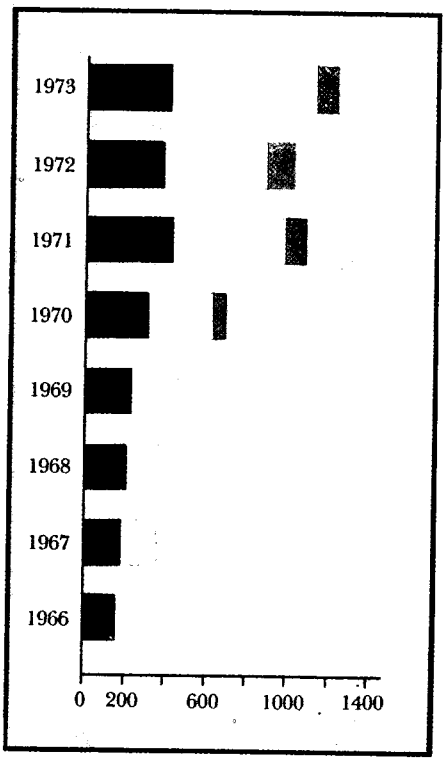
A facsimile of the questionnaire used in the survey is found in the back of this report. These questionnaires were submitted to the corporate offices of the member companies of API and to members of the National Petroleum Refiners Association. The companies participating in the survey had the capability to process 13,843,887 barrels of crude oil each day in 1973. This is equivalent to 88.9 per cent of the total 1973 industry refining capacity in accordance with the tabulation contained in the April 1974 "Oil and Gas Journal."

The companies which have participated in this survey series have reported environmental expenditures for the period of 1966 through 1973 totalling $5.5 billion.

Total Environmental Expenditures
Petroleum Industry
1966-1973

Expenditures in Millions of Dollars

Water	2,265	(41.2%)
Air	2,888	(52.4%)
Land & Other	352	(6.4%)
	5,505	



Survey Results

Figure 1 indicates that the petroleum industry has spent over $5.5 billion for environmental protection over the past eight years. The four surveys which are summarized above did not cover the environmental expenditures of the entire industry, but rather approximately 90% of the industry as measured by refining capacity. During this period, spending for environmental protection increased by 457%. In other words, for every dollar spent in 1966, $4.57 was spent in 1973.

The largest expenditures for 1973 were required for air quality. These were equivalent to 59.5% of the expenditures reported, while the expenditures for maintenance of water quality represented 32.5% of the total. The remaining 8% of total environmental expenditures is attributed to land and other activities.

A more detailed tabulation of the total expenditures has been included in Appendix I of this report. See Tables I and II.

Figure 1

Classification of Environmental Expenditures
Petroleum Industry
1966-1973

Classification of Expenditures

Figure 2 shows the distribution of expenditures with reference to capital, operating and maintenance, administration, and research and development.

On comparing the bar graphs it will be noted the capital expenditures represent 57% of the total, and show an increase over the eight-year survey period. The operating and maintenance expenditures show a steady increase over the same period, averaging about 30% of the total. The administrative and research costs are equivalent to 12% of the total costs. The research and development expenditures, tabulated from the individual questionnaires, do not include the cost of the American Petroleum Institute's environmental research program supported by member companies at an average annual cost of about $3 million.

A detailed tabulation of the costs for the various classifications of expenditures will be found in Appendix I, Tables II, III, IV, V and VI.

Expenditures in Millions of Dollars

Capital	3,155	(57.4%)
Operating & Maintenance	1,687	(30.7%)
Administration	357	(6.3%)
Research & Development	306	(5.6%)
	5,505	

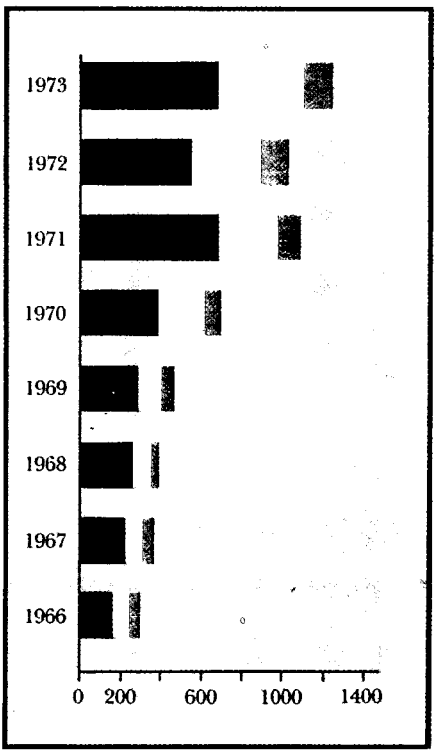


Figure 2

Annual Rates of Expenditure

On the assumption that the petroleum industry had the capability of processing approximately 14 million barrels of crude each calendar day and that the survey participation was 88.9%, it can be calculated that the total expenditures for environmental activities in 1973 were equivalent to 28.0¢ per barrel. An analysis of the survey results will show more than 50% of this cost or 15.4¢ would be required for capital investment.

According to the survey, the petroleum industry's annual rate of environmental expenditure in 1973 was $1,239,000,000. As will be noted from Figure 3, the comparable rate in 1966 was $271,000,000, Capital expenditures are shown in lower portion of figure, all other categories are in upper portion.

The industry capital investment for environmental activities in 1973 of $682,000,000 is reported to be equivalent to 12.7% of the total capital expenditure of the petroleum industry within the United States.

Environmental Expenditure Trends in Millions of Dollars

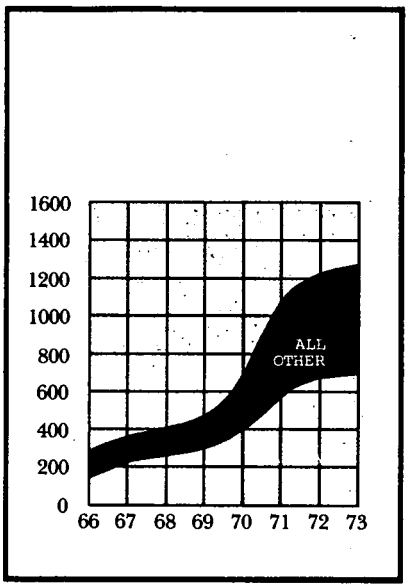


Figure 3

Survey Procedures

The questionnaire used in this survey is shown in Appendix II. It was developed after consultation with representatives of all industry disciplines and is similar to questionnaires used in previous surveys.

Instructions and guidelines were developed to assist the respondents in calculating capital expenditures on environmental activities although, where actual cost data was available, respondents were urged to report that information. The guidelines covered all phases of the industry operations and provided a uniform procedure for determining the environmental expenditures.

As completed questionnaires were received, code numbers were assigned, and each document was forwarded to an independent organization for tabulation. The data contained in Tables I through VI was compiled by Haskins & Sells, Washington, D. C.

APPENDIX I. TABULATIONS OF SURVEY DATA

TABLE I

ENVIRONMENTAL EXPENDITURES
UNITED STATES PETROLEUM INDUSTRY
SUMMARY TABULATION
(Millions of Dollars)

	YEAR								
	1966	1967	1968	1969	1970	1971	1972	1973	TOTAL
TABLE II - TOTAL EXPENDITURES									
1. Air	$125	$167	$187	$231	$320	$ 571	$ 550	$ 737	$2,888
2. Water	146	191	205	224	303	415	379	402	2,265
3. Land and other					60	101	91	100	352
TOTAL	$271	$358	$392	$455	$683	$1,087	$1,020	$1,239	$5,505
TABLE III - CAPITAL EXPENDITURES									
1. Air	$ 69	$100	$112	$145	$181	$ 391	$ 305	$ 436	$1,739
2. Water	79	114	128	136	163	224	184	194	1,222
3. Land and other					34	57	51	52	194
TOTAL	$148	$214	$240	$281	$378	$ 672	$ 540	$ 682	$3,155
TABLE IV - OPERATING AND MAINTENANCE EXPENDITURES									
1. Air	$ 33	$ 39	$ 41	$ 46	$ 87	$ 116	$ 169	$ 215	$ 746
2. Water	46	53	59	66	110	153	160	171	818
3. Land and other					21	35	31	36	123
TOTAL	$ 79	$ 92	$100	$112	$218	$ 304	$ 360	$ 422	$1,687
TABLE V - ADMINISTRATIVE EXPENDITURES									
1. Air	$ 10	$ 11	$ 12	$ 16	$ 21	$ 27	$ 29	$ 36	$ 162
2. Water	11	13	16	18	26	32	27	30	173
3. Land and other					3	6	6	7	22
TOTAL	$ 21	$ 24	$ 28	$ 34	$ 50	$ 65	$ 62	$ 73	$ 357
TABLE VI - RESEARCH AND DEVELOPMENT EXPENDITURES									
1. Air	$ 13	$ 17	$ 22	$ 24	$ 31	$ 37	$ 47	$ 50	$ 241
2. Water	10	11	2	4	4	6	8	7	52
3. Land and other					2	3	3	5	13
TOTAL	$ 23	$ 28	$ 24	$ 28	$ 37	$ 46	$ 58	$ 62	$ 306

TABLE II

ENVIRONMENTAL EXPENDITURES
UNITED STATES PETROLEUM INDUSTRY
TOTAL EXPENDITURES
(Millions of Dollars)

	YEAR								
	1966	1967	1968	1969	1970	1971	1972	1973	TOTAL
1. AIR:									
Capital	$ 69	$100	$112	$145	$181	$ 391	$ 305	$ 436	$1,739
Operating & maintenance	33	39	41	46	87	116	169	215	746
Administrative	10	11	12	16	21	27	29	36	162
Research & development.	13	17	22	24	31	37	47	50	241
Total	$125	$167	$187	$231	$320	$ 571	$ 550	$ 737	$2,888
2. WATER:									
Capital	$ 79	$114	$128	$136	$163	$ 224	$ 184	$ 194	$1,222
Operating & maintenance	46	53	59	66	110	153	160	171	818
Administrative	11	13	16	18	26	32	27	30	173
Research & development.	10	11	2	4	4	6	8	7	52
Total	$146	$191	$205	$224	$303	$ 415	$ 379	$ 402	$2,265
3. LAND AND OTHER:									
Capital					$ 34	$ 57	$ 51	$ 52	$ 194
Operating & maintenance					21	35	31	36	123
Administrative					3	6	6	7	22
Research & development.					2	3	3	5	13
Total					$ 60	$ 101	$ 91	$ 100	$ 352
4. AIR, WATER, LAND & OTHER									
Capital	$148	$214	$240	$281	$378	$ 672	$ 540	$ 682	$3,155
Operating & maintenance	79	92	100	112	218	304	360	422	1,687
Administrative	21	24	28	34	50	65	62	73	357
Research & development.	23	28	24	28	37	46	58	62	306
TOTAL	$271	$358	$392	$455	$683	$1,087	$1,020	$1,239	$5,505

TABLE III

ENVIRONMENTAL EXPENDITURES
UNITED STATES PETROLEUM INDUSTRY
CAPITAL EXPENDITURES
(Millions of Dollars)

	YEAR								
	1966	1967	1968	1969	1970	1971	1972	1973	TOTAL
1. AIR:									
Exploration & production	$ 4	$ 5	$ 6	$ 8	$ 9	$ 15	$ 17	$ 14	$ 78
Transportation	1	2	2	2	3	8	3	10	31
Marketing	2	3	4	5	54	39	21	43	171
Manufacturing	62	90	100	130	115	329	264	369	1,459
Total	$ 69	$100	$112	$145	$181	$391	$305	$436	$1,739
2. WATER:									
Exploration & production	$ 58	$ 70	$ 70	$ 68	$ 74	$ 82	$ 68	$ 62	$ 552
Transportation	1	1	4	4	11	20	16	22	79
Marketing	2	3	5	8	8	10	14	17	67
Manufacturing	18	40	49	56	70	112	86	93	524
Total	$ 79	$114	$128	$136	$163	$224	$184	$194	$1,222
3. LAND AND OTHER:									
Exploration & production					$ 15	$ 13	$ 22	$ 27	$ 77
Transportation					4	6	8	9	27
Marketing					10	11	14	8	43
Manufacturing					5	27	7	8	47
Total					$ 34	$ 57	$ 51	$ 52	$ 194
$. AIR, WATER, LAND & OTHER TOTAL	$148	$214	$240	$281	$378	$672	$540	$682	$3,155

TABLE IV

ENVIRONMENTAL EXPENDITURES
UNITED STATES PETROLEUM INDUSTRY
OPERATING AND MAINTENANCE EXPENDITURES
(Millions of Dollars)

	YEAR								
	1966	1967	1968	1969	1970	1971	1972	1973	TOTAL
1. AIR:									
Exploration & production	$ 1	$ 3	$ 2	$ 3	$ 5	$ 7	$ 7	$ 10	$ 38
Transportation	1	1			4	4	2	3	15
Marketing	1	1	2	1	7	11	10	16	49
Manufacturing	30	34	37	42	71	94	150	186	644
Total	$33	$39	$ 41	$ 46	$ 87	$116	$169	$215	$ 746
2. WATER:									
Exploration & production	$26	$30	$ 32	$ 34	$ 50	$ 71	$ 57	$ 58	$ 358
Transportation	1	1	3	3	14	17	12	13	64
Marketing	1	1	2	3	2	4	4	5	22
Manufacturing	18	21	22	26	44	61	87	95	374
Total	$46	$53	$ 59	$ 66	$110	$153	$160	$171	$ 818
3. LAND AND OTHER:									
Exploration & production					$ 10	$ 15	$ 14	$ 17	$ 56
Transportation					3	4	7	7	21
Marketing					5	5	3	3	16
Manufacturing					3	11	7	9	30
Total					$ 21	$ 35	$ 31	$ 36	$ 123
4. AIR, WATER, LAND & OTHER TOTAL	$79	$92	$100	$112	$218	$304	$360	$422	$1,687

TABLE V

ENVIRONMENTAL EXPENDITURES
UNITED STATES PETROLEUM INDUSTRY
ADMINISTRATIVE EXPENDITURES
(Millions of Dollars)

	YEAR								
	1966	1967	1968	1969	1970	1971	1972	1973	TOTAL
1. AIR:									
Exploration & production	$ 1	$ 1	$ 1	$ 1	$ 1	$ 1	$ 1	$ 2	$ 9
Transportation					2	2	1	1	6
Marketing				1	1	2	5	5	14
Manufacturing	9	10	11	14	17	22	22	28	133
Total	$10	$11	$12	$16	$21	$27	$29	$36	$162
2. WATER:									
Exploration & production	$ 7	$ 8	$ 8	$ 8	$10	$13	$ 9	$11	$ 74
Transportation					4	4	3	3	14
Marketing			1	1	1	1	2	2	8
Manufacturing	4	5	7	9	11	14	13	14	77
Total	$11	$13	$16	$18	$26	$32	$27	$30	$173
3. LAND AND OTHER:									
Exploration & production					$ 1	$ 1	$ 2	$ 3	$ 7
Transportation					1	1	2	1	5
Marketing						2	1	2	5
Manufacturing					1	2	1	1	5
Total					$ 3	$ 6	$ 6	$ 7	$ 22
4. AIR, WATER, LAND & OTHER TOTAL	$21	$24	$28	$34	$50	$65	$62	$73	$357

TABLE VI

ENVIRONMENTAL EXPENDITURES
UNITED STATES PETROLEUM INDUSTRY
RESEARCH AND DEVELOPMENT EXPENDITURES
(Millions of Dollars)

	YEAR								
	1966	1967	1968	1969	1970	1971	1972	1973	TOTAL
1. AIR:									
Product	$ 7	$ 8	$10	$11	$20	$22	$18	$19	$115
Process	5	8	11	12	10	14	26	29	115
Sampling & testing	1	1	1	1	1	1	3	2	11
Total	$13	$17	$22	$24	$31	$37	$47	$50	$241
2. WATER:									
Product	$ 1	$ 1	$ 1	$ 1	$ 2	$ 2	$ 2	$ 1	$ 11
Process	2	3	1	2	2	3	4	4	21
Sampling & testing	7	7		1		1	2	2	20
Total	$10	$11	$ 2	$ 4	$ 4	$ 6	$ 8	$ 7	$ 52
3. LAND AND OTHER:									
Product							$ 1	$ 1	$ 2
Process					$ 2	$ 1	1	2	6
Sampling & testing						2	1	2	5
Total					$ 2	$ 3	$ 3	$ 5	$ 13
4. AIR, WATER, LAND & OTHER TOTAL	$23	$28	$24	$28	$37	$46	$58	$62	$306

APPENDIX II. THE QUESTIONNAIRE

AMERICAN PETROLEUM INSTITUTE

COMMITTEE ON ENVIRONMENTAL AFFAIRS

Instructions for Completing
Questionnaire:

ENVIRONMENTAL EXPENDITURES
OF THE
UNITED STATES PETROLEUM INDUSTRY

The accompanying questionnaire has been designed to obtain information which will be used to update the current API survey, "Environmental Expenditures of the United States Petroleum Industry."

Scope -- Environmental Protection Expenditures are considered to be all those expenditures related to the prevention, control, abatement or elimination of environmental pollution. They include, but are not limited to expenditures which meet definitions promulgated by federal, state, or local regulatory bodies or those which meet tax relief provisions. The questionnaire includes three categories of such expenditures: air, water, and land and other. The latter includes expenditures for such items as solid waste management, noise abatement, and beautification.

Confidentiality -- Each questionnaire mailed to a member company will be coded and the response treated as confidential. The completed questionnaire will be returned to that company after its data has been tabulated.

Frequency -- This and previous questionnaires have been prepared on a biennial basis. Because of the increasing emphasis on environmental protection and its related costs, future surveys may be conducted on an annual basis.

Organization -- The questionnaire has been organized to correspond with the four basic areas of each company: exploration and production, transportation, refining, and marketing. Each functional area has been further divided into the following two categories of expenditures: capital and expense. Expense items include operating and maintenance as well as administrative expenditures. Research and development expenditures are reported separately.

Data and data estimates -- Companies with accounting systems that provide for the identification of environmental protection expenses should report such expenses by function as available from their accounting records. If the company's accounting records do not provide a method for retrieval of environmental protection expenses, the guidelines which follow will be helpful in making the necessary estimates.

Criteria -- Many expenditures cannot be attributed entirely to "environmental protection." In all such cases, appropriate consideration should be given to motivation: What were the principle factors involved in the expenditure decision? How large a role did considerations of environmental protection play in that decision?

Reported costs should not include the loss of revenue or estimates of business "loss" as a result of conditions associated with environmental protection. The speculative nature of such cost items and the difficulty of justifying methods used to develop them could be construed as unrealistic reporting designed to make the industry's total expenditures for environmental protection appear larger than they actually were.

Do include environmental protection costs of petrochemical or carbon black operations which are closely related to the basic petroleum operations, as in a combined refinery operation. Also include

environmental protection costs of all other integrated functions of a petroleum operation. Non-petroleum operations (e.g., mining of coal, shale, or minerals) should not be included unless the objective of such activities is the extraction of liquid hydrocarbons.

In some instances, estimates of environmental protection expenditures must be based on incremental concepts and will be heavily dependent on engineering judgement. For example, if a unit would meet good business operating requirements under normal design concepts, but requires modifications or additions because of environmental considerations, then the estimated cost of modifications or additions should logically be attributed to environmental protection. Other examples might include requirements for additional height on stacks, thicker walls on pipes or vessels, the inclusion of a vapor recovery system, or a smokeless flare. Investments which yield acceptable rates of return may logically be included as environmental expenditures if, in fact, they meet the above mentioned criteria.

Identification of expenditures for environmental protection may, in many instances, require the combined application of financial, engineering and conservation disciplines.

Costs associated with special projects should be identified as separate line items or by footnotes. Otherwise, projects such as the trans-Alaska pipeline system, involving environmental expenditures of great magnitude, would result in the distortion of industry totals.

DETERMINATION OF APPLICABLE EXPENSES

When your company records identify current expenses applicable to environmental protection activities, report such expenses by function as incurred. Report maintenance, operating and administrative expenses by function (i.e., plant burden, indirect and general) as available from accounting records. Do not include depreciation in reporting current expenses, since this questionnaire provides for reporting capital expenditure as incurred.

When environmental protection expenses for administration and operations and maintenance must be estimated, they can be derived as follows:

Environmental investment factor (P): $P = \frac{E}{T}$

Environmental operating and maintenance expense (B): $B = P \times O$

Environmental administrative expense (C): $C = P \times A$

Where:

E = Average gross capital investment for environmental facilities.
T = Average gross capital investment for functional facilities.
O = Total functional operating and maintenance expenses (net working interest only for joint properties).
A = Total functional administrative expenses.

Use the net working interest only for joint properties in calculating operating and maintenance expenses.

The use of these calculations on a function-by-function basis should produce a reasonable but conservative allocation of current expenses to environmental protection facilities for the year being reported. Companies with accounting systems which provide a better means for determining conservation expenses as incurred should ignore this procedure and report their better documented expenses applicable to environmental protection. The modification of records to provide such information is encouraged.

RESEARCH AND DEVELOPMENT EXPENDITURES

Expenditures for research and development are seldom organized, reported, or budgeted in the same manner as capital expenditures. Some R & D expenditures are classified by research objectives, others are accumulated on a project by project basis. The following list is provided to serve as a reminder of the areas where the industry's R & D is frequently related to environmental protection objectives:

Air Conservation Expenditures
- Product:
  - Motor Gasoline
  - Diesel Fuel
  - Jet or Turbo Fuel
  - Distillate Fuel
  - Residual Fuel
  - Gaseous Fuels
  - Other
- Process:
  - Emission Reduction
  - Other
- Vehicle Emissions
- Sampling and Testing
- Other

Water Conservation Expenditures
- Process:
  - Emission Reduction
- Sampling and Testing
- Other

Land and Other Conservation Expenditures
- Process:
  - Emission Reduction
- Sampling and Testing
- Other

CAPITAL EXPENDITURES

The lists which follow illustrate the types of capital expenditures which may be fully or partially attributed to environmental protection. For uniformity in reporting, please use the suggested percentage of total cost when you allocate expenditures to environmental protection. The lists are not inclusive. You may and should report environmental protection expenditures even if they are not listed. In all cases, include increased incremental costs resulting from environmental considerations--such as thicker walls for pipes and vessels.

The capital guidelines which follow are not intended to preclude the use of actual cost data where such information is available.

Capital Guideline Index

Capital Item Guidelines

MANUFACTURING	% of TOTAL COSTS
Air	
1. Bag filters	100
2. Cat cracking	10
3. Closed pressure and relief valve systems	100
4. CO boilers	50
5. Covers on API separators	100
6. Crude or residual desulfurization	100
7. Cyclones (25% on fluid units)	25-100
8. Dust supression systems	100
9. Electrostatic precipitators	100
10. Emission and ambient air monitors	100
11. Environmental monitoring & sampling equipment	100
12. Extra tall stacks (20% for 200'; 30% for 300', etc.)	10-70
13. Flare gas recovery systems	75
14. Flare system,	50
15. Floating roof tanks (new construction)	20
16. Floating roof tanks (conversion to)	100
17. Fuel gas desulfurication (Amine, etc.)	100
18. Hydrocracking	30
19. Hydrodesulfurizers	50
20. Incineration of waste gases	100
21. Increased processing for lead reduction	100
22. Leak detection systems	100
23. LPG odor control facilities	100
24. Odor control	100
25. Pumpout systems	50
26. Regenerative caustic systems with sulfur recovery (Merox,etc)	25
27. Smoke control of fired heaters	100
28. Smokeless flare systems	100
29. Sour H_2O stripper O.H. recovery facilities	100
30. Sulfuric acid plant	35
31. Sulfur recovery plants	100
32. Vapor recovery systems	100
33. Other	-

Capital Item Guidelines

MANUFACTURING	% of TOTAL COSTS
Water	
1. Activated carbon absorption	100
2. Activated sludge plants	100
3. Air cooling	25
4. Air flotation	100
5. Ballast & bilge shore treatment facilities	100
6. Clarification	100
7. Collection systems - separate sewer, etc.	100
8. Cooling towers	50
9. Deep well disposal	100
10. Environmental monitoring & sampling equipment	100
11. Flocculators	100
12. Mechanical seals on pumps	10
13. Oil recovery and handling systems	100
14. Oxidation ponds and mechanical aerators	100
15. Pumpout systems	50
16. Regeneration caustic systems	50
17. Sanitary sewerage systems	100
18. Sludge farming	100
19. Sludge incinerators	100
20. Sour H_2O strippers and/or oxidizers	50
21. Spent caustic treating systems	100
22. Spill booms and other spill cleanup equipment	100
23. Tank bottom disposal & treatment facilities	100
24. Trickling filter plants	100
25. Other	-
Land and Other	
1. Baffles (noise reduction)	100
2. Building aesthetics	50
3. Environmental monitoring & sampling equipment	100
4. Equipment noise insulation	100
5. Fire walls or tank dikes	100
6. Incinerators	100
7. Land restoration, revegetation, etc.	100
8. Landscaping	100
9. Mufflers	100
10. Sanitary land fills	100
11. Screening or buffering	100
12. Solid waste hauling & disposal equipment	100
13. Other	-

Capital Item Guidelines

EXPLORATION AND PRODUCTION (Note: Gas processing plants should be reported if operated by production, but the manufacturing guidelines should be used.)	% of TOTAL COSTS
Air	
1. Environmental monitoring and sampling equipment	100
2. Flare systems	50
3. Gas well and gas line automatic shut down devices	100
4. Odor control	100
5. Smokeless flare & smokeless burn pit systems	100
6. Sulfur recovery plants	100
7. Vapor conservation equipment (tank & vent-line valves, etc.)	100
8. Vapor recovery systems	100
9. Other	-
Water	
1. Approved collection pits	100
2. Cooling towers	50
3. Environmental monitoring and sampling equipment	100
4. Increased platform, drilling and completion costs to comply with Gulf Coast OCS Orders 5,7,8,9, and similar regulations	100
5. Radiators	100
6. Salt water disposal (Do not include secondary recovery investments)	100
7. Sanitary sewerage systems	100
8. Spill booms and other spill cleanup equipment	100
9. Surface casing (state % of total cost if not 35%)	35
10. Tank bottom disposal and treatment facilities	100
11. Other	-
Land & Other	
1. Baffles (noise reduction)	100
2. Building aesthetics	50
3. Control devices on onshore leases (check valves, hi-level shut down, hi-lo pressure, etc.)	100
4. Drilling mud disposal	100
5. Elimination of pits and cellars (include cost of steel tankage if required)	100
6. Environmental monitoring and sampling equipment	100
7. Equipment noise insulation	100
8. Fire walls or tank dikes	100
9. Incinerators	100
10. LACT units	10
11. Land restoration, revegetation, etc.	100
12. Landscaping	100
13. Mufflers	100
14. Radio alarm systems	10
15. Sanitary land fills	100
16. Screening or buffering	100
17. Solid waste hauling and disposal equipment	100
18. Waste lubricant disposal devices	100
19. Other	-

Capital Item Guidelines

TRANSPORTATION	% of TOTAL COSTS
Air	
1. Environmental monitoring and sample equipment	100
2. Floating roof tanks (new construction)	20
3. Floating roof tanks (conversion to)	100
4. Microballoons	100
5. Odor control	100
6. Smoke and odor control on diesel trucks	100
7. Smoke control on tankers	100
8. Vapor recovery systems	100
9. Other	-
Water	
1. Aerial and ground pipeline patrol equipment and related communications equipment	50
2. Ballast and bilge shore treatment facilities	100
3. Cathodic protection of pipelines	50
4. Cathodic protection surveys	50
5. Cooling towers	50
6. Environmental monitoring and sampling equipment	100
7. Ground bed replacement for cathodic protection systems	50
8. Leak detection surveys (all types)	50
9. Mechanical seals on pumps	10
10. Oil recovery from ballast and tank vessel operations	100
11. Oil/Water seperators	100
12. Pipeline reconditioning	50
13. Pipeline replacement	50
14. Pipeline reroute (pollution prevention)	50
15. Pumpout systems	50
16. Replacement of pipeline river crossings	50
17. Replacement of wooden station platforms with concrete	50
18. Sanitary sewerage systems	100
19. Spill booms and other spill cleanup equipment	100
20. Sumps and related equipment	100
21. Tank bottom disposal and treatment facilities	100
22. Tank farm skimming ponds	100
23. Other	-
Land and Other	
1. Baffles (noise reduction)	100
2. Building aesthetics	50
3. Environmental monitoring and sampling equipment	100
4. Equipment noise insulation	100
5. Fire wall or tank dikes	100
6. Incinerators	100
7. Land restoration, revegetation, etc.	100
8. Landscaping	100
9. Mufflers	100
10. Sanitary land fills	100
11. Screening or buffering	100
12. Solid waste hauling and disposal equipment	100
13. Other	-

Capital Item Guidelines

MARKETING	% of TOTAL COSTS
Air	
1. Additional facilities	
a. Additional dispensing pump and auxiliary equipment	100
b. New storage	100
c. No lead gasoline (third grade, low lead gasoline)	100
2. Bottom fill loading and vapor collection lines on trucks and tank cars	50
3. Environmental monitoring and sampling equipment	100
4. Evaporation control (Product storage and transfer to service stations)	100
5. Floating roof tanks (conversion to)	100
6. Floating roof tanks (new construction)	20
7. Gasoline volatility control:	
a. Additive facilties for segregated storage (such as New York City)	100
b. Auxiliary equipment	100
8. Odor control	100
9. Vapor balancing systems	100
10. Vapor recovery systems	100
11. Other	-
Water	
1. Environmental monitoring & sampling equipment	100
2. Control of effluent discharge at terminals	100
3. Oil recovery at bulk terminals	100
4. Oil spill prevention activities at the bulk terminals	100
5. Oil spill prevention activities at terminals as required by government regulations	100
6. Sanitary sewerage systems	100
7. Waste oil recovery or recycle	100
8. Other	-
Land and Other	
1. Baffles (noise reduction)	100
2. Building aesthetics	50
3. Environmental monitoring & sampling equipment	100
4. Equipment noise insulation	100
5. Fire walls or tank dikes	100
6. Incinerators	100
7. Land restoration, revegetation, etc.	100
8. Landscaping	100
9. Mufflers	100
10. Sanitary land fills	100
11. Screening or buffering	100
12. Solid waste hauling and disposal equipment	100
13. Other	-

Environmental Expenditures Survey 1972/1973

Please report your company's expenditures for environmental protection in each of the following categories:

		ACTUAL EXPENDITURES FOR 1972 (THOUSANDS OF DOLLARS)			ACTUAL EXPENDITURES FOR 1973 (THOUSANDS OF DOLLARS)		
		AIR	WATER	LAND & OTHER	AIR	WATER	LAND & OTHER
I. EXPLORATION & PRODUCTION	1. CAPITAL EXPENDITURES						
	2. OPERATING & MAINTENANCE EXP.						
	3. ADMINISTRATIVE EXPENDITURES						
	TOTAL EXPLORATION & PRODUCTION						
II. TRANSPORTATION	1. CAPITAL EXPENDITURES						
	2. OPERATING & MAINTENANCE EXP.						
	3. ADMINISTRATIVE EXPENDITURES						
	TOTAL TRANSPORTATION						
III. MANUFACTURING	1. CAPITAL EXPENDITURES						
	2. OPERATING & MAINTENANCE EXP.						
	3. ADMINISTRATIVE EXPENDITURES						
	TOTAL MANUFACTURING						
IV. MARKETING	1. CAPITAL EXPENDITURES						
	2. OPERATING & MAINTENANCE EXP.						
	3. ADMINISTRATIVE EXPENDITURES						
	TOTAL MARKETING						
V. RESEARCH & DEVELOPMENT	1. PRODUCT						
	2. PROCESS						
	3. SAMPLING & TESTING						
	TOTAL RESEARCH & DEVELOPMENT						

Code Number _____

EXHIBIT II

EXAMPLES OF ENVIRONMENTAL DELAYS, ENVIRONMENTAL DELAYS IN OIL AND GAS PRODUCING OPERATIONS

Area and event	Dates	Delay
CALIFORNIA		
Santa Barbara Channel OCS:		
Blowout and oil spill at Union, et al, tract 402	January 28, 1969	
Operations on all Channel OCS leases suspended by Interior Secretary, pending new operating regulations.	Feb. 7, 1969 to April 1, 1969.	1.7 mo.
Interior administrative delay on 20 leases pending consideration of legislation to cancel these leases.	Jan. 28, 1970 to Apr. 21, 1971.	1 yr 3 mo.
Formal Interior Department suspension of operations on 14 leases for preparation of environmental impact statement.	Apr. 21, 1971 to Aug. 3, 1971.	3.4 mo.
Formal Interior Department suspension of operations on 35 leases pending consideration of legislation to cancel. Suspension expired January 1973, but reimposed April 1973, pending further environmental study.	Apr. 21, 1971 to present	2 yr 10 mo plus.
Interior Department initial denial of permit to install Union Oil Co. tract 402 platform C (platform completed Mar. 4, 1969). Final denial of permit Sept. 20, 1971. No permit granted as of March 1974.	Apr. 7, 1969 to present	4 yr 10 mo plus.
Interior denial of permit to Sun Oil to build Platform Henry on tract 401 (applied for Jan. 22, 1970). No permit granted as of March 1974.	Sept. 20, 1971 to present	2 yr 5 mo.
State offshore leases: Offshore drilling banned after January 1969 Santa Barbara oil spill. Moratorium ended by State Lands Commission in December 1973. Final action by other state agencies still pending.	February 1969 to December 11, 1973.	4 yr 10 mo plus.
LOUISIANA		
Offshore (OCS):		
Cancellation of scheduled February 1969 OCS drainage lease sale, following Santa Barbara blowout. Sale held December 1969.	February 25, 1969 to December 16, 1969.	10 mo.
Deferral of scheduled December 1969 OCS general sale following Santa Barbara spill, Chevron main pass blowout, and passage of Environmental Policy Act requiring environmental impact statement. Sale finally held December 1970.	December 1969 to December 15, 1970.	1 yr.
Postponement of OCS drainage sale from March to July 1970 because of Chevron main pass blowout, and environmental impact statement requirement of new Environmental Policy Act.	March 31, 1970 to July 21, 1970.	3.7 mo.
Cancellation of scheduled December 1971 general sale due to court action by 3 environmental groups, charging inadequate environmental impact statements. Sale held September 1972.	December 21, 1971 to September 12, 1972.	8.7 mo.
TEXAS		
Offshore (OCS): Court action blocking scheduled December 1971 Louisiana offshore sale also caused postponement of planned November 1972 Texas OCS general lease sale, for which nominations had been submitted Dec. 1, 1971. Sale finally held June 19, 1973.	November 1972 to June 19, 1973.	7 mo.
Northeast Gulf of Mexico OCS: Delay in scheduling 1st lease sale, due in part to environmental opposition. Final sale Dec. 20, 1973.		Indeterminate, but probably several years.
Atlantic Coast OCS: Deferral of leasing since 1963 when industry expressed interest. Environmental opposition has been major factor. Latest action is study by CEQ to be completed late 1974.		Several years.
Gulf of Alaska: Delays in scheduling leasing since 1968, when Interior Department began OCS sale preparations. Delays largely for environmental reasons.		Several years.

ENVIRONMENTAL DELAYS IN PETROLEUM REFINING OPERATIONS

DELAWARE		
Delaware Bay:		
In early 1970, Governor Peterson directed that a coastal zone management study be made; he also declared a moratorium on new industrial plant construction in the Delaware Bay area.	Early 1970 to present.	4 yr plus.
State legislation, enacted in June 1971, prohibits industrial plant construction in the Delaware Bay area. These actions blocked a planned Shell Oil Co. 150,000-barrels per day refinery; also halted industry efforts toward offshore terminal.		
MAINE		
South Portland and Searsport: Successive attempts by Maine clean fuels to locate a proposed 200,000-barrels per day refinery at each site blocked by various actions. South Portland project rejected by City Council in 1970. Searsport location rejected by Maine Environmental Improvement Commission July 1971.	1970 to present	3½ yr plus.
Eastport:		
Maine Environmental Improvement Commission rejected Pittston Co. application for 150,000-barrels per day refinery at Eastport in 1971.	1971 to present	2½ yr plus.
Pittston application for 250,000-barrels per day refinery at Eastport rejected by Maine Board of Environmental Protection (successor to EIC) late 1973.		

ENVIRONMENTAL DELAYS IN PETROLEUM REFINING OPERATIONS—Continued

Area and event	Dates	Delay
NEW HAMPSHIRE		
Durham: Olympic Refineries (Onassis) proposal for 400,000-barrels per day refinery rejected by Durham, N.H. voters Mar. 5, 1974, then by New Hampshire House of Representatives Mar. 8. Olympic now trying for Rhode Island.	November 1973 to present.	5 mo plus.
NEW JERSEY		
Hoboken: Supermarine, Inc. withdrew proposal for 100,000-barrels per day Hoboken plant under pressure from environmental groups, around mid-1971.	Mid-1971 to present.	2½ yr. plus.
NEW YORK		
Riverhead, Long Island: Fuels Desulfurization (parent of Maine Clean Fuels) February 1970 application for 200,000-barrels per day refinery withdrawn March 1970 after refusal of county and City Council to rezone.	March 1970 to present.	3 yr 11 mo plus.
RHODE ISLAND		
Tiverton: Northeast Petroleum mid-1970 application for 65,000-barrels per day refinery at Tiverton withdrawn in 1971 after adverse local reaction.	Mid-1970 to present.	3½ yr plus.
ALASKA		
North Slope:		
Court injunction April 1970 to halt construction of Trans-Alaska Pipeline for lack of environmental impact statement under new Environmental Policy Act.	April 1970 to Jan. 23, 1974	3 yr., 8 mo.
Appeals court ruling Feb. 9, 1973 (upheld by Supreme Court Apr. 2, 1973) that proposed right-of-way exceeded legal width. Courts declined to rule on environmental issue.		
Legislation authorizing construction of pipeline enacted November 1973.		
Interior Secretary Morton approved right-of-way permit Jan. 23, 1974.		

NOTES

List (not including Alaska) includes specific proposals rejected in the 1970's, where environment has been a factor. Some of these were regarded as promptional, and Government autnhorities were not convinced of the applicants' technical qualifications, or ability to protect the environment. Therefore, care should be taken not to allege that rejection of all proposals was due to environmental opposition per se.

List (for Alaska only) does not reflect situations where sites may have been considered, but no application made because of an assessment of environmental obstacles, or where sites were not considered at all because of obviously unfavorable circumstances.

STATEMENT OF HON. AUBREY J. WAGNER, CHAIRMAN, TENNESSEE VALLEY AUTHORITY, ACCOMPANIED BY ROBERT MARQUIS, TVA GENERAL COUNSEL; AND NATHANIEL B. HUGHES, DIRECTOR, POWER RESOURCES PLANNING

Mr. WAGNER. I have with me Mr. Robert Marquis, TVA General Counsel, and Mr. Nathaniel B. Hughes, Director of Power Resources Planning.

Senator PROXMIRE. I might say for the benefit of those who have come in late that you, as I understand, represent the Tennessee Valley Authority; is that correct?

Mr. WAGNER. That is right.

Senator PROXMIRE. What is your position with TVA?

Mr. WAGNER. I am Chairman of the Board of the Tennessee Valley Authority.

Senator PROXMIRE. Go right ahead.

Mr. WAGNER. Mr. Chairman, your letter asking that I come before you today stated that the purpose of your hearing is to assess the economic impact of environmental regulations. As such, it deals with

two areas which were of prime concern to the Congress when it passed the act creating TVA in 1933.

The Tennessee Valley, at that time, was afflicted with severe economic depression as well as a wasting of natural resources. TVA was formed to combat these, and other ills, by fostering the unified development of the total resources of the area.

Flood control, agriculture, and reforestation efforts were but some of the tools to be utilized by TVA in combating soil erosion, flooding, forest fires, and other environmental problems of the day. TVA was also given the authority to produce and sell electric power at the lowest possible cost in order that it might me used as an added tool to overcome the severe economic depression then present.

Throughout its existence, the twin concerns of environment and the economy have been addressed by TVA. We have long realized that without a healthy environment no man can fully enjoy the benefits offered by a strong economy. Likewise, the full quality of life offered by a healthy environmental setting cannot be achieved by one who is not able to earn adequate funds to maintain a descent standard of living.

The dual concern of TVA with economy and the environment has been evidenced in many ways. For example, when the TVA system of dams, lakes, and navigation channels was being started, we formed a unit within TVA to assure that the fisheries potential of the system would be protected and enhanced. The economic benefits of navigation and flood control were thereby tied to what today we would call an environmental aspect—fish. Likewise, other units of TVA sought and found means to improve the water quality in those same reservoirs. As a consequence, the waters of the Tennessee Valley as a whole are cleaner today then they were in 1933 despite substantial growth in population and industrialization.

As TVA started building steam plants, we were aware of the potential effects of the gases and particulates released to the air when coal is burned. Therefore, in the early 1950s we began extensive research into those effects. This research, which has been continued and expanded to this day, produced data used by TVA, and others, in developing the methods of pollution control in use today.

Just as TVA's continuing environmental concern is expressed in a different way today than it was 40 years ago, our concerns about the economy take different forms today. When TVA was organized, one of its purposes was to serve as a yardstick of the power industry. That term has been variously interpreted by different people to reflect their own ideas about the nature of TVA. Nevertheless, one of the constants in application of the yardstick principle is that it should measure the costs necessary to the production of power.

We believe that one of the necessary costs of producing power is that cost reasonably related to providing needed protection of the environment. However, we must not, as my friend Brooks Hays used to say, "over-egg our pudding." We must be sure that our investment in environmental controls is needed to protect human health and welfare and that the benefits are worth the cost. This concern is not a mere money item, for the cost of electric power intimately affects all phases of our economy. Addition of unnnecessary costs is not an item which shows up only in the balance sheets of the power producer; rather, the

effect of unnecessary costs spreads out to affect all segments of our society.

Each dollar unnecessarily added to the homeowner's power bill removes a dollar from his savings or from funds that he can use for other purposes, and it adds pressure to his need for more income. Each dollar unnecessarily added to the electric bill of a school system or a city or a State either removes from the tax revenues a dollar which could be used to pay for some other program which that governmental unit feels is necessary to serve its citizens or adds a dollar to the tax burden the citizens must bear.

Each dollar unnecessarily added to the electric bill of an industry adds pressure to that industry to raise prices for the goods produced with that electricity. These prices, of course, are ultimately borne by the consumer—who is probably the same person as the taxpayer and the homeowner who ultimately pays the bill for any unnecessary increase in governmental and residential electricity costs.

In short, because electric energy has become such a vital part of our total societal welfare, unwarranted increases in its costs feed the flames of inflation at the base, spreading its effects throughout the economy.

In addition to dollar costs which become part of the power bill, construction and operation of pollution control facilities involve the expenditure of both human and natural resources. Where the facility is genuinely needed to protect human health or public welfare, the resources must be used, of course.

A decision to build a pollution control facility is a decision to allocate materials and manpower. Steel which is used for a pollution control facility cannot be used for a mass transit system or a school or a factory. The talent of an engineer designing a pollution control facility is denied, for the time he is working on that facility, to other problems which our society must solve. The same can be said about every other item of material and labor which goes into that facility.

As indicated previously, if that facility is reasonably required to protect public health and welfare, there can be no quarrel with the allocation of these resources to that effect. However, if that facility is not needed, or if its real cost exceeds its value, we become engaged in an effort that wastes resources needed to achieve other national goals.

It might be well at this point to discuss one major item about which TVA and the Environmental Protection Agency have not yet reached full agreement—how to handle sulfur dioxide created when coal is burned to generate electricity.

TVA has developed a method of sulfur dioxide control which is efficient and, we believe, meets the requirements of the Clean Air Act in our situation and probably in many others. This program, the sulfur dioxide emission limitation program, or SDEL, uses an intricate monitoring system, together with a combination of tall stacks and generation reduction to insure that national ambient air quality standards are met. Installation of SDEL on the TVA system would have an estimated annual operating cost of $18 million. The TVA-SDEL program would cost even less but for the fact that TVA is committed to installing an experimental scrubber on one of the units at our Widows Creek Steam Plant in Alabama. This unit alone has

an estimated annual cost of $7 million, which was included in the $18 million.

EPA interprets the Clean Air Act to mean that constant emission limitations must be applied as a means to achieve ambient standards. In order to be assured each agency was aware of the factual position of the other, a joint TVA-EPA task force was formed for an assessment of SO_2 control needs for TVA powerplants. Although that assessment is still being worked on, we have a copy including the work that has been done to date available for the committee's use if you wish to have it.

EPA suggested a program, developed as part of this effort, which would involve scrubbers, fuel switching, low-sulfur coal, and coal washing. EPA estimated that the annual cost of this program would be about $150 million. These are annual costs I am talking about.

TVA estimated the EPA proposal would cost slightly over $170 million. It should be noted, however, that these costs were based on the least stringent constant emission standards which EPA believed were possible for TVA plants. The present State standards are more stringent and, therefore, more costly.

This compares with the annual cost of $18 million for TVA's method to achieve the same measure of protection of public health. In other words, the TVA program would meet national ambient air quality standards set by EPA to protect the air we breathe at a savings of about $130 million to $150 million annually.

We are mindful that some recent studies have indicated a possible connection between sulfate particles in the air and certain health problems. EPA is using these studies to justify, at least in part, constant emission limitations. However, these studies leave many unanswered questions about the nature of the health hazard involved. Some of the studies also state that the effect, if any, that sulfur dioxide emissions from powerplant stacks have on ground level concentrations of sulfates is unknown.

We believe that before vast sums are expended on constant emission limitations for existing powerplants to control sulfate particles, more knowledge must be gained. Until additional knowledge about sulfates is available, we can only speculate about health benefits from the application of constant emission limitations at those plants where national ambient air quality standards can be met by other means.

We believe that in pollution control a distinction should be made between new and existing plants. Such a distinction appears in the Clean Air Act's imposition of new source emission limitation standards.

On a new plant, choices concerning type of plant and design of plant are made before construction. Therefore, adherence to standards can be built into the new plant at much less cost than is incurred when new equipment must be added to an existing plant. Beyond that, it is relatively easy to determine whether there are serious adverse impacts from a plant that has been operating for several years. If so, they must of course be corrected. But, where a relatively few years of operating life remains for a plant, and where there is no evidence of significant environmental damage, expenditures to meet standards set for the future may place an unjustified economic burden on consumers of the plant's output.

Let me illustrate. Some of our coal-fired steamplants have been

using river water for cooling purposes. The discharge of this heated water through the years has created no known significant pollution problems. In fact, it has created some of the most heavily used fishing areas in our lakes. Yet, it is possible that under the Water Pollution Control Act cooling towers could be required for at least some of these plants. I will develop that a little further later.

Mr. Chairman, within the time limits available to us to prepare this testimony, we have not been able to develop complete answers to the questions propounded by the committee in the invitation to testify, but will provide them later for the record if you desire.

Senator PROXMIRE. I would appreciate very much if you could do that. I would like you to do that as promptly as you can. How long before you think you can have that material?

Mr. WAGNER. I think in a few days, and I am going to give you some figures that will illustrate the sort of things we have.

Senator PROXMIRE. Do you think by the end of next week you could have that to us?

Mr. WAGNER. I should think so, yes.

Senator PROXMIRE. Fine.

[The material referred to follows:]

RESPONSE OF HON. AUBREY J. WAGNER TO WRITTEN QUESTIONS POSED BY THE COMMITTEE IN THE INVITATION TO TESTIFY

Question 1. What has been the industry's record of pollution abatement expenditures since 1970, broken down into air and water pollution categories and any others you may deem appropriate? This table of actual dollar expenditures should also indicate what percentage of total capital expenditures these represent as well as a breakdown of pollution control expenditures into initial capital and operating.

Answer 1. Part 1 of the tabulation on the following page shows TVA's record of pollution abatement expenditures through FY 1974 and projected expenditures for these programs through FY 1979, broken down into air, water, and radiation waste control and other expenditures. Part 2 of the tabulation shows the estimated annual costs including depreciation interest and operation and maintenance associated with TVA's pollution abatement program. We have restricted these tabulations to the TVA system because we do not have access to firm data on an industry-wide basis.

PART 1—ESTIMATED TVA POLLUTION ABATEMENT EXPENDITURES

[Dollar amounts in millions]

	Prior years	Fiscal year— 1970	1971	1972	1973	1974	Total 1970–74	Ensuing years through fiscal year 1979	Total
Air pollution	$19.7	$11.1	$20.9	$18.6	$14.7	$20.5	$85.8	$275.1	$380.6
Water pollution	22.6	6.7	9.0	5.5	21.1	39.3	81.6	386.3	490.5
Radiation, monitoring, and other	6.0	4.2	2.6	2.4	6.5	4.3	20.0	151.7	177.7
Total pollution abatement expenditures	48.3	22.0	32.5	26.5	42.3	64.1	187.4	813.1	1,048.8
Total construction expendtures		352.3	476.9	585.4	482.7	525.0	2,422.3	5,683.2	[1] 8,105.0
Percentage—pollution abatement expenditures of total construction expenditures		6.2	6.8	4.5	8.8	12.2	7.7	14.3	[1] 12.9

PART 2—ESTIMATED ANNUAL COSTS OF TVA POLLUTION ABATEMENT

[In millions of dollars]

	Fiscal year—					
	1970	1971	1972	1973	1974	1979
Depreciation and interest	$6.2	$6.6	$7.5	$8.7	$10.1	$99.6
O. & M	10.5	11.1	12.7	14.6	17.0	35.3
Total [2]	16.7	17.7	20.2	23.3	27.1	134.9

[1] For period 1970 through 1979.
[2] Includes environmental R. & D. costs, additional power costs because of SDEL program, strip mine reclamation costs, and annual costs of coal dust allaying systems.

Question 2. Using this table as a base, to what extent have these increased costs been passed through in the form of increased electricity costs? Please be as specific as possible in terms of how this estimate was derived and its component categories.

Answer 2. The tabular calculation on the following page shows that the approximate TVA rate effects resulting from TVA's pollution abatement program have ranged from 2.2 percent to 3.2 percent for fiscal years 1970–74. These effects result only from activities to which TVA is currently committed. They do not include additional effects which would occur should TVA be required to install pollution abatement equipment which it believes is not required to protect the quality of the environment.

	Fiscal year—				
	1970	1971	1972	1973	1974
TVA system costs including annual costs of pollution abatement programs (millions)	$462.6	$544.1	$585.5	$696.7	$840.9
Annual costs of pollution abatement programs (millions)	$16.7	$17.7	$20.2	$23.3	$27.1
Percent of TVA revenues required for pollution abatement programs	3.6	3.3	3.5	3.3	3.2
TVA-kWh sold (billions)	90.7	90.6	91.1	103.5	106.1
Required increase in TVA revenue per kWh sold needed to cover costs of pollution abatement programs. (Annual costs of pollution abatement programed times 1.15 for margin divided by kWh sold) (mills per kWh)	.212	.225	.255	.259	.294
Required increase in average residential rate needed to cover cost of pollution abatement programs. (Annual costs above times 1.10 for losses) (mills per kWh)	.233	.248	.281	.285	.323
Average residential rate excluding cost of pollution abatement programs (mills per kWh)	10.10	11.94	12.54	12.71	14.18
Percent increase in average direct served industrial customer rate required (AEC excluded)	4.6	4.1	4.3	4.1	4.0
Percent increase in average residential rate required	2.3	2.1	2.2	2.2	2.3

Question 3. As for the near future, how much do you expect pollution abatement expenditures to be in the next three to five years and in what year will the industry have met the standards which are currently in effect? What price increases may be expected in this time frame due to the environmental regulations?

Answer 3. The tabulation included in the answer to Question 1 shows the estimated expenditures and annual costs incurred by TVA for environmental controls and monitoring through FY 1974. The tabular calculation on the following page shows the estimated rate effects resulting from TVA's proposed programs to provide environmental protection by fiscal year 1979. The tabulation does not include expenditures that could be needed to meet all environmental requirements which might be in effect in 1979. For example, TVA will meet national ambient air quality standards for sulfur dioxide through the use of its SDEL program by July 1975. EPA has stated it believes constant emission controls for SO_2 are required. These issues are discussed more fully under Question 9, attached.

TVA will meet the particulate standards by installing electrostatic precipitators so as to meet the emission standards adopted by the states. This program is to be completed by 1979.

Standards for water quality compliance carry a somewhat longer time schedule with applicable dates ranging from 1977 to 1983. Although questions about implementation of regulations still remain to be resolved with EPA and the states, we believe that these compliance dates will be met. The costs indicated for 1979 assume no retrofitting of cooling towers on existing generating plants.

The table attached as part of Question 1 includes TVA's committed plans for environmental controls at both the existing coal-fired stations and nuclear plants under construction. It indicates that by the end of FY 1979 TVA will have expended over $1 billion in capital expenditures for pollution control facilities, and the annual costs of these facilities will total $136 million. These facilities include the electrostatic precipitator program totaling $260 million as well as a scrubber on Widows Creek Steam Plant unit 8, tall stacks at three generating plants, and planned cooling towers and extended radwaste treatment facilities on nuclear plants. These pollution control costs of $135 million a year require that pollution control expenses be 7.5 percent of TVA revenues. If, however, TVA were required to meet constant emission standards for SO_2 control, the annual costs could be increased by at least an additional $150 million in 1979, if such work could be completed by that time. If the eight coal-fired plants that might be required to install cooling towers are not granted section 316(a) variances as discussed in Question 9, then the annual cost in FY 1979 could be increased by an additional $95 million. Thus, TVA currently faces potential operating expenses of $245 million in FY 1979 for SO_2 and thermal pollution control in addition to the committed program which costs $135 million in FY 1979. This additional $245 million would increase pollution control expenditures to about $380 million in FY 1979 thus making pollution control expenses total 18.6 percent of total revenues.

	Fiscal year 1979
TVA system costs including annual costs of pollution abatement programs (millions of dollars)[1]	$1,809.1
Annual cost of pollution abatement programs (millions of dollars)[1]	$134.9
Percent of TVA revenues required for pollution abatement programs	7.5
TVA kWh sold (billions)[1]	$157.8
Required increase in TVA revenue per kWh sold needed to cover costs of pollution abatement programs. (Annual costs of pollution abatement programs times 1.15—for margin—divided by kWh sold) (mills.)	$0.983
Required increase in average residential rate needed to cover cost of pollution abatement programs. (Annual costs above times 1.10 for losses) (mills per kWh.)	$1.081
Average residential rate excluding cost of pollution abatement programs (mills per kWh)[1]	$23.73
Percent increase in average direct served industrial customer rate required (AEC excluded)	6.2
Percent increase in average residential rate required[2]	4.6

[1] These estimates are highly subject to change depending on differences in the estimated level of fuel, labor and money costs, delays in the operation of new generating units, additional escalation in the cost of new facilities, and changes in the level of projected sales.

[2] The increase in residential power costs shown excludes the effect of increased power costs to industrial customers that supply goods and services purchased by residential customers.

Question 4(a). Will these standards be met principally through end-of-line treatment or is it possible that in some cases process changes will enable full compliance?

Answer 4(a). On the TVA power system the standards will be met basically through end-of-line treatment. Existing plants or plants now being designed present few opportunities for process changes to meet standards. Basically, end-of-line treatment is required to meet standards established after a plant has been built.

There are a few exceptions to this general rule. TVA has worked with EPA on research into introducing limestone into the coal combustion chamber as an SO_2 control measure. This research has not produced promising results. Fuel switching, that is substitution of a lower sulfur fuel, is a process change which can be used to meet SO_2 standards, assuming that low-sulfur fuel is available. In the future clean fuels or cleaner combustion processes also may be available if current research proves successful.

End-of-line control measures for existing plants include scrubbers, cooling towers, precipitators and similar hardware.

Question 4(b). In this regard, what have been, and will be, industry expenditures for research and development to meet the standards in the most cost-effective way?

Answer 4(b). Following is a table showing expenditures by TVA for Air Pollution and Water Pollution R&D:

TVA RESEARCH EXPENDITURES

	Through fiscal year 1973	Fiscal year 1974	Fiscal year 1975	Fiscal year 1976
Air pollution R. & D	$4,763,000	$6,460,000	$16,384,000	$19,329,000
Water Pollution R. & D	652,000	564,000	2,635,000	2,660,000

Similar research is being supported by others in the industry, much of it through the Electric Power Research Institute, of which TVA is a member. In 1975 EPRI plans to spend about $40 million, of its $130 million budget, for exploration of the clean up of fossil fuels and other environmentally related research. TVA's contribution to EPRI in fiscal year 1975 will be $6.3 million. This amount is not included in the above figures.

AIR POLLUTION STUDIES

For several years TVA has been conducting studies and experimental programs to define approaches for improving the air quality of the region and establishing approaches to make coal fired steam plants environmentally acceptable. Subprograms which have been considered in this research and development are sulfur dioxide control, nitrogen oxide control, particulate control, etc.

For fiscal year 1975 an estimated $3,384,300 will be used for operating pilot plants and prototype units for investigating sulfur dioxide control, for experimental nitrogen oxide studies, for performing particulate studies, for preparing reviews and evaluations of control technology, for studies necessary to furnish data for use in establishing sulfur dioxide emission control programs, and for other studies associated with air pollution.

For fiscal year 1976 an estimated $4,929,000 will be used to continue the studies of fiscal year 1975 and to start new studies or investigations as the need arises.

WIDOWS CREEK UNIT 8—LIMESTONE WET SCRUBBER

The purpose of this project is to install a full-scale research and demonstration limestone wet scrubber on the 550–MW Widows Creek Steam Plant unit 8 for purposes of removing both fly ash and SO_2 from the stack gas.

The major portion of the funds shown in the table for air pollution research and development for fiscal years 1975 and 1976 are for design and construction of this project. Thirteen million dollars in 1975 and $14.4 million in 1976 will be spent for this purpose. These funds will be capital costs and will have no effect on rates until the scrubber becomes operational.

WATER POLLUTION—THERMAL

TVA has conducted numerous studies and experimental programs related to the utilization and dissipation of thermal discharges from power plants. Subprograms which have been considered in this research project are the study of heat dissipation methods and devices, study of thermal effects from TVA power plants, the study of the beneficial uses of waste heat in greenhouses and in fish production.

An estimated $993,000 in fiscal year 1975 and an estimated $1,733,000 in fiscal year 1976 will be used to continue these studies.

WATER POLLUTION—OTHER

For many years TVA has been concerned with the impact of power generation on the aquatic environment and has conducted various studies, evaluations, and experimental programs related to improving the environmental quality in the

Tennessee Valley. Subprograms which have been considered in this research project are a study of trace elements associated with fossil-fired power plants, study on ways of reducing chlorine discharges, reaeration studies, a study on the entrainment and entrapment of organisms at intake structures, etc.

An estimated $993,000 in fiscal year 1975 and an estimated $1,733,000 in fiscal year 1976 will be used to continue these studies.

Question 5. Has compliance with the environmental regulations caused the industry (and your company) to reduce expenditures for new plant and equipment in 1973–74 from what they otherwise would have been? If so, to what degree and what specifically was cut back? What do you expect in the future in this area?

Answer 5. TVA has not reduced its program of providing new generating capacity to meet the projected needs of the Tennessee Valley region for electricity. We are aware that some utilities have delayed or canceled plans for new generating units. Whether these delays were caused by general economic conditions, high interest rates, or capital requirements for pollution control is something that can only be answered by a company which made the decision to delay or cancel a unit.

Question 6. Be as specific as possible in delineating the adverse economic impacts these standards may have had in your industry in terms of construction delays, plant closings, increased layoffs, etc. Please substantiate that these effects were due specifically to environmental regulations.

Answer 6. Although there have been construction delays in some TVA plants it is not possible to ascribe all or even a major portion of such delays directly to pollution control standards. Among the problems which have affected construction schedules on recent TVA power plants has been retrofitting of control equipment required to meet pollution control standards. However, problems with materials deliveries, insufficient supply of skilled labor, licensing for nuclear plants, and other items have also contributed to delays. We do not believe that it is warranted to say more than that the effort required to meet environmental standards has been one of several causes contributing to the stretching out of schedules for recent construction.

TVA itself has not closed plants or laid off workers because of environmental regulations.

Question 7. What has been the principal industry means of financing the pollution control measures? Have industrial development revenue ("pollution control") bonds been issued? If so, to what extent and have these provided the funds desired from this form of financing? Are there additional financing schemes you would like to recommend?

Answer 7. TVA has met its capital requirements for pollution control facilities through the use of proceeds from the sale of bonds and from retained earnings. We understand that some utilities have used so-called pollution control bonds which are exempt from federal taxes. However, it is our understanding that, although over $2 billion of pollution control bonds are pending, the major portion of pollution control investment has been made through normal corporate financing measures.

Question 8. Have there been any positive effects (benefits) for your industry resulting from complying with the standards? For instance, have any processes become more efficient, has productivity increased or have materials been conserved because of process changes, etc.?

Answer 8. We interpret this question to refer specifically to benefits accruing to the power industry from adoption of pollution control regulations. Because of the nature of pollution control as it has affected the power industry there are few opportunities for the realization of production savings from pollution control measures.

On the contrary, most pollution control measures require increased capital expenditures and the operation of pollution control facilities usually requires the use of electricity thereby reducing the amount of net generation available from that plant. For example, the operation of scrubbers is estimated to require five to ten percent of a power plant's electrical generation.

TVA's program to reduce the particulate emissions at its plants built mostly during the 1950's has resulted in collection of large quantities of ash which generally meet most specifications for use as an admixture in concrete and concrete products. Mechanical dust collectors which are generally over 60 percent efficient and collect the coarser part of the ash were installed at most older plants during plant construction. All of these type plants either have been or will be equipped

with electrostatic precipitators following the mechanical collectors in order to meet present particulate emission standards.

The finer part of the ash collected from the electrostatic precipitators is usually excellent for use as an admixture in concrete and concrete products to replace part of the cement in the mixture. TVA has been marketing and using in its own construction ash from the Kingston plant for over 15 years and from Gallatin for over 2 years and hopes to have a supply available at Colbert shortly.

For the five-year period ending June 30, 1974, TVA sold about 19,000 tons of fly ash for $208,000; in addition TVA used about 83,000 tons in its own construction projects. In this same period, TVA sold 125,000 tons of bottom slag for $150,000.

Question 9. What is your and the industry's (as much as it can be represented) feeling as to the standards now in force which impinge on your industry—that is, which standards are necessary and reasonable in their demands and which should simply not have been passed, or at least not with the timetable for compliance they now impose?

Answer 9. In this answer we will represent TVA's views. We believe some, though not necessarily all, of our feelings may be shared by other producers of electricity. We will limit our remarks to the effects of the Federal Water Pollution Control Act and the Clean Air Act, since these are the two pieces of pollution control legislation which most intimately affect producers of electric power.

At the outset it should be stated that TVA has no disagreement with the broad thrust of these two acts. We believe they were both passed to meet a need for a national system of rational regulation of pollution. In general, they provide mechanisms for setting standards which are reasonably connected with problems which the Nation must solve. Our major concerns with the acts are some of the time limits established in them and some of the actions which have been taken to implement them.

In making these comments we feel that it should be recognized that our pollution problems developed over an extended period of time and cannot be solved immediately. Furthermore, as indicated in the body of my statement, investments in pollution control should produce benefits to public health and welfare.

We will deal first with the Federal Water Pollution Control Act. Our major concern about this act is that its section 316(a) (33 U.S.C. § 1326(a) (Supp. II, 1972)) be administered by EPA in such a way as to carry out the intent of Congress. Section 316(a) was enacted in recognition of the fact that thermal discharges into the Nation's waters presented a unique problem that required a more selective approach than some other pollution problems.

Under section 316(a) the Administrator may establish a less stringent effluent limitation for control of thermal discharges if it can be demonstrated that the otherwise applicable standard is more stringent than necessary to protect a balanced aquatic community.

In order to establish that the otherwise applicable standard is more stringent than necessary to protect aquatic life, a power plant operator must conduct a series of biological studies. Since these studies must extend over a period of time, there is insufficient time to complete them prior to July 1, 1977, which is the date the usually more stringent state water quality standards become applicable.

As a result an owner may be required to design and in some cases begin construction of a cooling tower at the same time biological studies are being undertaken to determine if a demonstration of the type required by section 316(a) can be made.

We believe that beginning to build cooling towers at the same time studies are underway to determine whether the towers are necessary is unwarranted and that means are available to EPA for assuring that an applicant will have a reasonable time to complete biological studies before it is required to comply with otherwise applicable limitations. We have communicated our concern to EPA together with suggested approaches which could be used to overcome this problem.

In brief, we have proposed that EPA, by regulation provide that application to a given source of the otherwise applicable standard be suspended, upon application by the operator of that source, for a reasonable period of time to allow biological data to be collected and analyzed.

An alternative approach would be for EPA to issue initial short term permits on the basis of currently available biological and other data which would in effect modify any more stringent limitations, including water quality standards, for a period reasonably required to obtain more complete biological data upon which longer term permits would be issued.

We believe that either of these approaches would comply with the intent of Congress, allow for the protection of environmental quality, and provide a cost effective means of meeting the requirements of the Federal Water Pollution Control Act.

A second problem which is developing arises under section 402(k) of the act (33 U.S.C. § 1342 (Supp. II, 1972)). Under this section any entity which discharges a pollutant into the water must have a permit by December 31, 1974, or be subject to suit. Such a suit could be filed by a citizen, a state, or even EPA itself.

The final guidelines for these permits were not established by EPA until October 8, 1974. This has delayed EPA's processing of the backlog of permit applications which have been filed. We believe that efficient administration of the act will be promoted by extending until December 31, 1975, the protection from suit now contained in section 402(k) of the act.

Our concern with the Clean Air Act deals mainly with interpretation and application of that act rather than the language of the statute. In the body of my statement I referred to differing interpretations of the Act by TVA and EPA. EPA maintains that constant emission limitation programs are mandated by the Act while TVA maintains that intermittent or alternate controls which provide for achievement of national ambient air quality standards are permissable. It is interesting to note that EPA's current position is a reversal of the opinion of EPA's first Administrator, William Ruckleshaus, as expressed in testimony before the Senate Public Works Committee in 1972.

Other executive agencies have proposed that the Act be clarified by an amendment which would provide that nothing in the Clean Air Act should be construed to preclude the use of an alternative or intermittent control strategy as a primary control strategy where such strategy will permit attainment and maintenance of national ambient air quality standards. Such an amendment, which TVA also supports, could preclude the needless expenditure of dollars and resources where public health can be protected by a program like the TVA–SDEL program.

Mr. WAGNER. However, we have worked out some computations of the possible dollar effects of environmental control legislation. TVA's coal-fired generating plants represent a sizable installation, I believe at least as large or perhaps larger than any other electric power system now in the United States.

This comparison shows the difference between what we believe to be reasonably required for compliance at these plants with environmental legislation—that is what is needed to protect the environment—and what some of the possible costs of compliance could be under some proposals that have been made. In other words, these figures I think will illustrate the kind of balance we are struggling for between adequate protection of environment and a reasonable imposition of costs on our consumers.

In the area of air-pollution control, the two major cost items involve particulate control and sulfur dioxide control. In the area of particulate control, we are in full agreement with the measures proposed and have committed ourselves to a $260 million electrostatic precipitator installation and upgrading program. This program, which will have an annual cost of $30 million, will comply with the regulations which have been set, and which we agree must be met.

As I indicated earlier, EPA's proposal for controlling sulfur-dioxide emissions could cost about $170 million annually according to TVA's estimates. The method we propose for controlling SO_2 would cost only $18 million a year and give the same protection to public health.

I have noticed in going over this statement, Mr. Chairman, we have not included the capital costs at that point, and let me insert them here.

The capital cost of the TVA proposal for controlling sulfur-dioxide emission is $102 million. The capital cost of the EPA control would be $310 million just for scrubbers that they now think will be required in 3 of our 12 plants.

There might be some additional capital costs.

In the water-pollution control field, certain questions remain unresolved. About 2 years ago it appeared that the Federal Water Pollution Control Act could be interpreted to require installation of cooling towers on all existing TVA coal-fired steamplants, although in their operation extending up to more than 20 years there has been no observable indication of environmental damage. Cooling towers at all TVA coal-fired plants, not now so equipped, would require a capital investment of $470 million, and an annual cost of $115 million.

Subsequent development of regulations has shown that at least three of these TVA steamplants will not require cooling towers. While we believe environmental considerations do not require them at any of these 11 plants, we are still faced with a possible requirement for installation of cooling towers at the remaining 8. We are working within the framework of the Federal Water Pollution Control Act on studies which we hope will prove them unnecessary. But, if they should be required, this would involve a capital cost of $380 million and an annual cost of $95 million.

Summing up these costs—this is for 12 coal-fired plants that are now operating on our system—we see that application of just these three provisions promulgated under environmental statutes could result in increased annual costs to consumers of TVA electricity of $295 million. On the other hand, TVA programs to deal with the same environmental problems would have an annual cost of $48 million. This can be compared with TVA's current annual operating revenues of $884 million.

If you look at their effect on the cost of power sold by TVA—TVA sells power at wholesale to 160 municipalities and cooperatives and to some 40 large industries—the $48 million is about 6 or 7 percent of our total current revenues. The $295 million would be about 40 percent of our current revenues.

I should point out, though, that the cost of installation of these facilities could not be achieved until sometime in the future and revenues at that point would be much larger. However, the $884 million does relate to present revenues which come largely from these plants.

The capital costs in total for what TVA has now committed would be about $362 million. In comparison, the capital cost would be about $950 million if we have to install cooling towers at eight plants as well as scrubbers at three plants.

In relation to the invested capital in those plants, the program, to which TVA is committed, represents about 13 percent of the cost of those plants. If we should have to go to the more expensive EPA controls and cooling towers, capital cost of pollution control would be about 38 percent of the cost of those plants.

I do have one figure on our proposals for pollution-control investments in our total system during the coming 5 years, which is one of the questions you asked.

During the next 5 years we will invest about $813 million for pollu-

tion-control facilities for our total system. This includes plants in addition to the coal-burning plants referred to earlier.

Our total capital expenditures in that time will be about $5.683 million. So that would represent about 14 percent of the total investment which would go to pollution-control facilities. That is pollution-control facilities as planned by TVA does not include the more expensive EPA programs.

One factor that is often overlooked is that delay in placing a generating unit into operation creates an economic cost which must be recovered through increased rates. Construction schedules for some of our plants have stretched out, although these delays are not solely attributable to environmental reasons. However, we understand that generating plants in other sections of the country have been delayed by environmental lawsuits and other environmentally related causes.

We have estimated that for each month a 1,000 megawatt generating plant's operation is delayed there is a cost incurred of between $4 to $7 million. To the extent that any such delay can be attributed to environmental compliance, such cost is an environmental cost. These costs include interest and depreciation as well as the higher cost of operating older, less efficient plants, or purchasing power to serve needs which the delayed plant was intended to fill.

One other point I would like to mention just briefly for a moment. The requirements that are placed on the electric utility industry for cleaning up sulfur dioxide from the stack gases have, in our section of the country, at least, been cited as reasons for not opening new coal mines. We are in a high-sulfur coal area, generally, and one of our problems in the electric power industry now is that coal consumption for the last couple of years has exceeded coal production and we need new mines opened. The coal producers say they are reluctant to open new mines which produce high-sulfur coal because they are not certain they will have a market for the coal. That failure to open new mines has helped produce a seller's market and contributed to very, very high costs for coal. Coal which on the average cost us $10 a ton last year costs as high as $30 and $35 a ton now. Some people are paying even more than that.

The exact extent of the reason that I gave as a basis for not opening new mines I am not aware of, but I am sure this is a factor.

Senator PROXMIRE. Thank you very much.

I thank all of you gentlemen and I think you have made a very strong case for your position. I think these papers have been extremely well organized and presented and I very much appreciate it.

This is a Joint Economic Committee, it not a committee that is primarily concerned with environmental problems, it is concerned with economic problems, that is our responsibility, and that is what we are working on.

Furthermore, we have a charge from the Congress of the United States to come up with a program to deal with our inflation situation, and we have to do that by the end of the year, and this hearing is an important part of that.

There is not any question in my mind that our No. 1 economic problem is inflation. We have a gathering recession, but inflation is still an overpowering and most serious economic problem.

In the second place, I think the three industries represented here make the strongest case that can be made anywhere for the inflationary impact, the extent there is such an impact of environmental regulations on inflation.

You, as I said in my opening remarks, are the three industries which require the greatest amount of capital expenditures to cope with pollution control.

I understand the estimates of the staff are that your three industries represent about 40 percent of all requirements throughout industry for pollution control. So I think the case is here, to the extent that there is a convincing case.

Yesterday we had John Sawhill appear and he argued, when I questioned him on this, he said that he was not sure that you could make a case that there was any inflationary effect from pollution control, and he made that argument on this ground:

No. 1, he said there there were benefits that are very substantial, economic benefits from pollution control in terms of health, in terms of greater opportunities to enjoy the environment, and that they were definite and no question about it.

Furthermore, he said when you do not have all of your resources in the society utilized, either manpower or industrial, he argued that it was hard to show that mandating additional expenditures would have a net effect, overall effect on increasing prices.

I think you have made some specific rebuttal to that here.

Now I would like to start off with Mr. Gammelgard and ask you, sir, speaking as an expert in the oil industry, to respond to this.

In 1972, a major publication of three Federal agencies including the Department of Commerce, published a document called the Economic Impact of Pollution Controls. They concluded that, No. 1, refined product prices at the refinery gate will increase about 8 cents per barrel, or two-tenths cents per gallon. That is an increase of 1⅔ percent.

Number two, they concluded the earning power of the industry as a whole will be unimpaired.

Number three, they concluded there may be a minor acceleration of the rate at which very small refineries close.

Number four, they concluded that fewer than 1 percent of those employed may be displaced.

This total estimated impact is very small. How do these predictions compare with actual experience? That was 2 years ago. What has been your record, what has it shown?

Mr. GAMMELGARD. I think that study, if I recall it correctly, took into account only the costs in the refining segment of the industry, and in doing so it is limited to the refining segment.

Senator PROXMIRE. Well, let me interrupt to say, as I understand it, what they tried to conclude was that the total effect on price refined products at the refinery gate, it was my understanding, you can correct me if I am wrong, that this would include all of the process up to that point as well as the refinery itself.

Mr. GAMMELGARD. I don't think that is correct. I believe the study, if it is the one I am familiar with, said 8 cents per barrel would be the cost to the industry. It is limited to just the refining segment of the industry and it is also limited to "inside the refinery fence" cost of pollution control. It did not include desulfurizing fuels, which is a

major cost, which are then sold outside of the refinery fence, and it did not include such costs as making unleaded gasoline, because it assumed that those costs would automatically be passed on to the consumer.

These are the big parts of the cost.

Senator PROXMIRE. Well, how much of it is the additional impact in proportion, would you say that this report covered what, 10, 20, 30 percent of the total impact on the oil industry, or can you give me an estimate?

Mr. GAMMELGARD. I guess probably 25 percent.

Senator PROXMIRE. Well, then, roughly you would say the increase per gallon would be in the neighborhood, maybe, of a cent a gallon?

Mr. GAMMELGARD. At the minimum.

Senator PROXMIRE. All right.

This report also noted that about 5 percent of the total investment in new refineries over the next decade would be required to enable refinery operation to conform with environmental standards. Five percent for that purpose.

How accurate does this estimate appear to be in light of the recent past?

Mr. GAMMELGARD. That is patently incorrect. We have examples of two refineries, the Union Oil Plant in Lemont, Ill., and the ARCO Plant at Cherry Point in the State of Washington, and both are fairly recent plants. At the Cherry Point plant of ARCO I believe the pollution control equipment put in at that refinery represented 15 percent of their capital investment. This was about 4 years ago. I do not think the percentage would change much today. The plant at that time, I think, cost about $200 million.

Senator PROXMIRE. So you think it is more like 15 percent than 5 percent?

Mr. GAMMELGARD. I think it would be more like 15 to 17 percent.

The Union Oil plant at Lemont, Ill., put out a figure of 17 percent. These were grassroots plants, which is the ideal, or the optimum time in which to put in pollution control facilities, you can design them in.

Senator PROXMIRE. That is right.

After all, these are just two examples and this was an overall study by competent people in the Federal Government without an ax to grind, I presume.

Mr. GAMMELGARD. I might question that.

Really, honestly, Mr. Chairman, so many of these studies that are conducted by the Government are done on a 90-day or 60-day crash basis, with very incomplete input, they have to be reviewed, the drafts and so forth, and they must be finalized in 90 days.

Senator PROXMIRE. I think what would be very helpful, if you would take that and give us whatever critique you would like to give and let us get whatever rebuttal we can get from the agency and see if we can come to some kind of a conclusion on this.

Mr. GAMMELGARD. Yes, sir.

Senator PROXMIRE. Finally, the study stated, "Due to the nature of the market for crude oil it is unlikely that the new control costs in petroleum refining can be passed back to crude oil producers."

Consequently, these cost increases will be passed on to the industry's customers or absorbed by refiners. It is unlikely such an absorption will take place by industry as a whole.

Would you agree that the great bulk of pollution control costs are passed forward to the consumer?

Mr. GAMMELGARD. Yes, if you have a company that is economically competitive and in a position to pass these costs on he will do so as a cost of doing business.

If he is not competitive, he may not be able to pass on all of those costs or all of some of his other cost.

Senator PROXMIRE. In general it is fair to conclude this is the fundamental problem, there is an inflation problem rather than a problem of inhibiting production or inhibiting the growth of the industry, except to the extent that you have an elastic demand. I do not think you do have an elastic demand, I don't think you do. I think people will buy gasoline, if they have to pay 1 cent more for environmental control for each gallon.

Mr. GAMMELGARD. I agree.

Senator PROXMIRE. Mr. Kane, I would like to get off the subject a little bit but I think this relates to the subject indirectly. I can't resist it because it is so topical.

In this morning's Post there was an article with a very serious allegation about one of your popular products, Freon. I have a copy of the article here.

The aerosol gas Freon poses such a serious threat to the earth's ozone radiation shield that the nation should consider banning its manufacture.

This is the type of technological progress that is becoming of increasing concern to our citizens.

Let me ask, is Du Pont aware of the potentially harmful effect on the atmosphere of Freon or do they dispute the finding of the National Academy of Sciences?

Mr. KANE. It is not a finding of the National Academy, it is a finding of several university people——

Senator PROXMIRE. Let me read the second paragraph.

Mr. KANE [continuing]. Of rather recent origin.

To answer your question, we were not aware of this until this was uncovered by the scientists.

Senator PROXMIRE. Well, the second paragraph said:

That is a tentative conclusion of a 5-member panel of the National Academy of Sciences, which recommended a 1-year investigation to determine the scale of the threat and to attempt to find a way around it.

Mr. KANE. We suggest perhaps the Chairman was out of order since this is an objective study to find out what is going on. We applaud these studies. There are studies active in universities and Government, and in the companies involved, and the whole message is trying to get hard data just as promptly as we can. So far the work is theoretical.

Senator PROXMIRE. What will be the reaction of Du Pont, will you discontinue the manufacture of this product or——

Mr. KANE. I suggest, Senator, it is premature to try to answer that question until we get data to see whether there is a problem or not.

A potential problem has been flagged and now people are busy trying to get data.

Senator PROXMIRE. How long do you think it would take before you would be in a position to make a decision on that?

Mr. KANE. Mr. Driver could comment for the industry on some of the studies.

Mr. DRIVER. Yes, sir. We have had underway for several months a study in this area and we are currently organizing three separate studies on the subject that you bring up, Mr. Chairman. One is that the University of Reading in England is taking indirect measurement in the atmosphere of concentration. Another is the University of Montreal where they will measure the ultraviolet absorption spectrum and the University of California at Riverside. So far the scientists who are consulting with the Manufacturing Chemists Association and working these study areas are not satisfied that there are any sufficient specific numbers to warrant action at this point, but we are continuing with these studies and as information from them becomes available it will, of course, be available to the Government as well.

Senator PROXMIRE. I understand the Harvard study says if the use of "Freon" keeps escalating at its current rate, it will be enough to reduce the ozone layer by 10 percent by 1990, and that will be enough to cause a 20-percent increase in skin cancer.

Mr. DRIVER. Yes, sir, it is our feeling that this is speculation in the extreme.

Senator PROXMIRE. But at any rate within a matter of months within a year at least, you would be in a position to make a more definitive and accepted evaluation of this and determine whether or not the product should continue.

Mr. DRIVER. That is right.

Senator PROXMIRE. I assume if you find it does constitute any threat to the ozone and, therefore, have an effect on radiation on Earth, that you would discontinue it, is that correct?

Mr. KANE. Well, of course, if it is a health hazard we would, and I would suggest, Senator, there is an article in Chemical Week of November 20 that your staff may want to look at which we consider rather balanced treatment of this subject.

Senator PROXMIRE. We will put that in the record at this point. I am delighted to get that.

[The article referred to follows:]

[From Chemical Week, Nov. 20, 1974]

THREAT TO THE SEASON IN THE SUN?

RESEARCHERS STUDY POSSIBLE OZONE DESTRUCTION BY FLUOROCARBONS FROM AEROSOL PROPELLANTS THAT RISE INTO THE STRATOSPHERE

The heated debate over whether fluorocarbon aerosol propellants pose an imminent threat to the earth's stratospheric ozone layer has stirred up action. Dire forecasts by some researchers of an explosion of skin cancer cases and irreversible climate changes (CW, Sept. 18, p. 59) have been countered by industry's contention that experimental evidence of ozone destruction is lacking. And researchers are already at work to get the facts.

Meanwhile, one atmospheric scientist, Donald M. Hunten of the National Science Foundation's Kitt Peak Observatory, has called for a ban on the use of fluorocarbons (the chlorofluoromethanes), which are also used as refrigerants.

The stakes are high. Estimated U.S. production was 831 million lbs. last year and 403 million lbs. in the first six months of this year, according to the U.S. Tariff Commission. Major producers include Du Pont, Allied Chemical, Union Carbide, Kaiser Aluminum & Chemical, Pennwalt and Raycon.

MCA Studies: To gather hard data, the Manufacturing Chemists Assn. has three separate studies in progress.

James E. Lovelock of the University of Reading (England) will take direct measurements in the stratosphere of concentrations of fluorocarbon 11 (CCl_3F), which is one of the two most commonly used compounds—the other is fluorocar-

bon 12 (CCl_2F_2). This should enable Lovelock to determine whether ozone-destroying reactions are taking place and how significant they are.

Camille Sandorfy of the University of Montreal will measure the ultraviolet absorption spectra of a variety of fluorocarbons at different simulated altitudes.

James N. Pitts and O. C. Taylor of the University of California at Riverside will use a specially constructed chamber to study fluorocarbon reactions at various simulated altitudes.

MCA says the investigations are in preliminary stages, may take several years to complete.

Meanwhile, Kitt Peak's Hunten is heading a panel of scientists at the National Academy of Sciences now studying the fluorocarbon-ozone controversy and the group is expected to issue recommendations soon. In addition, the Commerce Dept's National Oceanic and Atmospheric Administration held a meeting last week to which all scientists measuring fluorocarbons in the environment were invited. The discussions dealt with standardization of instrumentation being used so that different measurements can be compared.

NOAA is also conducting photochemical modeling experiments involving fluorocarbons at its Boulder, Colo., laboratory and is collaborating with the Atomic Energy Commission in monitoring the stratosphere.

The American Geophysical Union has slated a special session on atmospheric fluorocarbons at its annual meeting next month in San Francisco.

And the Environmental Protection Agency says it is studying the entire ozone situation but is a long way from considering anything like fluorocarbon regulations.

Chain Reaction: The big stir over fluorocarbons was touched off last June when chemists F. S. Rowland and Mario Molina of the University of California at Irvine published a paper in the British journal *Nature* contending that supposedly inert fluorocarbons are split by the sun's radiation in the stratosphere, 10-20 miles above the surface, and yield highly reactive chlorine atoms. These atoms, say the chemists, can convert ozone (O_3) into ordinary molecular oxygen (O_2) in a two-step process that releases the chlorine, and the reactions can be repeated. This leads to a chain reaction in which one chlorine atom ultimately destroys thousands of ozone molecules.

Because there are few natural "sinks" in the lower atmosphere for dissipation of fluorocarbons, Rowland and Molina assert, the chemicals will eventually build up, reach atmospheric concentrations 15–30 times the present levels (assuming there is no growth in the current worldwide fluorocarbon production rate of 1.6 billion lbs./year). The worst of the ozone destruction might not ocur for decades because of the long time (up to 50 years) it takes a fluorocarbon molecule to diffuse upward into the stratosphere. And the problem would persist long after fluorocarbon production was halted, they claim, because of the long atmospheric lifetimes of the chemicals.

Although their conclusions are based on theoretical models, Rowland and Molina say the stratospheric ozone layer has already been depleted by 1% to 2% by man-made chemicals from spray cans. And this is enough to cause an estimated 10,000 new U.S. skin cancer cases each year, they add.

"Recent calculations . . . are even more pessimistic than we supposed initially," says Rowland, warning that if the steep rise in aerosol use continues, the ozone layer will be depleted by 7% in 1995 and ultimately by as much as 25%.

Other Warnings: Another alarm was sounded recently by Ralph J. Cicerone, a physicist at the University of Michigan. In a paper published in an issue of *Science* last September, he reported that his computer calculations indicated ozone destruction rates caused by fluorocarbons would exceed those from all natural ozone sinks (such as reactions with molecular oxygen and nitrogen oxides) by 1985 or 1990, assuming there is no letup in current fluorocarbon production. Even if emissions of the chemicals were halted now, he wrote, "the resultant ozone destruction would maximize by about 1990 and would remain significant for several decades."

A new set of computer calculations by Harvard University atmospheric scientist Michael B. McElroy strikes a more ominous note. If the present annual fluorocarbon industry growth rate (22%) continues unabated, he warns, the ozone concentrations in the stratosphere will be depleted by a whopping 40% by 1995. Even a more modest 10% annual growth rate, he preducts, would lead to 40% depletion by the year 2014.

Says Michigan's Cicerone: "The potential situation can only be described as global and dangerous." He advocates an immediate halt in fluorocarbon production and a search for suitable replacements.

Experiments Needed: On the other side of the controversy, Du Pont's Raymond L. McCarthy, technical director of the Freon Products Division, maintains that claims of fluorocarbons' peril to the environment are based on theoretical hypotheses. "The next step that is very definitely needed," he says, "is experimental evidence." He adds that there is now no current evidence from laboratory tests or actual observations that significant amounts of fluorocarbons have diffused into the stratosphere.

McCarthy maintains that fluorocarbons account for only about 4% of total U.S. halogenated hydrocarbon production. Other chlorinated compounds, he adds, are potentially capable of releasing chlorine atoms into the stratosphere but often escape detection because instruments cannot measure them as precisely as fluorocarbons can be measured. "I think the issue is chlorine in the stratosphere," he says. "Where it comes from would be quite secondary."

McCarthy wants a thorough scientific examination of all chlorinated compounds in the atmosphere.

To counter Rowland's contention that ozone depletion has already occurred, McCarthy cites studies at the University of Colorado indicating that stratospheric ozone levels in the Northern Hemisphere have actually increased during the last decade. Asked if the situation could rapidly reverse itself, he responds: "That gets us into an area of speculation. The question is: Is that [the Rowland hypothesis] what's really happening? None of us really knows. Nobody wants to wait and see if the ozone layer depletes in 20 years, but I don't think that's the alternative. The alternative is to get the data and do the laboratory experiments."

The studies now in progress could provide that data.

Senator PROXMIRE. Mr. Kane, Dow Chemical Co.'s pollution control systems have resulted in a companywide profit. Its chairman, Carl Gerstacker, has urged that the profit motive be effectively connected to environmental cleanup. Specifically he has said:

> Pollution control will continue on forever if we see it simply as a drag on earnings, as a necessary nuisance classified as overhead. If we see the opportunity in pollution and exploit that opportunity to the hilt, then we will help our earnings, and we will solve our pollution problems and * * * the Nation's pollution programs.

I must say it has a lot of appeal, if it is true.

I want to ask you as an expert how you would evaluate the realism of that.

I would like to know if that attitude and the tie-in with the profit motive is widely shared in the chemical industry and do you feel other industries would share——

Mr. KANE. I agree it has a lot of appeal and we wish it were so across the chemical industry.

I think that it has a lot to do with the length of time that a chemical company or a plant has been working on the problem and I think much of what Mr. Gerstacker says is in the past for his company and not looking ahead, as standards get tighter and more and more of the inefficiency, if you will, of the process has been eliminated.

We would estimate that only a very small percentage of our pollution control investment would earn any kind of a financial return despite our very best efforts to make it happen with the amount of money that we are investing.

Senator PROXMIRE. Now, Senator Javits asked a question before he left, and I think his question was an excellent one.

As you said, I think it does reflect the views of industry, but I would like to ask if those views may not be wrong in this sense.

Union Carbide, I understand, has done this with one of its plants in West Virginia. It brought about a 97 percent reduction in particulate emissions, after they signed a strict abatement schedule. It would

cost them a great deal to do it, I understand, but it avoided the even higher costs now facing their competitors.

The point I am raising is to the extent that you postpone this, isn't it possible it may cost you a great deal more in the long run, not only inflationary cost because of the growth in your production and so forth, rather than acting promptly to meet this and sometimes these abatement requirements which may seem stern and strict and costly may even be economically wise in the long run?

Mr. KANE. Well, I interpreted Senator Javits' remark to include some plants, for example, that may have a high employment and could be in dire straits and be unable to justify with their earnings situation now environmental investment. In the broader sense, within a recession in my own company, we do not see any real practical difference in spending for pollution control at this time, but I think the point is well taken that any postponement of something that you agree you should do and is right will be more costly later on granted there be some inflation in our system.

Senator PROXMIRE. At any rate, you do consider this element in your determination of the policy you adopt for pollution abatement.

Mr. KANE. That is right.

Senator PROXMIRE. Mr. Wagner, a decade from now, what will be the percentage increase in the price of electric due to meeting all pollution controls? Can you make any estimate on that 10 years from now?

Mr. WAGNER. Not a decade from now, no, sir.

Senator PROXMIRE. In percentage terms, 10, 20, 30 percent?

Mr. WAGNER. I would think in the first place it depends on what pollution control standards——

Senator PROXMIRE. Let us assume we persist in the standards that have been put in effect.

Mr. WAGNER. I would guess, Senator, it could be in the neighborhood of 20 percent but I would like to check that.

Senator PROXMIRE. Well, the reason I raised that point, I did not want to trap you at all, and you may be aware of this, but the Environmental Policy Administration claims that in 1983 the price will be only 7 percent higher than it otherwise would be, which is only a dollar and a quarter increase in the monthly electric bill of the average residential consumer.

You would challenge that?

Mr. WAGNER. I think our experience would challenge that, yes, sir.

Senator PROXMIRE. You would think it would be two or three times as high?

Mr. WAGNER. I would think so.

Senator PROXMIRE. Why?

Mr. WAGNER. The cost of sulfur dioxide controls are, if constant emission standards are required on existing plants, it will be high. I understand they are required on new plants anyway and they will be high. The question of handling thermal discharges is going to increase in cost as more plants are built. I am not saying that some of these costs should not be accepted, some of them should, Mr. Chairman, all I am saying, I think they will be substantial.

Senator PROXMIRE. Now, as I understand it, EPA maintains that in putting together its regulations it does look at the economic effect

and potential economic effect and particularly it cites as a good example of this the rather substantial reduction in cost reflected in the thermal effluent guidelines which they have recently issued for the electric utility industry. Do you agree that that is a good example and do you generally accept the position that the EPA carefully weighs the potential economic consequences and does everything it reasonably and responsibily can to ease or avert any adverse economic consequence.

Mr. WAGNER. I would hope they ultimately would do that. Some of the arguments we are having with them, Senator, I suppose are based on this very point, Mr. Chairman, particularly the argument we are having with them on sulfur dioxide control.

Senator PROXMIRE. Mr. Gammelgard, the total expenditures on pollution control in the petroleum industry in 1973 amounted to 28 percent, I should say a 28-cent increase in the price of a barrel of oil. That is only 3 percent of the current price for a barrel of new oil.

Would you conclude from this that the increased costs to consumers are of relatively slight consequence even if they were passed through entirely?

Mr. GAMMELGARD. That is a relatively minor charge. There is no question about it. I think one of the problems we have run into is looking at each segment completely separate and not adding them all up, and I think EPA is guilty of that. I think we have probably been guilty of it in our industry until we finally find out what is the whole package going to cost. Unleaded gasoline, desulfurized gasoline, phased down leaded grades, effluent cleanup from refinery waste water and others. If you look at each one of these separately it is not much of an increment but when you add them together it is going to be a very substantial figure.

Senator PROXMIRE. That is what I want to do, add it together. The calculation that I have here, and I would like you to comment on it, is that the price of a gallon of gasoline, due to environmental controls in the oil industry, would be increased about a penny a gallon?

Mr. GAMMELGARD. I think that is a low figure. I do not think there is any question that that figure will show up low when we look at what we are faced with for 1977 and the lead phasedown which is just starting on January first of 1975. We have not seen the effects of that yet. One penny a gallon, I would like to point out, on roughly 100 billion gallons of gasoline sold in 1 year is $1 billion.

Senator PROXMIRE. I realize it is a whale of a lot of money. We are trying to put it in perspective. It is an enormous industry, too.

Mr. GAMMELGARD. Yes, sir. The other thing to consider is that you pay much more for your raw material which, as you know, has quadrupled in price, at least the crude we bring in from the Middle East and Venezuela and also from Canada. Then it becomes all the more important when dollars get tigther and tighter, because the impact of this crude cost on the economy not only of this country but even more so on Western Europe, is going to be. I think, just very, very strong. We are seeing it now and we have not seen it all yet. So to the extent that you can save additional incremental costs you are helping the economy that much. There is not much we can do right now in spite of the best efforts of Mr. Kissinger and others to try to get the Arab countries to reduce the cost of crude, they are holding to that price

and what can you do about it? What can we do about the incremental costs? I think in this extremely tough economy the Western World and Japan is facing, I think we should make every dollar that we spend count.

Senator PROXMIRE. In your prepared statement you cite some examples of the kind of regulatory questions that have been of concern to the oil industry. I know all of these have dealt with autos. Does this imply the environmental regulations concerning the operation of the industry itself have been well accepted and do not place undue burden on the industry as such primarily its effect is on the price of gasoline.

Mr. GAMMELGARD. I do not think I quite agree with that. We are facing some increasing costs now on making gasoline to comply with the conditions imposed by the catalyst. The catalyst must have unleaded gasoline. This is going to cost billions of dollars of investment in the industry to make it unleaded. We are going to have to phase down the amount of lead for the EPA schedule starting January 1, 1975, and the amount of lead we put in a gallon of gas is going to cost several billion dollars more in refining investment and this has got to be reflected in the price of the product. The first EPA requirement, Mr. Chairman, for making an unleaded gasoline for the catalytic system we do not argue with. We know that catalysts will not tolerate lead in the exhaust that passes over it and give a satisfactory operating life so the industry is making unleaded gasoline generally available all over the country. We are opposed to spending more billions of dollars to make less gasoline from the remaining crude and make it more expensive because of phasing down the lead in the leaded grades of gasoline, which is a diminishing market. If you will look at the two curves in figure 4, I think they graphically illustrate the point far better than I can say it. We have drawn the charts from EPA data to reproduce the charts that Mr. Ruckelshaus used at a press conference I attended just about 2 years ago. The dashed line shows the reduction percentage on the left hand scale starting with zero percent when the regulation first came in, down to a 95-percent reduction in lead by 1985, based on lead-free gasoline only. The lower solid line starts at the same point in 1974 and winds up at essentially the same point in 1985, but that little belly in the curve that gets you down in percentage reduction a little bit faster is going to cost several billion dollars with no benefit to the public except an additional cost and I do not consider that a benefit.

Senator PROXMIRE. Now, the Council on Environmental Quality has consistently stated that environmental expenditures by industry will reach a peak in 1976 or 1977, yet you stated and I quote,

> The upward trend in amount of environmental expenditures both in absolute dollars and as a percentage of total capital is expected to continue into the early 1980's.

Is the oil industry convinced the upward trend will continue that long and, if so, why are you an exception to the overall estimates of the Environmental Quality Council?

Mr. GAMMELGARD. Well, I think one illustration of why we think it is going to continue is shown in figure 2 of my statement.

Just take the top category, existing refineries with greater than 10,000 barrels a day crude capacity. Ignore the rest for the moment. To achieve the best practicable control technology by 1977 will re-

quire an investment of $952 million. To get the best available by 1983 is another billion dollars, or better than double. To get to the goal, if we can get there, the elimination of pollutant discharge completely, which is a goal in the Water Act for 1985, we estimate will cost $2.7 billion. Not on top of the 1.9 by incremental 800 million. So we think——

Senator PROXMIRE. You label this cumulative capital costs, and if you cumulate them that means a billion dollars over about a 7-year period, 6-year period, and that would mean a lesser capital cost per year after 1977. That was my question.

Mr. GAMMELGARD. Yes. But then, in addition to whatever capital facilities you put in, you have an operating and maintenance cost which the larger the investment you have that is going to be an increasing amount year by year until you stop investing additional capital and finally have the ball game made.

I do not see this going down even in constant dollars and certainly with inflated dollars it is going to continue going up and add thereby to inflation. I am not an economist.

Senator PROXMIRE. Mr. Kane, in the title to section III of your statement you suggest that pollution abatement spending is recessionary. If you allow for the antirecessionary effect of outlays mandated by environmental control laws which will increase business investment, when it otherwise may be weak, in this case it would create jobs and spending at a time when they are necessary. I notice that in so many industries, when I go back to the State in a recess I spend a day working in a different industry. I worked all day in a paper mill in Wisconsin last spring and they put me on a pollution abatement project, they were pretty wise to do it—a pollution abatement project for a couple of hours knocking the concrete stuff out of some forms that they had. And I could see it is a massive project costing an enormous amount of money. It is something that requires a lot of work and a lot of people and a lot of jobs.

Why is it not true, therefore, that the extent that we require industry to engage in these jobs producing anti-pollution efforts, that it would put people to work rather than result in unemployment or a recession?

Mr. KANE. Well, I would make two points here. One, of course, is the timing on all of this. What you do now and when the plant gets built, when the employment would come to you, which could be 2 years off and the timing may not be right.

Senator PROXMIRE. There is a whale of a lot of construction work and, as you know, the unemployment in the construction trades is twice as high as it is elsewhere, it is 12½ percent.

Mr. KANE. That is right. That would start to give some benefit. But the bigger thing, it seems to me, the point we are making, is that not all of that investment is justified. If some of that investment were translated into productive equipment like the example I stated of building new plants, then when you consider the downstream effect you would employ many more people by that action than by investment in pollution-control equipment.

Senator PROXMIRE. So you think that the——

Mr. KANE. My thesis then is better put your——

Senator PROXMIRE. It is pretty hard to tell. There would be cases where the requirement that you first build your pollution abatement

project before you can expand your production would undoubtedly postpone the hiring.

Mr. KANE. Well, I think the point I am getting back to is that there is for each of our companies a limit to the amount of money you can spend in 1 year and if you spend more of it in pollution-control equipment, which it may be necessary to do, then you have not put that money in productive equipment that can provide a lot of jobs downstream.

Senator PROXMIRE. It is hard to buy your basic assumption. It may be true in Du Pont. We have such a colossal fluctuation in business investment in plant and equipment in the last few years and an explosion in 1973 and a very big increase in 1974, it looks as if it is going to level out now. The way it goes way up and down it would seem they can fluctuate quite a bit. It is not a fixed amount but they——

Mr. KANE. I am not saying a fixed amount from year to year. I am saying the amount that would be available because of your cash flow and retained earnings that year which would provide the setting for your investment decision.

Senator PROXMIRE. Well, that provides one limitation in circumstances such as we have had in the last year or so, but there are other times when the decision to invest in equipment is really based on estimates of demand and they decide not to expand because they have no point of overbuilding even if you have the cash flow.

Mr. KANE. It is on demand, no question about it, but then you get to the question of timing, whether you are a year earlier or late in getting plants onstream.

Senator PROXMIRE. At any rate, you say there are cases at least where it would have a recessionary effect?

Mr. KANE. In the way that we have discussed this, yes.

Senator PROXMIRE. Do you think you could make an overall conclusion now that the effect this year is to aggravate unemployment or would you think that——

Mr. KANE. I would not make that point this year.

Senator PROXMIRE. Do you agree, Mr. Wagner, with the following statement with regard to EPA proposed regulations under sections 304, 306, and 317(a) of the Federal Water Pollution Control Act: "By conservative estimates"—this is what the statement says—

> By conservative estimates the costs of EPA's proposals would be 3 to 50 times greater than any social benefits that might result from their imposition. More realistic estimates suggest costs which are 100 to 1,000 times the benefits. In many cases it appears that no social benefits whatsoever would result from the economic burden imposed by EPA proposals.

Mr. WAGNER. Mr. Chairman, that is a group of figures that I am not familiar with and I do not think I am in a position to disagree or agree.

Senator PROXMIRE. The reason I asked that question, I understand TVA was a signatory to this statement containing these——

Mr. WAGNER. Some of our technical people perhaps signed it.

Senator PROXMIRE. It seems it is so emphatic and I would think one-sided, maybe that is unfair, if it is not, I would like a rebuttal of that because it would certainly be most germane to what we are considering here.

Mr. WAGNER. What is the statement again?

Senator PROXMIRE. I will say it again:

By conservative estimates, the costs of EPA's proposal would be 3 to 50 times greater than any social benefits that might result from their imposition. More realistic estimates suggest costs which are a hundred to a thousand times the benefits. In many cases it appears that no social benefits whatsoever will result from the economic burdens imposed by the EPA proposals.

Mr. WAGNER. What specific proposal is this, total proposals or is it thermal pollution?

Senator PROXMIRE. It is the EPA-proposed regulation under sections 304, 306, 316, water pollution proposals, primarily. Water pollution proposals that would affect utilities.

Mr. WAGNER. I do not know about the figures but I would subscribe to the statement that in many cases no social benefits could be recognized from that.

Senator PROXMIRE. The only one I can think of is the argument made with respect to thermal and you do that in your statement, the fact that you warm water does not necessarily mean that the water is, you say you have increased the fishing, for example, by warming the water.

Mr. WAGNER. Yes, sir.

Senator PROXMIRE. I guess it is easier for the polar bears to swim in the winter when you warm the water. I am talking about people who call themselves polar bears.

Mr. WAGNER. We do not have them like you do in Wisconsin.

Senator PROXMIRE. We have them in Wisconsin and Illinois.

Mr. WAGNER. Yes.

Senator PROXMIRE. I can think of many, many social benefits that come from having cleaner water, you can drink it, swim in it, sail on it, you can enjoy it for recreation, you do not have to smell the odor that you get from what happens to some of these streams because of pollution.

Mr. WAGNER. On the question of cleaner water, I think I would agree with you. I believe in, just thinking as you are talking, that perhaps this statement comes from one of these groups studying water quality requirements and we did participate in that. I assume that one of our organizations looked at those figures and thought they made sense but I do not know about them myself.

Senator PROXMIRE. Can you give me the energy penalties associated with pollution control for electrical utilities, that is, in controlling sulfur oxide, sulfur dioxide and particulate emissions? How much energy in equivalent barrels of oil is expended or what is the percentage of reduction? I say that because I might tell you that Mr. Sawhill said yesterday these penalties over the next few years will not be large.

Mr. WAGNER. Well——

Senator PROXMIRE. Do you agree with that?

Mr. WAGNER. We made some calculations on the effect of scrubbers for the removal of sulfur dioxide from stack gas and we figure they would reduce the output of the plant by 5 to 10 percent. That is, I think a fairly significant figure. The operation of cooling towers——

Senator PROXMIRE. 5 to 10 percent, you say, reduction in production because of these——

Mr. WAGNER. Of limestone scrubbers. And if you go to cooling towers on the thermal question, particularly if you go to mechanical draft towers, the power consumption there is fairly high, 3 to 5 percent.

Senator PROXMIRE. Let me ask you, Mr. Wagner, how many nuclear plants does TVA have under construction or on the drawing boards? How many are behind schedule?

Mr. WAGNER. Well, all of them are behind schedule except the ones that we have not started, I suppose. They are running late. But we have five different plants under construction or for which an application for a construction permit has been filed.

Senator PROXMIRE. You have what?

Mr. WAGNER. Five different plants.

Senator PROXMIRE. Five different nuclear plants?

Mr. WAGNER. Yes, sir.

Senator PROXMIRE. What proportion of the delays——

Mr. WAGNER. Let me correct that. We have contracted for nuclear steam supply systems for two additional plants.

Senator PROXMIRE. What proportion of the delays are due to delays in reactor design and construction, what proportion because of installation of reactors, and what proportion financing problems, and what proportion are environmental requirements, or suits, decisions in delaying completion?

Mr. WAGNER. In our instance——

Senator PROXMIRE. Primarily the latter, why don't you answer that?

Mr. WAGNER. Environmental delays?

Senator PROXMIRE. Environmental delays due to suits and other considerations.

Mr. WAGNER. I think we cannot on our nuclear plants identify any delays specifically for environmental reasons.

Senator PROXMIRE. Is that correct?

Mr. WAGNER. Yes, sir. I think others are not in that same position, but that is our situation.

Senator PROXMIRE. Mr. Kane——

Mr. WAGNER. Before we finish, may I go back to the question you asked me?

Senator PROXMIRE. I beg your pardon, I thought you were through.

Mr. WAGNER. I was through with that but I did not have information on the percentage of impact of environmental requirements on electric rates. You referred to the fact that Mr. Sawhill, I believe, or EPA, said a 7 percent increase by 1985. I do have some figures for 1979. In 1979 the program to which we are committed would add about 7½ percent to our revenue needs in TVA and by the time you feed that out to residential bills it would add about 4⅚ percent to the average residential rate. That is based on TVA's program. The EPA requirements—if we have to go to more elaborate sulfur dioxide treatment and to cooling towers would add over 18 percent to our revenue needs, and that is a measure to a degree of the impact on industries. Residential rate level effects would amount to an increase of about 13 percent.

I should point out that that 1979 figure feeds into the mix the output of our nuclear plants, our hydrosystems and so on. Therefore the cost effect on individual plants is greater but the effect on the system is about that much.

Senator PROXMIRE. Are you saying that that year you will have that much of an increase in that specific year or will it be cumulative, that much of an increase between now and 1979?

Mr. WAGNER. It is in that year.

Senator PROXMIRE. In the one year?

Mr. WAGNER. Yes, sir. Now, going to 1985 this figure is approximate, taking it from memory, by 1985 our system will be about half nuclear, so the effect of these coal burning plants is much reduced percentage-wise and the impact on residential rates at that point would be about 7 or 8 percent.

But as I recall it, in 1985 the output of the coal-burning plants is likely to be 40 percent or less of our total output.

Senator PROXMIRE. As you know, I do not know about your situation with TVA, I know in my State, and I am sure around the country, there is a growing resistance to nuclear plants and it is becoming more and more intense and more widespread and I think there may be very serious problems with respect to relying as much as we have expected to on nuclear plants by that time. In that case your situation would be somewhat aggravated?

Mr. WAGNER. It perhaps would.

Senator PROXMIRE. You indicated to me, however, there was no environmental delay in construction of nuclear plants.

Mr. WAGNER. Up to the present time, no, sir—no delay that can be exclusively attributed to environmental reasons.

Senator PROXMIRE. Mr. Kane, Russell Train, head of EPA, will testify here before us tomorrow, along with Mr. Peterson, and has said, and I quote:

> Our environmental energy and economic interests converge to put a premium on greater and greater efficiency in the industrial process, a new efficiency which can, at one and the same time, cut costs, conserve energy and curb pollution, a new efficiency which can help reduce inflation as well as pollution.

How do you feel your industry leaders would react to that statement? How do you react?

Mr. KANE. Well, I think on the overall picture of moving ahead to improve efficiency can cite our own experience with energy conservation wherein the last 5 years we have doubled the output and our energy requirements only go up 50 percent. That is a measure of what we have built in our processes to try to conserve energy. And when I responded about Mr. Gerstacker's statement a little while ago——

Senator PROXMIRE. May I interrupt to say at this point, in view of the fact that, of course, the cost of energy is substantial, in that sense you have reduced your energy costs because of this kind of conservation, the unit cost——

Mr. KANE. They have galloped ahead faster.

Senator PROXMIRE. What would they have been if you had not done that, they would have been 100 percent up as your production was?

Mr. KANE. I think the message is that we certainly aim to make progress in the field of getting environmental improvements for lower investment in cost but it is going to take time and take a lot of effort and this is what we intend to put into it. We are looking really, at the future.

Senator PROXMIRE. What kind of things do you do, can you be a little more specific in the ways you are to bring that efficiency about?

Mr. KANE. Well, for one thing, are we talking both energy and pollution or environment?

Senator PROXMIRE. Yes, sir.

Mr. KANE. I think that I might, if we had a few minutes, call on Mr. Balmer, who is in our Engineering Department.

Mr. BALMER. In striving for greater efficiency, we perhaps can bring it into play most rapidly in new plants where there are new developments. The application of new developments to existing plants is more difficult and takes more time. We are looking at new technologies trying to develop some ourselves. We are looking at what other people do. So it is a constant effort in the technological area to——

Senator PROXMIRE. What I am trying to get at, sir, is the effect that the environmental requirements have had on you. Du Pont and the other companies are companies that are always trying to improve efficiency and reduce cost, that is the name of the game. What I am trying to get at, what specific and particular effect in requiring that you do this have the environmental requirements had?

Mr. BALMER. Well, as the cost for environmental control go up relatively, then you can do more things in your process that might not be justified otherwise. And that is true of energy also.

For instance, if you have a solvent recovery column perhaps by adding more plates or something to your column, you can take out the last few dribs and drabs. It costs more money but as the cost to treat that goes up then you tend to add bits to your process.

Senator PROXMIRE. Let me ask one other question because I have been pushing very, very hard for an effluent tax, something that has been used in West Germany for years with considerable success. They point out the Ruhr River as a prime example. They have chemicals, steel, coal, all kinds of firms there, and the river is relatively clean. One reason it is clean is because they simply impose a big tax on putting effluents into the stream, then they leave it to industry to do things they want to do. If they want to continue to pollute they will have to pay a big tax to do it. The disincentive is great. They have found you have good cooperation and you have a degree of freedom as to how you go about reducing pollution. That, it seems to me, should be welcomed by industry but I do not know, how would you feel about that, would that increase the efficiency more directly and also would it provide a welcome degree of freedom on the part of industry to proceed if you had something like that?

Mr. BALMER. Well, as I understand the German situation, the Ruhr is improved by taking some of the waste out of it and putting it into the Emscher after it goes through a treatment plant. Yes, you may improve the Ruhr by transferring your load but your wastes have to go someplace.

Senator PROXMIRE. They recycle them, they reprocess them in ways that reduces the ultimate waste.

Mr. BALMER. Well, we are all trying to do this to the extent that we can. But I think you want to look at the problem of administering that kind of an operation in this country where our river basins are much larger, more diversified.

Mr. KANE. If I may make a comment, Senator. The Committee for Economic Development had a study on this not so long ago and they came out with the same thought of the tax and I must say I was a dissenter to that because it strikes us that it is more of a license to pollute and there are some real administrative problems. If the fee

were high enough and this is talking about small plants and large ones, some of which cannot afford and would go out of business maybe, then perhaps it might work, but in our system I think the administration is going to be very difficult. We would rather see the work done and move ahead positively.

Senator PROXMIRE. It works elsewhere, it seems to me it would be a relatively simple process to determine how much effluent you put into the air and how much into the water. Engineers can determine that. And the charge is made and the result is that industry can use its most efficient means rather than having a plant close down at a certain time rather than having the court say that you have to adopt a process that may be wholly unwise, uneconomical. It is up to the industry to determine how to do it, they have to do it if they are going to be able to operate properly.

Mr. Gammelgard.

Mr. GAMMELGARD. Mr. Chairman, I would like to make a comment on that. I think there are two ways you can proceed to stop pollution. You make a choice. You do not do both of them. One is taxing the polluting effluent, like you have described, in such a manner that it is going to be better economics for plants to cut back and not have to pay this. It has to be severe enough to do that, otherwise nothing will happen.

The other is to set up a system of standards for receiving water and air which is a system which this country has chosen and really embarked on and a change at this point in history, I think, would be the wrong way to do it.

I spent some time over in the Ruhr a couple years ago with Dr. Buchsteeg who was the head man of the Ruhr Verbund. This agency performs a cleanup service and assesses the users a fee calculated on what you discharge into the water and what their costs are of running various purification plants. They have a number of them. You are billed at the end of whatever calendar period for your proportionate share of expenses based on your load. I would agree with Mr. Balmer it is much easier to do this on small streams like you find in Western Europe, than in our enormous river systems here.

Senator PROXMIRE. All right, sir, Mr. Kane, John Sawhill on Tuesday said that industries which the FEA talk to expect to achieve efficiency gains of at least 1½ percent annually and many cited much higher figures.

What can we expect from the chemical industry and what will be the principal developments, technological or otherwise, in this area? I am especially interested in this in view of the fact that recently the National Petroleum Council study said that chemical and petroleum refining could achieve savings of 20 percent and 15 percent, respectively, between 1974 and 1978, the largest savings among the six most energy intensive industries.

Mr. KANE. In this we have taken on the task of the chemical industry to save 15 percent based on 1972 output by 1980 and this task is going to fall unevenly on companies because it depends upon how much work has been done in tightening up plants and saving energy already. But I think Mr. Driver would agree with me this is a pretty fair task for the chemical industry.

Mr. DRIVER. No question about it.

Senator PROXMIRE. So you think 15 percent by 1978?

Mr. DRIVER. 1980, based on the 1972 base.

Senator PROXMIRE. The president of Calgon Corporation, Arthur Goeschel, recently said:

> We really do need stringent pollution control laws, and the benefits, while difficult to quantify, will be worth the costs. The cost will neither wreck the economy nor drive a lot of companies out of business, and the technology does exist even though it may not have been perfected.

Would you say that a substantial proportion of the executives in the chemical industry share that view?

Mr. KANE. I would say that the majority of the executives in the chemical industry, Senator, are more concerned about the future, that is, the 1977 and the 1983 and primarily water rather than air, and there the uncertainties are so great it is just difficult to forecast. That is why we make this plea for this balancing out and trying to make a judgment of a major environmental actions—what the economic tradeoff will be.

Senator PROXMIRE. Would you say then, for the future the technology does not exist?

Mr. KANE. I would say it is a mixed bag. I would say some exists and some of it does not.

Senator PROXMIRE. He said it was not perfected but stringent control laws are the only real way to make sure you are going to make any real progress.

Mr. KANE. I think the head of Calgon has been talking from a particular vantage point, too, perhaps. But even so, I think that the other point is whether it is technically feasible or not is an interesting aspect of it. The aspect that we keep coming back to is, is it worth the trip? If it is a desirable environmental action and it balances out economically, we are all for it.

Senator PROXMIRE. I am going to have to be brief because I do not want to detain you, I know you gentlemen are all busy and Mr. Kane, I think you had an appointment you had to keep. I apologize for keeping you as long as I have.

Let me move on quickly and ask if you will respond as briefly as you can to this.

Do you think that most environmental regulations have been well formulated and are necessary?

Mr. KANE. That is a big question. I think that, by and large, we would say that considerable progress was made to date. There may be a lot of back-and-forth reaction. I believe there are some 100 lawsuits involved here with the water regulations and the chemical industry as a whole. We do not look upon that as a most satisfactory way of doing business, continued litigation, but, in summary, I think we have made progress that has been reasonable. I am more concerned about the future, Senator.

Senator PROXMIRE. Mr. Gammelgard.

Mr. GAMMELGARD. I would agree that most environment regulations to date have been pretty well formulated. Some stagger here and there along the way but, nevertheless, are generally pretty good and necessary. I think they are necessary for this reason. I do not think that many plants would put in pollution controls unless there were a little

goading behind it to get it done. I think the nature of the business is such that the plant manager wants to look real well on his costs. Having been in that situation myself I know, and you do not want to spend money that really does not have a payout or does not increase your plant's production. You could hesitate on things like that unless there is a push which equalizes the burden within your industry and in effect, puts the industry up against the same tight regulations, otherwise there would be some who would do it just to be good citizens and others would not do a thing.

Senator PROXMIRE. Mr. Wagner.

Mr. WAGNER. Well, I think we would agree that the objectives of the legislation and of the regulations, too, are certainly worthwhile and needed. I think one of the problems though, Senator, is that we have been generations creating the situation which we now find ourselves in and in our efforts to try and correct it, we want to do it overnight. I would add to the plea that others have made here, some consideration be given, among other matters to time schedules on these requirements.

Senator PROXMIRE. I am sorry, I missed the last.

Mr. WAGNER. Be given to increasing the time schedules on pollution-control requirements. The question of how much time does it take to get it done and can it be done, by a certain date, is not only a question of developing the technology. For example, take the question of electrostatic precipitators where the technology is well known and works. When all of the utilities in the country start buying electrostatic precipitators, it places a tremendous strain on the manufacturing facilities. In addition, you need time to take a plant out of service when you are going to install them and you have to fit that outage into an operating schedule in order to maintain your power supply. I think that as we go on there needs to be a flexibility on the part of those who establish regulations to recognize the hard realities.

Senator PROXMIRE. Have you found that flexibility by and large, a recognition of the hard realities?

Mr. WAGNER. It is a stubborn flexibility.

Senator PROXMIRE. Well, it has to be pretty stubborn, does it not?

Mr. WAGNER. Yes, sir.

Senator PROXMIRE. You would not want a cream puff administration of these laws or you would not get anything done.

Mr. WAGNER. I agree, but I think if it is so stubborn that it requires the expenditure of funds for equipment and processes that are unnecessary, or that further technology will prove to be unnecessary, then it is too stubborn.

Just to give a quick example. Apart from the question of the extent to which scrubbers are needed, there is argument as to whether we have workable scrubber technology now. We are developing it, I am sure it will be made workable someday, but to say everybody must put scrubbers on all plants right now would be a very bad mistake because most of them are not going to work and we will have to invest a tremendous amount of steel and manpower.

Senator PROXMIRE. The available supply of scrubbers is limited and then you have a problem there, too.

Mr. WAGNER. Yes, sir.

Senator PROXMIRE. But, I have got some technical questions on scrubbers I did not ask you because of the limited time. We would appreciate it if you would answer that for the record.

I would like to ask Mr. Gammelgard this: All of the major pollution-control spending industries have reported sizable increases in expected expenditures this year except the oil industry. Why is it that the oil industry's expected total cleanup cost in 1974 is 30 percent below the level estimated in 1973?

Mr. GAMMELGARD. Mr. Chairman, those are not our estimated costs. I think Mr. Sawhill, I checked with his office after that statement because it rang a clear signal to me.

Senator PROXMIRE. Let me say this did not come from Sawhill, my evidence is the most recent McGraw-Hill survey of pollution-control expenditures, which shows a 1974 total of $1.9 billion compared to $2.74 billion in 1973, a drop of 30 percent.

Mr. GAMMELGARD. Well, I am not familiar with McGraw-Hill's study. I do not know where they got their data, but in Mr. Sawhill's prepared statement, I think, forecast our expenditures for several years and I asked later where they got it and they said from the internal EPA documents.

Senator PROXMIRE. Well, I was told that McGraw-Hill gets theirs from the industry, they ask the industry, they do not make it and they do not ask the Government.

Mr. GAMMELGARD. They may have gone to different companies.

Senator PROXMIRE. Why has there been a 13-percent decrease in research and development pollution-control expenditures this year in the oil industry? The 1973 expenditures were $101 million, while only $88 million is planned for 1974.

Mr. GAMMELGARD. I think if you are looking—are you looking at McGraw-Hill?

Senator PROXMIRE. Was that McGraw-Hill? Yes, I have the document here, McGraw-Hill survey of pollution-control industries, on their very first page.

Mr. GAMMELGARD. I would be glad to check that.

Senator PROXMIRE. It is further back in the statement. We will be happy to make that available to you and then respond for the record.

Mr. GAMMELGARD. Our figures show continual increase in 1972 through 1973 and I do not think it will go down in 1974.

Senator PROXMIRE. I understand at the recent American Petroleum Institute meeting in New York there was a marked decline in interest for oil from shale and tar sands and coal gasification. In October in fact, Colony Development announced that it plans for what was to be the first commercial oil shale plant were cancelled.

Do you feel that environmental regulations have really played a significant part in this diminution of industry enthusiasm or are other factors more dominant? Please be as specific as possible.

Mr. GAMMELGARD. I think it would be a combination of factors, one of them being environmental. I have seen the studies that——

Senator PROXMIRE. How big was the environmental consideration?

Mr. GAMMELGARD. It is a pretty important consideration because of land restoration and so forth, that you have to do. Water is a real problem out there, water is needed for the shale processing and there

is very little water available out there. The other thing is cost. Cost of plants have gotten to the point where it does not appear to be too profitable to put one in. So it is a combination, I think, of the three. Environmental is part of the cost.

Senator PROXMIRE. I have one further question for you gentlemen. It is a question that comes out of what I thought was a most intelligent proposal by the President of the United States shortly after he took office, President Ford suggested that we have an inflation impact statement on legislation before we act on it so we know what we are doing. And this is particularly true in the environmental area.

I am inclined to think that would not impede environmental activity but make it more reasonable and might even make it much more effective.

To what extent do you think that this kind of estimate would be practical, workable and desirable? Mr. Kane?

Mr. KANE. Well, I think that parallels what I was suggesting and I think the trick is to do it for a major environmental act and not get bogged down with plant-by-plant, permit-by-permit.

Senator PROXMIRE. We have to do it on that basis.

Mr. KANE. Yes, sir. And I think that sort of thing could be done.

Senator PROXMIRE. Do you think it could be done, it would be a realistic estimate?

Mr. KANE. It is tough to get realistic estimates but I think they would be good enough to take action on.

Senator PROXMIRE. Mr. Gammelgard.

Mr. GAMMELGARD. I agree with that. I would like to see cost-effectiveness or benefits rolled into that.

Senator PROXMIRE. Fine. I think that is a very good suggestion. Mr. Wagner.

Mr. WAGNER. I agree.

Senator PROXMIRE. Well, gentlemen, I want to thank you very much. As I understand your testimony this morning, you all strongly favor abating pollution, and Government regulation, Government responsibility for doing it, and you argue at least in your industries there is some inflationary effect but you feel that it is worthwhile provided the administration is realistic, and I think you also conclude it should be, however, firm and not soft, is that correct?

Mr. GAMMELGARD. Yes, sir.

Mr. WAGNER. Yes, sir.

Mr. KANE. Yes, sir.

Senator PROXMIRE. Thank you very much and I would appreciate it if you would give us some written answers to questions we would like to submit when you correct your remarks.

Mr. GAMMELGARD. Thank you, Mr. Chairman.

Senator PROXMIRE. The committee will recess until tomorrow at 10 o'clock, when we will hear Russell Peterson, Chairman of the Council on Environmental Quality, Russell Train, Administrator of EPA, and Frank Zarb of the Office of Management and Budget.

[Whereupon, at 12:40 p.m., the committee recessed, to reconvene at 10 a.m., Friday, November 22, 1974.]

[The following questions and answers were subsequently supplied for the record:]

RESPONSE OF P. N. GAMMELGARD TO ADDITIONAL WRITTEN QUESTIONS POSED BY SENATOR PROXMIRE

Question 1. As you know, there are two classes of pollution abatement expenditures: end of line treatment and changes in production process. The latter, which may involve the substitution of raw materials, the use of improved catalysts, the reuse of waste, or the alteration of equipment, is likely to grow in importance as new plants and processes are designed to meet environmental standards. Do your firms separate pollution abatement costs in this manner and how significant do you expect the change in production process method to be in the coming year?

Answer 1. The survey attached to the Institute's prepared testimony as Exhibit I—"Environmental Expenditures of the United States Petroleum Industry: 1966–1973"—does *not* separate out the costs for end-of-pipe treatment and the costs for changes in production processes. As noted in the testimony itself (page 8), "plant and process changes may reduce the amount of pollutants generated; however, end-of-pipe treatment is usually also required to meet the regulations. As a result, the industry is using a combination of both methods in most instances."

The Institute believes that the use of changes in the production process is likely to increase as *new* plants and *new* processes are designed to meet environmental standards and that most of such growth will take place in the long-range future. We do not, therefore, expect changes in production process methods to be of real significance in the coming year. The use of the wet-coil cooling towers at refineries, for example, offers some prospect of using effluent as a coolant and thereby of reducing final effluent. But such towers are only just now undergoing initial testing, and much additional testing remains to be done before this technology can be considered ready for commercial demonstration.

Question 2. In relation to the points just raised, if pollution controls dictate construction of a new facility, does your industry claim that the whole facility represents costs associated with pollution control or should only the actual pollution control equipment be applicable to this calculation?

Answer 2. We assume that the word "facility" as used in this question refers to a new processing or treating unit or to a particular kind of equipment, such as floating roofs for oil storage tanks. The instructions accompanying the questionnaire on which the API expenditures survey is based are very clear with regard to the criteria to be used in determining what is and what is not an environmental expenditure. The instructions state:

"Many expenditures cannot be attributed entirely to 'environmental protection.' In all such cases, appropriate consideration should be given to motivation: What were the principal factors involved in the expenditure decision? How large a role did considerations of environmental protection play in that decision?

"Reported costs should not include the loss of revenue or estimates of business 'loss' as a result of conditions associated with environmental protection. The speculative nature of such cost items and the difficulty of justifying methods used to develop them could be construed as unrealistic reporting designed to make the industry's total expenditures for environmental protection appear larger than they actually were."

Further,

"In some instances, estimates of environmental protection expenditures must be based on incremental concepts and will be heavily dependent on engineering judgment. For example, if a unit would meet good business operating requirements under normal design concepts, but requires modifications or additions because of environmental considerations, then the estimated cost of modifications or additions should logically be attributed to environmental protection. Other examples might include requirements for additional height on stacks, thicker walls on pipes or vessels, the inclusion of a vapor recovery system, or a smokeless flare. Investments which yield acceptable rates of return may logically be included as environmental expenditures if, in fact, they meet the above mentioned criteria."

To summarize, in some cases all of the expenditure for an installation or a modification may be designated "environmental"; in other cases, only a portion of such expenditure may be so designated.

Question 3. Many industry people have argued that the Federal Government must offer price supports in order for a synthetic fuels industries to be established. What are the specific reasons for this? It must be because of a fear that the price of oil will drop precipitously, for at the present price level, I can see

no justification for subsidies. Does the oil industry really feel this is likely? Hasn't the U.S. been going after all the most expensive potential energy sources: coal gasification and liquefaction, oil shale and nuclear. Isn't it possible that the money which would be used for price supports could be better invested if spent on solar energy which certainly has less of an environmental impact.

Answer 3. The Institute has taken no formal position on the matter of price supports for synthetic fuels. We would point out, however, that it would not be sound business practice to risk very large sums of money in the development of any relatively high-cost product that might not be able to compete in the marketplace. This is pretty much the case with synthetic fuels. This past summer, for example, the Organization of Petroleum Exporting Countries (OPEC) estimated crude oil production at four million barrels per day over and above world requirements. The OPEC members cut production, but had they not done so, world crude oil prices undoubtedly would have come down.

Research in the U.S. has been and is being conducted on a variety of potential energy sources—including coal gasification and liquefaction, oil shale, and nuclear power. The Institute has publicly stated many times before its belief that they may well be needed in the future. Moreover, given the likely growth in demand for energy, the probability of higher costs of providing traditional forms of energy, and the possibilities of developing more efficient techniques for obtaining new forms of energy, new types of energy may well become economically viable in the future.

It will take a combination of effective programs—including conservation, deregulation of natural gas prices, and acceleration of offshore oil and gas development—to get the country through the near term, that is, from now to 1985. After that year—until the year 2000—coal gasification and liquefaction, oil shale, and nuclear power will all probably play increasingly important roles in supplying this nation with energy.

As for solar energy, it is already finding very limited application for supplementary home heating and, to even lesser degree, for generating electricity. There would appear to be at least some potential for increased application of solar energy within these areas, if it can win consumer acceptance. But the application of solar energy to large-scale projects—such as electric power plants—very probably lies in the 21st Century.

Question 4. Roger Sant (who appeared with Mr. Sawhill on November 19 in his capacity as FEA Assistant Administrator) announced on September 19 that oil refiners from 17 companies had agreed to cut their energy needs by 15 percent per unit of output by 1980. How specifically do they plan to do this? Is there room for further energy conservation at other stages in the industry?

Answer 4. Petroleum refining specialists in the Institute and in the National Petroleum Refiners Association have expressed the belief that the industry can work with the Federal Energy Administration and the Department of Commerce to set up a system to monitor progress toward achieving a 15 percent reduction in the energy needed in petroleum processing by 1980. A workable system would consist of tabulating the barrels of crude oil and condensate charged to refineries versus the amount of processing energy, in Btu's, used per unit charged. This Btu amount would then be compared with the processing energy used per unit charged during a comparable period in 1972.

Certain negative factors will have to be taken into account, since they represent increased energy requirements that could retard progress toward the 15 percent reduction goal. They include: Manufacturing higher volume of unleaded gasoline; need to increase desulfurization of distillate fuels, residual fuels, and, possibly, gasoline; and charging crude oils with a higher average sulfur content.

Some improved plant conservation practices are already being initiated. They include improved heat exchangers, insulation, more efficient mechanical devices, and burning of waste gases as fuel. These represent capital additions, but other kinds of energy savings are also possible—for example, in heating, air conditioning, and lighting.

It is expected that in the years immediately ahead petroleum refining will consume 50–75 percent of the total energy needed by all of the industry's operations. Crude petroleum extraction is the next largest consumer of energy in the industry. Oil and gas production's share seems certain to increase, in light of the current emphasis on increased production from advanced recovery techniques and from stripper wells, which are more energy-intensive modes of production.

Petroleum transportation—the third largest consumer of energy in the industry—includes pipelines, tankers and barges, tank trucks, and railroad tank cars.

Energy consumption by these modes is related to the tonnage moved; any reduction in domestic energy consumption, therefore, directly reduces transportation energy utilization. Other technical and operating efficiencies—such as improved engines and prime movers and slowing mobile transportation equipment—could also reduce energy consumption per barrel/mile of work.

One thing is certain. The continuing high prices of imported petroleum and petroleum products—which make up more than one-third of the energy used in this country—provide our industry and other industries with powerful economic incentives to conserve energy in all of its forms.

Question 5. What fraction of the cost of oil products to consumers is traceable to tanker transportation? Based on this, what percentage increase in product cost could be attributed to a double-bottom requirement for tankers?

Answer 5. A recent study by the Institute indicates that transportation costs currently amount to approximately 9 percent of the landed cost of U.S. crude and products imports. The U.S. Coast Guard provided the House Merchant Marine and Fisheries hearing with estimates which showed that double-bottom construction would increase the capital cost of tankers by 8¾ percent. In terms of daily operating costs, this would represent an increase of 3.5 percent of transportation costs or approximately 0.3 percent of landed petroleum costs. In terms of absolute dollars, double-bottom construction would amount to $60 million per year.

The American Institute of Merchant Shipping commented on this point in its recent booklet on the subject:

This [amount] would not be an unreasonable burden for industry or consumers—if the double bottom could assuredly do what its advocates feel it could. Faced, however, with little improvement at best, the additional cost and additional steel requirements . . . represent wasteful misuse of capital and steel at a time of pressing shortages of each.

Question 6. Can you itemize the major causes of the increased cost estimates for the Alaska pipeline? Do you really believe that the pipeline could have been built for $900 million as estimated in 1969 if construction had proceeded as planned? Is this estimate made in dollars comparable to those of the $5 billion current estimate, or does the latter include some inflation that also would have affected costs even if construction had proceeded promptly?

Answer 6. The Alyeska Pipeline Service Company—the firm responsible for the design, construction, and operation of the pipeline—has supplied us with the following information:

The 1969 preliminary cost estimate of $900 million was a budgetary figure based on general information available at that time. It reflected the estimated cost of a conventional pipeline of the size and length contemplated, plus an increment to cover the additional estimated costs required because of the remote location, the terrain, and the harsh environmental conditions in Alaska. At that time the pipeline had not been designed or engineered.

The increase in estimated costs since 1969—to $5.9 billion in 1974—are due primarily to these major causes: Increased cost of material; Increased cost of labor; and More sophisticated design and engineering, due to more precise project definition and to compliance with the strict technical and environmental stipulations contained in the right-of-way permit issued by the Department of the Interior in January of 1974.

The design changes have been substantial. They include: Construction of a 365-mile secondary highway, rather than a temporary haul road; Construction of approximately one-half of the line above ground, entailing massive amounts of additional materials for pipe supports (refrigerated in many cases to protect the permafrost); Special designs to meet the strictest seismic criteria ever imposed on such a structure; and Construction of a ballast treatment plant at the terminal so as to meet stricter water quality standards.

The 1969 estimate was in 1969 dollars. The current estimate is based on 1974 dollars, plus an amount to cover projected inflation over the period of construction.

RESPONSE OF HON. AUBREY J. WAGNER TO ADDITIONAL WRITTEN QUESTIONS POSED BY SENATOR PROXMIRE

Question 1. As you know, there are two classes of pollution abatement expenditures: end of line treatment and changes in production process. The latter, which may involve the substitution of raw materials, the use of improved catalysts, the

reuse of waste, or the alteration of equipment, is likely to grow in importance as new plants and processes are designed to meet environmental standards.

Does your industry separate pollution abatement costs in this manner and how significant do you expect the change in production process method to be in the coming year?

Answer 1. TVA maintains its own system of accounting which we utilize to obtain the information needed to report our costs in accordance with the Federal Power Commission's Uniform System of Accounts. Other members of the electric power industry also report their costs according to the FPC Uniform System of Accounts. A separate report is made to the FPC of readily identifiable specific costs incurred in the operation and maintenance of air and water pollution control equipment, but this does not include costs such as electric power consumed or loss of efficiency resulting from the use of such equipment and other costs that would have to be prorated.

Neither TVA's nor the FPC's capital accounts include a category for pollution control equipment. To identify the capital cost of pollution abatement equipment requires a line-by-line scrutiny of the detailed capital account to separate out the appropriate items, but this is done only upon special request. Even so, it is none too accurate a measure of the cost of installing or including such equipment as it does not permit us to identify the possibly higher cost of other equipment that may be incurred as a result of the pollution control equipment. For example, the electric power consumption of a wet scrubbing system is substantial and requires the installation of larger station service transformers and the addition of other electrical equipment which would be difficult to separate out of the Accessory Electrical Equipment accounts, and these separations and allocations would involve exercise of judgment rather than use of accurate accounting data.

We assume that "end of line treatment" for pollution abatement refers to processes such as stack gas cleaning. All costs associated with such technology are chargeable to pollution control. In technology that results in changing of the production process to reduce the emissions of pollutants such as coal gasification, fluid bed combustion, coal cleaning processes, combustion modification and refuse burning, only the incremental costs over that normally required for power investment and operation would be classified as environmental costs. For some of these, at least, the incremental costs could be substantial. As a practical matter, however, in some cases it would be quite difficult to establish with accuracy these incremental costs in the case of a new plant. Since these techniques are in the development stage, none, except possibly the physical cleaning of coal, will find significant use in the power industry in the coming year.

The substitution of low-sulfur fuels for high sulfur fuels could result in substantial costs for those utilities able to find and to use low-sulfur fuel supplies.

Question 2. In relation to the points just raised, if pollution controls dictate construction of a new facility, does your industry claim that the whole facility represents costs associated with pollution control or should only the actual pollution control equipment be applicable to this calculation?

Answer 2. If a new generating plant were built, then the charges reported as pollution abatement costs would be those associated with pollution control equipment. To the extent that capacity of a new generating plant replaced capacity required to operate pollution control equipment installed on all plants of a generating system, then the cost of that generating capacity, as well as the pollution control equipment installed on the new plant, could be regarded as pollution abatement costs.

In some cases, construction of new generating capacity to immediately replace existing facilities could be more practical than modification of existing facilities. However, TVA has not yet encountered such a clear-cut situation. This situation could conceivably occur in the event that very expensive, stringent, or numerous standards were placed on an older plant and the only alternative was to comply or die. A much more common situation is experienced when pollution control facilities are to be installed on existing facilities which reduces unit capacity and other performance factors and significantly increases the unit investment and operating costs. This results in a form of accelerated economic obsolescence of the facility which makes it desirable to replace the generation with more economical and technologically more effective facilities. In such a situation as new generating facilities are installed, the less effective and more expensive units are placed in progressively more subordinated operating priorities until they are ultimately retired. Such obsolescence can be accelerated considerably as a result

of increased pollution control costs and other constraints on plant performance. In both situations described above, only the incremental cost should be considered as cost of pollution abatement. Although TVA's costs submitted for this hearing have attempted to reflect the additional cost of providing the power used by the pollution abatement systems, these costs do not reflect the incremental costs either of replacing capacity lost or of the cost of enforced obsolescence (*i.e.*, either increased incremental power cost or levelized cost of reduced economic life). Since the economic procedures have not been well defined for identifying these functional accounts, we did not include them in the interest of avoiding possible conceptual problems. However, they should ultimately be included as a part of the incremental costs if we are to obtain a true assessment of the total cost of pollution abatement.

Question 3 (pt. 1). Your objection to using stack gas scrubbers to meet the sulfur dioxide requirements is well known. Could you please tell me how much research TVA has engaged in from 1960 in the area of advancing scrubber technology and utilization?

Answer 3 (pt. 1). Following is a discussion of TVA scrubber research:

BEFORE 1968

In the early work, several methods were studied, but ammonia scrubbing was studied in the most detail. The ammonia scrubbing process was studied in 1952 and details were published in 1955 (*1*). Since none of the processes studied appeared promising and dispersion from tall stacks protected the air quality of the Tennessee Valley, TVA adopted the use of tall stacks as the method for controlling ambient SO_2 concentrations. The dry limestone injection process and a catalytic process based on the use of manganese were also studied by TVA. Results of the dry limestone injection work were published in the late 1960's (*2, 3*).

DRY LIMESTONE INJECTION—1968 TO PRESENT

TVA has participated in EPA-funded projects and has reviewed other projects associated with dry limestone injection into a boiler to remove sulfur dioxide from power plant flue gas.

The dry limestone system is one of the oldest methods for SO_2 removal and has been studied by many investigators—mainly in Germany, Czechoslovakia, Japan, and the United States. An EPA-funded, full-scale cooperative demonstration of the process has been completed on a 157-MW unit at TVA's Shawnee Steam Plant at a cost of approximately $3,700,000.

The dry injection process involves the injection of pulverized limestone directly into the power plant boiler where it is calcined to lime and subsequently reacts in the gas phase at high temperature with SO_2 and excess oxygen to form calcium sulfate. The calcium sulfate is then removed as a solid with the fly ash by mechanical collectors and/ electrostatic precipitators.

Results from the Shawnee test effort (*4*) indicated that:

1. SO_2 removal efficiencies are quite low; for some limestones with the boiler operating at or near full load, only about 11 percent per stoichiometric unit of limestone injected can be expected. This removal can be increased by a factor up to two if a highly reactive limestone, such as marl, is available and/or if the boiler is operated at low load, on the order of 50 percent.

2. Use of this process can lead to severe operating problems. For example, during testing at Shawnee, severe boiler reheater pluggage occurred after only six days of continuous testing. Restriction of the gas passage through the reheater section prevents the boiler from operating. The resultant forced power unit shutdowns at Shawnee required several days of around-the-clock work before the unit could be returned to service. Shawnee tests have also indicated operating problems with the particulate-water slurry sluice disposal system due to solids deposition and plugging difficulties.

3. Impaired electrostatic precipitator performance resulted from higher dust loading and higher resistivity of particulate.

The dry injection process, even though its overall capital and operating costs (*4, 5*) appear much lower than for other flue gas desulfurization processes, appears to be inherently limited in its ability to comply with established SO_2 standards. For all of these reasons, the method is not likely to play any meaningful role in controlling SO_2 emissions from power plants.

AMMONIA SCRUBBING—1969 TO PRESENT

TVA operates a 1-MW (approximately 3,000 ACFM) pilot plant ammonia scrubbing process at the Colbert power station near Muscle Shoals, Alabama. For approximately three years prior to FY 1972, TVA operated the pilot plant under an EPA-funded program. In FY 1972, TVA joined with EPA in funding the development of a sulfur dioxide removal process which combined ammonia scrubbing with a regeneration process to produce a concentrated stream of sulfur dioxide which could be converted to elemental sulfur. Approximately $3,500,000 has been, or will be, spent on this program through FY 1975. It is anticipated that another $1,000,000 will be required through FY 1976 to identify and, hopefully, to solve the problems associated with this small pilot plant. Problems identified so far concern process chemistry, practical engineering, and equipment. Some of the theory and results from this study were published in 1972 and 1973 (*6, 7*).

LIME/LIMESTONE WET SCRUBBING SYSTEMS AT SHAWNEE (THREE 10-MW TEST SCRUBBERS: APPROXIMATELY 30,000 ACFM EACH)

In June 1968, EPA initiated a program to test larger lime and limestone wet scrubbing pilot systems for removing sulfur dioxide and particulates from flue gases. The system is integrated in the flue gas ductwork of a coal-fired boiler at the TVA Shawnee Steam Plant in Paducah, Kentucky.

The Bechtel Corporation of San Francisco is the major contractor and test director, and TVA is the constructor and facility operator.

Three major goals of the test program are (1) to characterize, as completely as possible, the effect of important process variables on sulfur dioxide and particulate removal; (2) to develop mathematical models to allow economic scaleup of attractive operating configurations to fullsize scrubber facilities; and (3) to perform long-term reliabilty testing.

The system has many inherent limitations such as its inability to test anything but vertical duct mist eliminators, direct-fired reheaters, or the venturi in series with either the Turbulent Contact Absorber (TCA) or the Hydro-Filter. Also, scrubber liquor residence time does not aedquately simulate what can be achieved in commercial equipment.

The test facility consists of three parallel scrubber systems: (1) a venturi followed by a spray tower; (2) a TCA, often referred to as a ping-pong ball scrubber; and (3) a marble-bed absorber (Hydro-Filter). Each system was designed to treat approximately 10 MW equivalent (30,000 ACFM at 300° F) of flue gas containing 2300–3300 ppm sulfur dioxide—in practice, however, it has been impossible to operate two of them at more than about two-thirds of this rating, and their lack of flexibility has hampered testing for more feasible commercial configurations.

The following sequential tests blocks were defined for the program: Air/water testing, Sodium carbonate testing, Limestone wet scrubbing testing, and Lime wet scrubbing testing.

The air/water and sodium carbonate tests have been completed. As of early August 1973, short-term limestone wet scrubbing factorial tests were 95 percent complete, and longer term limestone reliability verification tests were nearly complete. Long-term (4 to 10 months) limestone testing and short-term factorial lime testing are scheduled to begin in mid-October 1973.

The results of the testing at the Shawnee facility, including operability and reliability of the scrubber system, have been reported (*8–14*) since the start of testing.

The problems which have been most prevalent at the Shawnee operation are scale buildup in scrubbers and mist eliminators; corrosion of mist eliminators; erosion of spray nozzles; erosion of scrubber packing; erosion of scrubber grids; binding of fan inlet dampers due to solids deposition; and difficulties in measuring slurry density, pH, and level. These problems are described in detail in references 16 through 20.

Through F.Y. 1973, EPA has provided approximately $6,300,000 to TVA for this program.

LIMESTONE WET SCRUBBING FACILITY FOR WIDOWS CREEK UNIT 8

In mid-1970, TVA made a decision to install a full-scale demonstration limestone scrubbing SO_2 removal system on generating unit 8 at the Widows Creek Steam Plant in Jackson County, Alabama—even though the technology was still undeveloped. This unit is rated at approximately 550,000 kW; and at rated load, it burns about 200 tons of coal an hour. Since the beginning of this effort, the primary objective has been to work out design and operating problems that affect both SO_2 removal efficiency and process reliability—with emphasis on the latter—so that the emissions of SO_2 from power plant stack gas can be reduced. In order to accomplish this objective, the TVA Board authorized a supplementary experimental and pilot testing program.

In early 1971, TVA began operating a newly constructed 1-MW limestone scrubbing pilot plant at the Colbert Steam Plant. The objectives of this pilot plant program are to develop design data for the full-scale Widows Creek scrubber facility and to investigate other SO_2 removal processes to serve as an alternate, or "back-up," process should direct limestone scrubbing prove unmanageable. The pilot plant is also being used in an effort to solve engineering problems associated with the scrubbing process. TVA has spent, or will spend, approximately $3,200,000 on the operation of this facility through F.Y. 1975. Results from these pilot plant studies or studies associated with the pilot plant have been published in 1970, 1971, and 1973 (*15–22*).

A draft environmental statement covering the full-scale demonstration SO_2 removal system and waste disposal pond was prepared and issued on June 30, 1972. Following receipt and resolution of various state and Federal agencies comments, the final environmental statement (*23*) was issued on January 15, 1973.

The costs associated with the full-scale Widows Creek scrubber project which are now estimated at $54 million are described in detail in reference 20.

TVA'S INVESTIGATION OF OTHER MAJOR SYSTEMS

As part of the overall TVA program for assessment of desulfurization technology, a major effort has been made to maintain current information on the status of large-scale test installations of gas cleaning processes. The information has been obtained from published sources; visits with the process developers; communication with the utilities using the processes; and, in most cases, visits to the plant sites including developments in western and eastern Europe; Japan, and Canada. Technical employees with knowledge of both process and plant design have evaluated, in as much detail as available, the operating and mechanical performnce.

For other details, see reference 24.

REFERENCES

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Question 3 (pt. 2). Do you feel that scrubbers should be required to bear the burden of particulate control, or might it not be better to have an electrostatic precipitator in place before the scrubber which would alleviate many of the problems scrubbers now have?

Answer 3 (pt. 2). The objective of stack gas wet scrubbers development work at TVA has been removal of particulates as well as sulfur oxides. The investment savings on a new stack gas treatment system by eliminating the need for an electrostatic precipitator would be significant, and when the technology permits, we would want to take advantage of any economies possible. However, adequate

reliability of scrubbers to meet required power plant operating schedules has not been established to date, and until scrubbing technology has been developed to the point that systems can operate continuously and effectively, electrostatic precipitators may be required as a back-up method for control of particulate emissions when the scrubbers are not operating.

High efficiency particulate removal from stack gases is a necessary step for some SO_2 removal processes and will always be required—*e.g.*, the catalytic oxidation process. Also, while experimental work intimates that acceptable particulate removal can physically be accomplished in wet scrubbers, we have not yet established that the particulates thus collected will not interfere with the SO_2 removal process to an unacceptable degree. Thus, for the present, removal of particulates from the stack gases prior to scrubbing appears necessary, and, may always be needed for some processes.

Question 4. (pt. 1). I believe that you have said the use of scrubbers will lead to a 30 percent rate increase. Is this true? Aren't you assuming that every scrubber would be as expensive as the first, which may not be true as they become more widely used and their technology is perfected. Why is your estimate so much higher than the 17 percent increase in consumer costs cited by the Sulfur Oxide Control Technology Assessment Panel, a Federal interagency committee.

Answer 4 (pt. 1). As long as three years ago, TVA indicated that if SO_2 scrubbers were added to its existing coal-fired power plants, the annual cost of amortization and operation and maintenance would be $225 million. This cost estimate was based on an estimated cost of $76 per kilowat for the first scrubber (Widows Creek Steam Plant unit 8) and an average of $68 per kilowatt for all other generating units. More recent estimates indicate that the cost of the first scrubber will be in the order of $100 per kilowatt.

TVA has made references to the relationship between its revenues and the cost of scrubbers. The $225 million estimate is 30 percent of TVA's F.Y. 1973 revenues. In F.Y. 1973 our revenues were $749 million (7.0 mills/kWh sold). The Sulfur Oxide Control Technology Control Panel estimated that scrubbers would increase consumer costs by as much as 17 percent, but this was based on a national average consumer cost of power in 1971 of 17.8 mills/kWh. The two percentages are thus not comparable because different bases are used in the calculations.

In any case, such calculations are not indicative of the ultimate impact on electric rates, and TVA has made no such claims. On a power system with increasing consumer demand, the rate base is also increasing. The installation of scrubbers or other SO_2 control measures for existing plants could not be achieved until some future time when revenues would be much larger. Thus, the percentage impact on rates would be less.

Question 4 (pt. 2). Even if TVA's rates were increased, all other electric utility rates would go up by a proportionate amount under a nationally uniform pollution control standard. Thus, TVA would still have the lowest rates and consumers would be paying the full cost for the enhanced product, clean electricity. So why are you so concerned, or don't you agree with the points just mentioned?

Answer 4 (pt. 2). We are concerned about imposing wasteful and unnecessary costs on the people of the Tennessee Valley as well as upon the rest of the Nation. In determining if a cost is wasteful and unnecessary we do not believe that it is relevant that that cost would equally increase consumer expenses in all parts of the Nation.

Question 5. The capital problems faced by electrical utilities are well recognized. Is it not true that capital requirements are linked to peak power demand?

Then doesn't it follow that a utility should put charges that reflect peak demand on large industrial users. After all, the monitoring cost would be small, since only a few large users would be involved. Establishing such peak-load prices could, at one and the same time, save energy, and cut capital needs and pollution costs.

Answer 5. The capital expenditures of electric utilities are related to both peak power demands and energy requirements. New capacity additions are used to meet the growth in system energy requirements and to reduce the generation at older, less efficient plants as well as meet increased peak power demands. The potential for cost savings can be substantial when new nuclear capacity is added and generation at older coal-fired plants is reduced.

The greatest benefit of annual or hourly peak load pricing would derive from improvements in system load factor. There is a limit to the gain which can be realized in this way. For each system there is an optimum load factor which

allows periods for maintenance and emergency outages without the need for standby capacity to serve these purposes.

The maximum benefit of peak demand pricing on the TVA system would probably accure from residential customers rather than industrial customers since the loads of TVA's industrial customers are relatively flat on both a seasonal and daily basis while the loads of residential customers have significant daily and seasonal variations. However, the economics of residential peak load pricing are strongly influenced by the relatively high metering and billing costs involved. As a result the advantages of peak load pricing for the TVA system appear to be limited at the present time.

Question 6. If this year the pollutive waste heat from the generation of electricity could have been reduced from 70 percent to the total energy to even 60 percent, the U.S. could save a significant amount of oil, close to 350 million barrels.

What measures are being taken by TVA and the electrical utilities to reduce this level of environmental pollution, which in a very real sense is simply a sign of economic inefficiency and waste?

Answer 6. The statement "waste heat from generation of electricity is simply a sign of economic inefficiency and waste" fails to recognize the inherent limitations of available technology and progress in the electric utility industry. In generating bulk electric power from either fossil or nuclear fuels, the only process available to the electric utility since the time of Thomas Edison has been what the engineer refers to as the heat-power cycle in which heat from combustion of the fuel is converted to mechanical work to drive the generator. Converting heat to mechanical work in any heat engine (steam or gas turbines, or internal combustion engines) inherently requires the rejection of low-grade heat. This is a basic thermodynamic limitation. Historically, the utility industry (including equipment manufacturers, utilities, and other energy-related organizations) has pursued higher conversion efficiency of thermal energy from fossil-fuel-fired power plants to the extent that the materials available, the laws of thermodynamics, and economics would permit. This pursuit of improved efficiency is reflected by the steady increase in average thermal efficiency for U.S. power plants from 24 percent in 1955 to approximately 33 percent in 1970. TVA has been an active contributor through the years as demonstrated by a system thermal efficiency of approximately 35 percent in 1974. One of the newer units in the TVA system operated at a thermal efficiency of 38 percent in 1974.

TVA fully recognizes and supports the need to conserve all fossil energy sources and particularly petroleum. As a practical matter, attempting to improve thermal efficiencies of power plants—particularly existing ones—would require years of engineering and construction, probably long equipment outages, and could well cost more than building a new plant. I believe engineering and economic studies would indicate that for most existing plants such steps would not be practical.

Certainly the utility industry and TVA are not ready to rest with these achievements.

Higher thermal efficiencies are theoretically possible, but this is by no means to imply that this can be considered as today's engineering reality. The major barriers to the commercial application of advanced power cycles are development of materials to withstand the required operating conditions (temperature, pressure, etc.) and the solution of many engineering problems relating to practicality and reliability. The electric utility industry, along with manufacturers and others interested in energy conversion from fossil fuel, is currently engaged in research and development programs on such advanced concepts as fluid-bed combustion, combined power cycles, magnetohydrodynamic power generation, and on the fuel cell—the one device which theoretically could convert the chemical energy in fossil fuels to electrical energy at 100 percent efficiency. TVA is actively participating in a number of these programs.

Question 7. On November 20, the Senate passed the Tennessee Valley Authority Pollution Control Financing Act. What this boils down to is a subsidy to TVA to help alleviate the burden of pollution control expenditures. If high interest rates continue, the total subsidy to be granted over the 1975–1979 period could approach $500 million. The impact of this legislation, which I would like you to comment on, would be:

1. Deprive the Federal Treasury of $500 million which is inflationary and shift the burden of pollution control onto the general taxpayer rather than the TVA rate payer.

2. Encourage increased energy consumption when by all reports we should be doing our best to conserve energy.

3. Maintain artificially low rates through subsidy at a time of increasing public pressure for fair unit pricing of energy.

4. Result in strong pressure from private utilities for compensating Federal subsidies.

It seems to me that given the already lower rates for TVA consumers and the evidence that the demand for electricity is quite elastic, that this subsidy would run directly counter to the joint national goals of internalizing pollution control costs and stabilizing the demand for electrical energy. Would you please address yourself to the merits or nonmerits of the four impacts I have just cited?

Answer 7. The potential $500 million which TVA would have available for investment because of the delay in payments to the U.S. Treasury under this act would not substantially relieve the TVA rate payer of the burden of pollution control costs. The only long-run savings to TVA's rate payers from the act would be the savings in interest between the Treasury's average interest rate and the rate of interest which would have been paid on TVA borrowings. The attached table shows the effect of S. 3057 on TVA's rate test margin which margin determines the minimum level of rates TVA may charge. In F.Y. 1979 the reduction in costs applicable under this test would be $7.7 million. The estimated total amount of these costs in F.Y. 1979 is about $2.2 billion, so that the reduction in required revenues would be about 0.4 percent.

TVA's rates would be lower if this bill becomes law than if it does not. However, the effect on rates would be small with the overall effect being a slight moderation in the upward increase in rates necessary to cover inflationary increases in the cost of fuel, materials and supplies and labor. We believe that the effect of the bill on the demand would be, at most, insignificant.

We cannot assess the reaction of private utilities to passage of S. 3057. However, the attached report "Study of Tax Benefits Claimed by Privately Owned Electric Utilities in the Period 1961 Through 1973" prepared by Coopers & Lybrand, Certified Public Accountants, may be of interest to the committee.

EFFECT OF S. 3057 INTEREST SAVINGS AND IMPROVEMENT IN RATE TEST MARGIN

[Dollar×10⁶]

	Increased Treasury dividends	Decreased interest charges	Net improvement in rate test margin
Fiscal year:			
1976		1.6	1.6
1977	6.2	9.8	3.6
1978	12.8	18.4	5.6
1979	19.8	27.5	7.7
1980	27.2	37.1	9.9
1981	35.0	45.0	10.0
1982	35.0	45.0	10.0
1983	35.0	45.0	10.0
1984	35.0	45.0	10.0

Note: Assumes annual expenditures for pollution control facilities are at least equal to the treasury payments each year for the period 1976–80. The dividend rate is estimated at 7 percent and the new borrowings rate is estimated at 9 percent. This analysis also assumes that credits against the return on the appropriation investment for each year are added to the appropriation investment for calculating the return in each succeeding year.

Question 8. Is it true that there is enough sulfur coal in eastern Kentucky which TVA already has access to, so that you would not have to rely to a great extent on western coal which would have to be shipped over a vast distance?

Answer 8. Low-sulfur coal reserves in eastern Kentucky, while quite extensive, are apparently not accessible to TVA as verified by our experience in attempting to purchase coal in this area. In recent years TVA has made numerous attempts to purchase low-sulfur coal from the eastern Kentucky area and has met with little success. In mid-1972, for example, TVA issued a special coal bid invitation for the purpose of obtaining low-sulfur coal. Coal offered under the special invitation did not have to compete in price with coals containing a higher sulfur content. Results of the special invitation were disappointing, as not enough coal was offered from the Appalachian area to have a significant impact on the overall content of coal burned at TVA's plants. Low-sulfur coal could have been offered for sale under normal TVA bid invitations opened in December 1972 and August

1973, but was not. Due to the current shortage of coal of all qualities, TVA's attempts to purchase coal beginning in late 1973 have been by negotiation. Advertisements have been widely distributed asking for proposals for furnishing coal to TVA. Even during this year's coal shortage, TVA has continued its efforts to purchase low-sulfur coal. An advertisement was mailed in May 1974 to some 240 coal producing companies, coal sales companies, and other coal related companies and associations. This advertisement expressed specific interest by TVA in proposals for coal having a sulfur content of less than one percent. Response has thus far been negligible.

TVA certainly does not intend to abandon efforts to purchase low-sulfur coal in eastern Kentucky. However, the problem must be placed in perspective. In 1973 east Kentucky produced approximately 74 million tons of coal of all qualities. During the same period of time, TVA received approximately 3.9 million tons produced in that area, most of which was purchased under a contract made several years ago, well before the current shortage developed. Over the next few years TVA needs from 40 to 47 million tons of coal annually. If we are forced to purchase a significant portion of our requirements in the form of low-sulfur coal, we will probably have to make extensive purchases from all available sources including both the Appalachian and western coalfields.

TVA's recent purchase of a relatively small quantity of low-sulfur coal to be produced in Montana on a short-term contract was not made for the specific purpose of purchasing low-sulfur-coal, but was made for the purpose of obtaining additional fuel to enable TVA to meet its customers' electric power needs during the current coal shortage.

THE ECONOMIC IMPACT OF ENVIRONMENTAL REGULATIONS

FRIDAY, NOVEMBER 22, 1974

CONGRESS OF THE UNITED STATES,
JOINT ECONOMIC COMMITTEE,
Washington, D.C.

The committee met, pursuant to recess, at 10:05 a.m., in room 1202, Dirksen Senate Office Building, Hon. William Proxmire (vice chairman of the committee) presiding.

Present: Senator Proxmire and Representative Moorhead.

Also present: Loughlin F. McHugh and Courtenay M. Slater, senior economists; William A. Cox and Robert D. Hamrin, professional staff members; Michael J. Runde, administrative assistant; George D. Krumbhaar, Jr., minority counsel; and Walter B. Laessig, minority counsel.

OPENING STATEMENT OF SENATOR PROXMIRE

Senator PROXMIRE. Today's hearing is the final one in our current series on the economic impact of environmental regulations. We have heard some very interesting, informative, and challenging points raised by our previous witnesses. Mr. John Sawhill, Administrator of the Federal Energy Administration, said in his statement, "We generally feel that the benefits of improved environmental quality more than offset these penalties and we support the full implementation of these environmental programs."

The representatives from the electric utility, petroleum and chemical industries did not deliver, as would be expected, such a strong endorsement of environmental regulations. However, while citing the substantial costs which they have already borne and expect to bear in the coming decade, they also gave the general impression that industry was committed to meeting the general thrust of the standards although they think that some should be relaxed or have their timetable pushed back.

We will have before us today three witnesses from the administration who are eminently qualified to present the latest facts and figures in the pollution control area, what the overall impact of these expenditures will be on the Nation's economy, particularly on inflation, unemployment, and the GNP, and what the major points of contention are in the environmental field and how these may be resolved with maximum effectiveness in terms of their interaction with economic and energy supply considerations.

We look forward to an open and frank discussion of the costs and benefits of pollution control in order that the question often asked

about the environmental regulations, "Are they worth it?", may be answered in a forthright, economically justifiable way.

I fully realize that the measurement of the benefits has been a particularly complex question, but I also know that many knowledgeable, innovative people have been doing their best to provide quantitative figures in this area. I trust that the latest estimates will be spelled out in some detail today, so that the American people can better understand what they are purchasing when they hear industry claims of increased product costs due to complying with environmental regulations.

These questions are extremely important and range over quite a territory, so we had best begin to allow maximum time for discussion.

Our three witnesses will be Mr. Frank Zarb, Associate Director of Natural Resources at OMB, Mr. John Busterud, member of the President's Council on Environmental Quality and Mr. Russell Train, Administrator of the Environmental Protection Agency.

Mr. Zarb, would you proceed?

STATEMENT OF HON. FRANK G. ZARB, ASSOCIATE DIRECTOR FOR NATURAL RESOURCES, ENERGY AND SCIENCE, OFFICE OF MANAGEMENT AND BUDGET

Mr. ZARB. Thank you, Mr. Chairman.

I have a brief statement and I can either read it or summarize it.

Senator PROXMIRE. Why don't you summarize it, and the entire statement will be printed in full in the record.

Mr. ZARB. All right, sir.

Thank you, Mr. Chairman, for inviting my comments and the comments of my colleagues here this morning.

It is my understanding that Mr. Busterud on behalf of Mr. Peterson, will be discussing the impact of environmental policy in some detail and that Mr. Train plans to deal with some of the microeconomic effects of our environmental programs.

Mr. Chairman, this administration has been continuously committed to policies which limit environmental degradation. There have been and continues to be a great deal of discussion concerning the effects of our work on environment with respect to the economy, inflation, energy, employment and so forth.

It is our view that we have a multiple set of national goals and it is certainly important to see that each element is consistent with this total set.

Now, in some instances economic and environmental objectives are mutually reinforcing. In other instances we have seen that there are conflicts between them.

In recent months Administrator Train, Peterson, and I have come to grips with the question of the need to accumulate better information prior to the promulgation of rules and regulations that evolve from our environmental program.

This is no different, I think, from the consideration that should be given to any governmental action in promulgating rules which have an impact on the economy or some other national effort.

Both EPA and CEQ have undertaken to learn more about the impact of the things they do on the economy.

In my view they are making good progress. They have a long way to go, and we need not be or should not be satisfied with the macro-numbers they have developed.

Let's say this particular program has one-tenth of 1 percent impact on GNP. We need to be more precise in determining what impact it is having on a given industry and, in some cases, on a given community and to be certain that we understand the residual impacts which will accrue to the promulgation of the Federal regulations in this area.

The committee has expressed interest in the administration's views on the relation between environmental standards and energy supply considerations.

When Congress first enacted legislation to protect and enhance environmental quality, energy prices were low. Today, however, energy prices are sharply higher. In addition, the energy crisis has illustrated the vulnerability of the U.S. economy to interrupations in the international flow of oil. As a result, the Nation is developing plans to reduce its dependence on imported oil.

This would suggest that we ought to revise some of the former rules and regulations and legislation that affect this part of our economy as it relates to the environment.

Administrator Train has undertaken a look at these questions and will be in a position to comment on them here this morning, although his studies are continuing.

I won't go into the other questions at this point, Mr. Chairman, so we can have maximum time for the questions you may have. I would like to point to the final question which asks whether environmental expenditures are productive or nonproductive.

I think that to some extent, this whole issue is a matter of words. A part of environmental expenditures do not result in the production of goods that enter our GNP.

These, in a technical sense, might be regarded as nonproductive. However, our national environment is a scarce national resource and it is important to protect that resource.

Environmental expenditures do relate to regulations. These expenditures, if not excessive and if applied correctly do appear to be productive in the broadest sense of the word.

Having said that, I want also to emphasize the continuing need to examine the economic effects of regulations on individual industries before they are promulgated.

I would ask, Mr. Chairman, if we could go on to Mr. Busterud and, perhaps, the total presentation before answering questions.

Senator PROXMIRE. Fine, that was my intention.

[The prepared statement of Mr. Zarb follows:]

PREPARED STATEMENT OF HON. FRANK G. ZARB

Mr. Chairman and members of the committee, It is a pleasure to have an opportunity to testify before you today on the economic impact of environmental regulations.

It is my understanding that Mr. Busterud will be discussing the macroeconomic impacts of our environmental policies in some detail and that Administrator Train plans to deal with some of the microeconomic effects—the effects on specific industries. To avoid duplicating the material that they will cover, I would like to keep my own remarks rather brief and general.

Protection of the environment is an important goal of national policy: During the past six years, a great deal of progress has been made toward the attainment of that goal. The Administration is firmly committed to a continuation of policies to limit environmental degradation.

As important as it is to control pollution, this is but one of several major national goals. The Administration is also committed to improving the economic well being of the Nation and of all of its citizens. This requires: maintaining growth in GNP and consumption, reducing inflation, increasing productivity, maintaining full employment, and reducing the risk of interruption of the Nation's energy supplies.

In some instances, economic and environmental objectives are mutually reinforcing. In other instances, however, there are conflicts between economic goals and environmental goals. We cannot have a cleaner environment without paying some price.

In such cases, it is necessary to measure what that price may be and how it can be minimized without sacrificing our objectives. Only by giving explicit consideration to this kind of measurement, can we be assured that we are using our scarce national resources in the national interest. The Environmental Protection Agency, the Council on Environmental Quality and the Office of Management and Budget are working closely together, along with other Federal agencies, to review the economic and energy impact of our environmental programs.

We have been asked by the Committee to address the issue of the inflationary effects of environmental regulations. In this area, we endorse the figures published by EPA and CEQ and recently articulated by Administrator Train: Federal environmental regulations contribute less than one-half of one percent annually to the Nation's rate of inflation. We are not going to argue whether 0.5 percent is large or small; but I will say that, in examining policies to reduce inflation to an acceptable level, no one would begin by abandoning our environmental goals.

Now this does not mean that the costs of our environmental programs are negligible. Recent EPA figures show that in 1973 the cost of implementing Federal standards amounted to approximately $6.3 billion. Furthermore, nearly 6 percent of gross fixed nonresidential investment went into pollution abatement equipment; and for some industries, such as nonferrous metals, paper, and public utilities, the percentages were even higher. Though the environmental program is not a principal cause of our inflation, such figures as these strongly indicate that it can have a pronounced effect on some industries and sectors of the economy—the so-called microeconomic effects that Administrator Train will describe to you in more detail. For these reasons, we must be especially careful to review our environmental program on an industry by industry basis to insure that no sector of the economy suffers unduly in terms of increased unemployment and plant closings.

The Committee has also expressed an interest in the Administration's views on the relation between environmental standards and energy supply considerations. When Congress first enacted legislation to protect and enhance environmental quality, energy prices were low. Today, however, energy prices are sharply higher. In addition, the energy crisis has illustrated the vulnerability of the United States economy to interruptions in the international flow of oil. As a result, the Nation is developing plans to reduce its dependence on imported oil.

These two factors—the rising costs of fuel and the need to limit U.S. dependence on foreign oil—has led the Administration to undertake a review of all of its policies as they affect energy supply and demand. Those environmental measures that conserve energy appear more essential today than in the past; whereas environmental regulations that require greater energy use appear somewhat inconsistent with our energy goals.

The Administration submitted a list of proposed amendments to the Clean Air Act to Congress this past Spring. Congress responded to this proposal with the Energy Supply and Environmental Coordination Act and the provisions in this Act are now under close review by EPA, CEQ, FEA, OMB and other Executive Agencies. If our review leads us to conclude that the Act does not give us sufficient flexibility to achieve our energy objectives, the Administration will present Congress with additional recommendations. At that time, of course, we will provide detailed data to justify our proposals.

A third area of concern to the Committee is the question of measuring the benefits which have accrued to the Nation by virtue of its environmental programs. Recent EPA estimates of benefits from air pollution controls for the year

1970 are $12 billion while benefits from water pollution controls were placed at $13 billion. The benefits thus appear to be far in excess of the costs incurred.

It is important to remember, however, that it can be misleading to focus all of our attention on the benefits and costs of our environmental program as a whole. The total consists of a multitude of regulations, whose effects differ among media, among industries, and among geographical areas. The total cost is simply the sum of the expenditures on complying with all of these regulations; just as the total benefit is an estimate of the benefits from the entire program. Operational decisions relate to specific programs. Ideally these decisions should be made with complete knowledge of the benefits and costs of environmental controls. While our knowledge of costs is far from perfect, our knowledge of the benefits is even less well documented. EPA is currently conducting extensive research which will improve our ability to measure both the benefits and the cost of our environmental program. In the interim, decisions must be based, to a considerable extent, on human judgment.

The final question put to OMB by the Committee concerns the question of whether environmental expenditures are productive or nonproductive. To some extent this is a matter of definition. A large part of environmental expenditures do not result in the production of goods that enter in the Gross National Product. In this technical sense they can be regarded as nonproductive. However, our natural environment is a scarce national resource and it is important to protect this resource. Environmental expenditures do result in a cleaner environment, in an enhancement of this national resource. These expenditures, if not excessive, do appear to be productive. Having said that, I want to emphasize the need to do a better job of assessing the economic effects on individual industries before promulgating environmental regulations.

Senator PROXMIRE. Mr. Busterud, please proceed.

STATEMENT OF HON. JOHN A. BUSTERUD, MEMBER, COUNCIL ON ENVIRONMENTAL QUALITY

Mr. BUSTERUD. Thank you, Mr. Chairman.

I am appearing today on behalf of Chairman Peterson of the Council on Environmental Quality. He is unfortunately hospitalized today with a back ailment.

I am pleased to be here this morning to testify before you on the relationship between our environmental programs and the state of the Nation's economy. This is a subject which I think has been subject to serious misunderstanding, and I, therefore, welcome the opportunity to communicate to you the results of our analyses dealing with the issue which show that the macroeconomic impacts of these program is surprisingly small.

In an attempt to keep my remarks as brief as possible on this complicated subject, we have prepared a background memorandum which I would like to distribute to members of the committee and to submit for the record. I will be referring to various tables and diagrams contained in this memorandum during my testimony. I am also distributing copies of the summary table from the most recent Chase Econometrics analysis sponsored by CEQ and EPA.

As you probably know, the Council has always taken a leading role in analyzing, both on the basis of in-house work and through sponsoring outside research, the macroeconomic impacts of environmental programs. Each year, for instance, we estimate that the amount of money which we expect the Nation will be spending during the subsequent 10-year period in order to achieve a better environment. This is, of course, the place at which any analysis of economic impacts must begin—how much will it cost.

This year's estimates are summarized in table I of the memorandum that I gave you. The incremental capital and operating costs over the period 1973–1982 are estimated to be $194.8 billion. The incremental abatement costs given in table I are those abatement costs projected to meet the requirements of Federal environmental legislation enacted since the mid-sixties, beyond what the Nation would have spent for the same purposes in the absence of such legislation.

These cost estimates, which are based primarily on information provided by EPA and other Federal agencies, predominantly assume the installation of end-of-the-pipe treatment for air- and water-pollution abatement, and, thus, understate the potential for less costly production process modifications which also satisfy legislated abatement requirements. For this reason, and because CEQ's unit-cost assumptions are generally high, the cost estimates are considered to define, on the basis of current knowledge, the maximum likely costs the Nation will experience. However, not all of the costs associated with meeting the 1983 goals of best available technology are included because of uncertainty about the degree of abatement that will be required for many industries.

This year's estimate is approximately $42.1 billion higher than last year's estimate. However, only $10.1 billion of this increase represents a net increase in real cost estimates—primarily stationary air pollution control. The remainder of the increase resulted from: Changing the estimating period from 1972–1981 to 1973–1982—in essence, dropping 1972, a relatively low-cost year, and adding 1983, a higher-cost year—$20.5 billion. Inflation—changing from 1972 dollars to 1973 dollars—$11.5 billion.

Senator PROXMIRE. That means there is no inflation estimate built into the rest of the period, whatever the inflation is you will have to make adjustments as you go along?

Mr. BUSTERUD. That is correct.

We have predicted inflation in our study over the next 10 years, but of course it is difficult at this juncture for economists——

Senator PROXMIRE. You predict inflation, but you do not incorporate the inflation factor in the costs of 1982?

Mr. BUSTERUD. No; we do not include future price increases in these estimates.

Senator PROXMIRE. You do not. That is very helpful.

Mr. BUSTERUD. In terms of the timing of expenditures, investments are expected to increase steadily up to a peak in 1976 in order to meet the 1977 goals of the Clean Air Act and the Federal Water Pollution Control Act. Annual costs are expected to increase at a rapid rate through 1977, after which they will level off.

In terms of real resource costs, our estimates project $81.4 billion invested in capital equipment and $121.8 billion spent on operation and maintenance costs over the 10-year period.

Moving now from the estimate of the costs themselves to the impact of these costs upon the economy, some simple ratios may be useful:

In 1974, the estimated incremental real resource—investment plus O. & M.—abatement costs amounted to approximately 0.7 percent of the U.S. gross national product. This proportion is expected to increase up to approximately 1.7 percent in 1976, and then decrease thereafter as investment costs decrease and GNP continues to grow.

Estimated private pollution control investments—excluding mobile sources—amount to approximately 3 percent of gross private domestic investment, and 6 percent of business investment in plant and equipment in 1974. These ratios are expected to remain approximately constant through 1976, after which they should fall.

We can now turn to the question which is of very great interest in this period of rapidly increasing prices, and that is what is the impact of these expenditures upon our country's inflation. This question has been addressed by several independent analyses. Our staff has compared expected price increases from pollution abatement costs to the actual price increases which have occurred in the different sectors of our economy. Three other analyses—one by Chase Econometrics, one by the Brookings Institution, and one by Data Resources, Inc.—used sophisticated macroeconomic models.

All of these analyses arrived at essentially the same conclusion—that pollution abatement expenditures are not having and will not have a significant impact upon the rate of inflation. Our estimate remains that these programs have contributed approximately one-half percent out of the close to 20 percent annual rate of increase in the wholesale price index over the past year.

The impact of the pollution control expenditures on other macroeconomic parameters is of similar magnitude. The results of the most recent Chase Econometrics macroeconomic analyses, which were distributed with the background information you have, indicate these magnitudes.

The expenditures are projected to have some impact on the level of GNP because they will stimulate a business cycle. Figure II of our memorandum summarizes the results of the Chase projections. As you can see, GNP is projected to be somewhat higher than it otherwise would have been prior to 1977 because of the stimulating effect of additional expenditures on pollution abatement equipment. After 1977, the projected GNP with pollution abatement will dip below the projected level without pollution abatement, with the two curves returning to the same level by the end of the decade.

The impact of the expenditures on unemployment will mirror their impact on real GNP, as is indicated in figure III of our memorandum.

Finally, moving on to the question of Government finances, at the Federal level, the EPA sewage treatment grants program has become the second largest public works activity, exceeded only by the Federal highway program. Nevertheless, as indicated in table VI of our memorandum, environmental expenditures still account for only 1 percent of total Federal outlays in fiscal year 1974 and should account for 1.3 percent in fiscal year 1975.

On the State and local levels, because the Federal Government is presently paying a large proportion—up to 75 percent—of the investments required for municipal sewage collection and treatment works, we estimate that environmental expenditures by local governments will be lower than they would have been in the absence of Federal legislation.

Another question which is presently of major concern is the impact of the required investments on the market for capital in the United States. Industries—including electric utilities—are expected to invest up to $6 billion a year in order to meet the air and water standards

established for 1975 through 1977. This is equivalent to approximately 6 percent of total projected plant and equipment investment. These pollution control expenditures will, of course, place increased demands on the capital market and will displace some private investment, but the Chase Econometric analyses conclude that the displacement will predominantly be in areas other than plant and equipment expenditures, such as residential construction. The amount of investment displaced will depend very much upon the monetary policy followed by the Federal Reserve Banks.

These projections are at least partially confirmed by the results of the first Bureau of Economic Analysis survey of pollution control expenditures in which only 2 percent of the firms sampled claimed that pollution control expenditures had displaced any of their planned investments for expanding or modernizing their production capacity.

In light of these findings, pollution control expenditures are not expected to significantly delay the expansion or modernization of industrial capacity for producing goods and services and, therefore, are not expected to have a measurable adverse impact on labor productivity.

Now, I do not want to appear as if I am understating the importance of the magnitude of these costs or their impact on the economy; $194 billion is indeed a substantial amount of money and represents a substantial allocation of real resources to the purpose of improving our environment. However, these expenditures are also buying a great deal, and the Council submits that Americans and generations which follow will conclude that this money has been very well spent.

And this, after all, is the important question, how much are we getting for the money we are spending. One of the least useful distinctions that many critics seem to like to make is between productive investments and so-called unproductive investments for environmental improvement or health and safety considerations. The attitude that saving people's lives or giving them clean air to breathe and clean water to drink is unproductive represents to us a frightening perspective on the goals and purposes of our society. Is not the improvement of the quality of our life the most productive of investments?

Some recent analyses demonstrate again the extensive damages the Nation will suffer if we do not continue a strong effort directed at environmental improvement. A recent study by a committee established by the Federal Power Commission, and supported by several other organizations and agencies, reported:

> If the production of electricity grew to 3.2 trillion kWh by 1980 as projected by the National Electrical Reliability Council and if the Clean Air Act standards were applied, sulfur oxide emissions would increase by 70 percent and the adverse health effects would be considerable. Between 1973 and 1980 the number of premature deaths would be increased by 25,000—the number of person days during which senior citizens' chronic heart and lung disorders were aggravated would be increased by 160 million, the number of asthma attacks would go up 50 million, the number of acute respiratory disorders in children would be raised by 4.5 million and by 1980 over 1.5 million additional adults would suffer from persistent chronic respiratory diseases.

The committee concluded that:

> Means do, in fact, exist for guaranteeing adequate and reliable electric power during the next decade, as well as for insuring a desirable state of air quality and other environmental values.

In another study, the Senate Committee on Public Works asked the National Academy of Sciences and the National Academy of Engineering to analyze air quality and automobile emission control. They concluded that the tangible benefits from cleaner air are $15 to $20 billion per year, although these estimates may neglect some intangible esthetic and ecological values, and risk reduction. With respect to automobile emissions, the committee concluded:

> * * * that the benefits in monetary terms that could reasonably be expected to accrue from implementing the Federal statutory emission control standards for automobiles are commensurate with the expected cost.

To summarize, our analyses all demonstrate, I believe, that we do not have to be seriously concerned about the impact of the environmental programs on inflation, our GNP, unemployment, or productivity.

This is not to say that there may not be problems in specific industries because the impacts are not spread evenly across all sectors. Some industries pollute much more heavily than others and will therefore have to undertake significantly greater efforts to abate their pollution to acceptable levels. Figures IV and V of our report summarize the BEA findings about the relative level of investments being made for pollution control among different industries.

Eight industrial groupings account for four-fifths of the total estimated private pollution control investments in 1974, and for these industries the proportion of total plant and equipment investment spent for pollution control purposes—ranging from 10 to 25 percent—is substantially above the national average which is less than 6 percent.

I think that we have to assess the economic impact of the pollution regulations on these individual industries as well as on the economy as a whole. For this reason, CEQ and EPA are studying in detail some of the industries most likely to be seriously impacted. It may be that as a result of these analyses we will find that there are some variations that should be made in the standards or in the time period for their implementation in order to reduce adverse economic impacts at an acceptable cost in terms of environmental impact.

I think that we must always be on the lookout for better and more efficient ways of achieving our goals. We should be sure that every additional dollar that we spend on abating pollution is purchasing at least a dollar's worth of a cleaner environment, and that there is no more efficient way to achieve that dollar's worth of improvement.

If our studies indicate that we are not committing our resources in such an efficient manner, the CEQ will favor changes in the administration of our environmental programs or the legislation supporting them that will insure that we do spend our money efficiently. We cannot afford to waste our resources. But then, neither can we afford to delay in achieving improvements in environmental quality that will benefit all of us now and in the future.

Thank you, Mr. Chairman.

Senator PROXMIRE. Thank you, Mr. Busterud.

[The memorandum referred to in Mr. Busterud's statement follows:]

THE ECONOMIC IMPACT OF ENVIRONMENTAL PROGRAMS

The Council on Environmental Quality (CEQ) has, since its inception, taken a major responsibility for assessing the economic abatement costs the Nation can expect to face as a result of the current Federal environmental legislation (*1*).

The Council carries out other in-house analyses or contracts for studies concerning the economic impact of these programs. This memorandum summarizes CEQ's 1974 estimates and analyses. Additional supporting papers are available upon request. (See page 24.)

1974 Abatement Cost Estimates

The CEQ's estimate of abatement costs for the ten-year period 1973 through 1982 are given in Table I. These "incremental" abatement costs are those abatement costs projected to meet the requirements of Federal environmental legislation enacted since the mid-sixties, beyond what the Nation would have spent for the same purposes in the absence of this legislation. Four types of costs are shown:

"Investment costs" (for the period 1973–1982) which are the estimated expenditures which will be made on capital equipment for pollution abatement by both public and private sectors.

"Capital costs" which include interest charges on pollution control investments and the depreciation of the capital equipment.

"O&M costs" which are the costs of operating and maintaining the pollution abatement processes.

"Annual costs" which are the sum of the capital costs and the O&M costs. The last column in Table I shows the sum of annual costs projected for each of the ten years 1973, 1974, . . . 1982.

TABLE I.—ESTIMATED INCREMENTAL POLLUTION CONTROL EXPENDITURES [1]

[In billions of 1973 dollars]

Pollutant/medium	1973			1982			Cumulative, 1973–82		
	O. & M.[2]	Capital costs [3]	Total annual costs	O. & M.[2]	Capital costs [3]	Total annual costs [4]	Capital investment	O. & M.[2]	Total annual costs [4]
Air pollution:									
Public	0.1	0.1	0.2	0.5	0.2	0.7	1.7	3.8	5.4
Private:									
Mobile	1.2	.2	1.4	8.4	4.9	13.3	31.3	49.9	74.4
Industrial	.5	.7	1.2	1.3	1.1	2.4	8.4	11.6	24.5
Utilities	.5	.3	.8	2.7	1.2	4.0	7.9	19.6	29.0
Total	2.3	1.3	3.6	12.9	7.4	20.4	49.3	84.9	133.3
Water pollution:									
Public:									
Federal	.2	NA	NA	.2	NA	NA	1.8	NA	NA
State and local	1.1	.1	1.1	1.4	1.3	2.7	14.8	12.8	24.4
Private:									
Industrial	.5	.5	1.0	1.5	1.2	2.6	9.8	12.3	23.1
Utilities	0	0	.01	.4	.3	.7	4.4	2.2	3.5
Total	1.8	.6	2.1	3.5	2.8	6.0	30.8	27.3	51.0
Radiation: Nuclear powerplants	NA	NA	NA	.05	.05	.07	.3	.08	.3
Solid waste:									
Public	.1	.1	.2	.3	.1	.4	1.0	2.2	2.9
Private	.1	<.05	.1	.5	<.05	.5	<.05	2.3	2.3
Total	.2	.1	.3	.8	.1	.9	1.0	4.5	5.2
Land reclamation:									
Surface mining [5]	.3	0	.3	1.6	0	.6	0	5.0	5.0
Noise [6]	NA	.1	NA	NA	1.0–1.4	NA	6.0–8.7	NA	NA
Grand total [6]	4.6	2.0	6.3	18.8	10.4	28.0	81.4	121.8	194.8

[1] Incremental costs are expenditures made pursuant to Federal environmental legislation, beyond those that would have been made in the absence of this legislation.
[2] Operating and maintenance costs.
[3] Interest and depreciation.
[4] O. & M. plus capital costs.
[5] Includes coal mining only.
[6] Not included in grand total.

These abatement costs are estimated primarily from data provided by the Environmental Protection Agency (EPA) and other Federal agencies. The air pollution abatement costs are based primarily on the 1974 edition of *The Cost of Clean Air* (2), and the private water pollution abatement costs are based primarily upon the 1973 edition of *The Economics of Clean Water* (3). The cost estimates predominantly assume the installation of "end-of-the-pipe" treatment for air and water pollution abatement, and thus understate potential for less costly production process modifications which also satisfy legislated abatement requirements. For this reason, and because CEQ's unit cost assumptions are generally high, the cost estimates are considered to define, on the basis of current knowledge, the maximum likely costs the Nation will experience. However, not all of the costs associated with meeting the 1983 goals of "best available technology" are included because of uncertainty about the degree of abatement that will be required for many industries (4).

Cumulative abatement costs (in constant 1973 dollars) over the 1973–82 period are estimated to be $194.8 billion. This estimate is approximately $42.1 billion (28 percent) higher than last year's estimate. However, only $10.1 billion of this increase represents a net increase in real cost estimates (primarily stationary air pollution control). The remainder of the increase resulted from:

Changing the estimating period from 1972—$20.5 billion 81 to 1973–82 (in essence, dropping 1972, a relatively low cost year, and adding 1983, a higher cost year).

Inflation (changing from 1972 dollars to $11.5 billion 1973 dollars).

TABLE II.—INVESTMENT FOR AIR AND WATER POLLUTION ABATEMENT BY INDUSTRIES, 1973

	Total plant and expenditures	Pollution abatement investment					
		End-of-the-pipe and process change			Process change only		
		Total	Air	Water	Total	Air	Water
All industries	100,076	4,938	3,176	1,762	1,169	724	444
Manufacturing	38,003	3,153	2,050	1,103	712	446	266
Durable goods	19,389	1,579	1,207	372	321	220	101
Primary metals	3,421	814	712	101	112	82	29
Blast furnace, steel works	1,407	230	163	67	75	56	19
Nonferrous	1,679	523	492	31	29	19	9
Electrical machinery	2,895	129	44	85	35	14	21
Machinery, except electrical	3,478	80	52	28	36	24	12
Transportation equipment	3,063	170	96	74	37	20	17
Motor vehicles	2,244	143	81	62	35	19	16
Aircraft	531	20	11	10	0	0	0
Stone, clay, and glass	1,503	144	123	22	50	42	8
Other durables	4,969	243	180	63	52	37	15
Nondurable goods	18,614	1,574	843	731	391	226	165
Food including beverage	3,048	152	68	84	49	25	24
Textile	787	29	9	20	11	3	8
Paper	1,893	355	174	181	14	7	7
Chemical	4,324	416	203	213	149	88	61
Petroleum	5,409	555	352	203	151	94	57
Rubber	1,567	48	26	23	12	6	6
Other nondurables	1,586	19	12	7	5	4	1
Nonmanufacturing	62,073	1,785	1,126	659	457	278	179
Mining	2,759	91	41	50	20	15	5
Railroad	1,939	16	5	11	5	3	2
Air transportation	2,413	15	12	4	2	2	0
Other transportation	1,605	11	6	5	4	3	1
Public utilities	19,087	1,451	921	530	386	226	160
Electric	16,250	1,409	906	503	372	223	149
Gas and other	2,837	42	15	27	14	3	11
Communication, commercial, and other	34,270	201	142	58	41	31	10

Source: U.S. Department of Commerce, Bureau of Economic Analysis, "Survey of Current Business," vol. 54, July 1974.

Distribution of Costs by Sector: Approximately $77 billion of the cumulative costs (mobile sources and solid waste collection costs) is paid for directly by the consumer. Another $32 billion is initially paid by government and passed through to taxpayers. Of the remainder, $32 billion will be paid by electrical utilities and the rest by other industries. These costs will be predominantly passed on to the consumer in the form of higher electricity and product prices.

Distribution over Time: In terms of the timing of expenditures, investments are expected to increase steadily up to a peak in 1976 in order to meet the 1971 goals of the Clean Air Act and the Federal Water Pollution Control Act. Annual

costs are expected to increase at a rapid rate through 1977 after which they will level off.

Distribution between Investment and O&M Costs: In terms of real resource costs, CEQ estimates that there will be $81.4 billion invested in capital equipment and $121.8 billion spent on operation and maintenance costs over the 10-year period. As noted earlier, this estimate of investment costs is thought to be too high because of the emphasis placed on "end-of-the-pipe" capital investments as opposed to less investment-intensive process charges. The Bureau of Economic Analysis (Department of Commerce) in a recent survey of pollution abatement investments (see Tables II and III) found them to be somewhat lower than the CEQ estimates (*5*).

As Tables II and III indicate, the BEA survey provides the first information about the relative importance of process change as opposed to "end-of-the-pipe" treatment for pollution abatement. In 1973 and 1974, 23 percent of the total investment for pollution abatement was expected to be allocated for process changes.

MACROECONOMIC IMPACTS

The macroeconomic impacts of environmental expenditures were analyzed by CEQ, with the help of the Chase Econometrics, Inc., macroeconomic model (*6*).

In 1974, the estimated incremental real resource (investment plus O&M) abatement costs amounted to approximately 0.7 percent of the U.S. Gross National Product. This proportion is expected to increase to approximately 1.4 percent in 1976, and then decrease thereafter as investment costs decrease and GNP continues to grow.

TABLE III.—INVESTMENT FOR AIR AND WATER POLLUTION ABATEMENT BY INDUSTRIES, 1974

	Total plant and expenditures	Pollution abatement investment					
		End-of-the-pipe and process change			Process change only		
		Total	Air	Water	Total	Air	Water
All industries	112, 114	6, 543	4, 346	2, 196	1, 465	1, 003	462
Manufacturing	44, 404	4, 446	2, 929	1, 517	1, 042	721	321
Durable goods	22, 611	2, 063	1, 523	540	499	397	102
Primary metals	4, 337	1, 003	841	163	250	239	11
Blast furnace, steel works	1, 712	381	304	78	114	109	4
Nonferrous	2, 156	553	469	83	118	111	6
Electrical machinery	3, 179	175	53	122	46	16	30
Machinery, except electrical	3, 975	118	74	44	42	27	15
Transportation equipment	3, 570	195	112	83	29	17	12
Motor vehicles	2, 682	178	103	75	28	17	12
Aircraft	580	13	7	6	0	0	0
Stone, clay, and glass	1, 683	282	244	39	58	48	10
Other durables	5, 867	290	200	90	73	50	23
Nondurable goods	21, 793	2, 383	1, 406	977	543	324	220
Food including beverage	3, 276	230	112	118	67	35	32
Textile	773	43	17	26	7	3	4
Paper	2, 484	500	326	174	31	16	15
Chemical	5, 249	608	293	316	188	109	79
Petroleum	6, 888	926	610	316	239	153	86
Rubber	1, 580	51	33	18	8	6	2
Other nondurables	1, 543	24	16	9	5	2	2
Nonmanufacturing	67, 710	2, 097	1, 418	679	423	283	140
Mining	3, 143	100	53	47	28	22	6
Railroad	2, 272	19	3	16	3	2	2
Air transportation	2, 160	9	4	5	1	0	0
Other transportation	1, 617	17	10	7	5	3	2
Public utilities	22, 163	1, 696	1, 179	518	307	200	107
Electric	18, 808	1, 651	1, 160	491	295	197	98
Gas and other	3, 355	46	19	27	11	2	9
Communication, commercial, and other	36, 355	256	170	87	80	57	23

Source: U.S. Department of Commerce, Bureau of Economic Analysis, "Survey of Current Business," vol. 54, July 1974.

Estimated private pollution control investments (excluding mobile sources) amount to approximately 3 percent of gross private domestic investment and 6 percent of business investment in plant and equipment in 1974. These ratios are expected to remain approximately constant through 1976 after which they will fall.

Impact on Inflation: The impact of these expenditures on the rate of inflation has been estimated in two ways. One estimate compares the price increases expected in different economic sectors as a result of pollution control expenditures

with the contribution of these expenditures to the rate of inflation. As Figure I indicates, much of the increase in the wholesale price index (WPI) over the past year has occurred because of increased energy (predominantly oil) and food prices. The cost of producing crude oil and unprocessed food is virtually unaffected by pollution control expenditures. Calculating the impact of the remaining sectors involved weighting the contribution of each to the increase in the WPI by the price increase expected in each sector as a result of direct and indirect pollution control costs. These calculations indicate that pollution control expenditures were responsible for approximately 0.5 percent (one-fortieth of the total increase of 17 percent) in the WPI from 1973 to 1974.

This result was confirmed by three separate analyses using sophisticated macroeconomic computer models. The first was the 1973 Chase Econometrics macroeconomic analysis which predicted an increase in the WPI of 0.5 percent during 1974 as a result of pollution control expenditures (7). Two other similar analyses have been run by the Brookings Institution and by Data Resources, Inc. (8). Both show inflation rates of 0.3 percent to 0.5 percent per year resulting from pollution control expenditures. The Chase projections of price increases resulting from pollution control expenditures are given in Table IV.

TABLE IV.—PERCENTAGE CONTRIBUTION OF POLLUTION ABATEMENT EXPENDITURES TO PROJECTED CHANGES IN PRICE INDICES

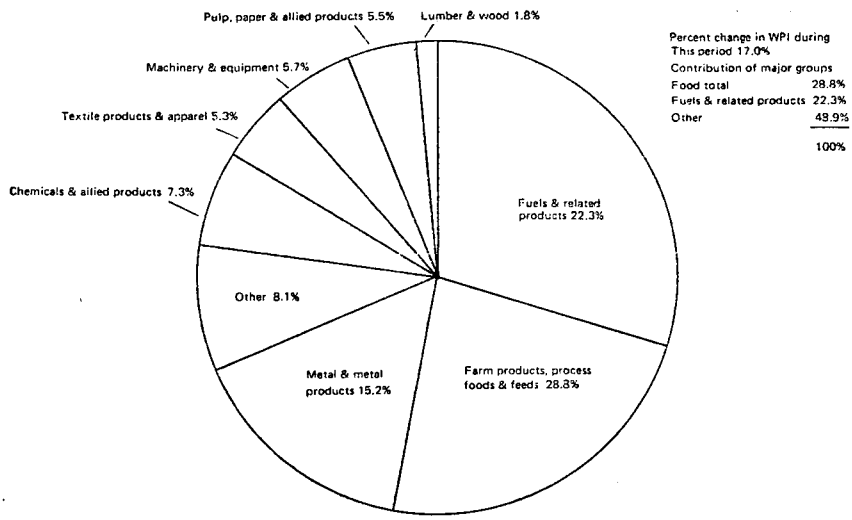
	CPI	WPI	GNP deflator
Increase 1975–76	0.5	2.0	0.9
Cumulative increase to 1976	.8	2.6	1.2
Average increase 1973–76	.3	.9	.4
Increase 1981–82	−.2	−.1	0
Cumulative increase to 1982	.3	2.4	.9
Average increase 1973–82	.03	.2	.1

Note: CPI=Consumer Price Index; WPI=Wholesale Price Index.

Source: Based on Chase Econometrics, Inc., (1974) estimates.

FIGURE I

Percent Contribution to Change in Wholesale Price Index, April 1973-April 1974 (by Major Commodity Groupings)



Source: Cost of Living Council, 1974, based on Bureau of Labor Statistics data.

Impact on Investment, Productivity, and Economic Growth: One of the concerns currently being expressed about environmental programs is that the substantial investments they require will displace investments that firms would otherwise be making to expand or modernize their production capacity. Such a substitution, if it were to occur widely, could have an adverse impact on the rate of increase in labor productivity because firms would be operating with older, less productive equipment. And this reduced productivity growth would result in a lower rate of economic growth for the Nation.

The available data indicate that such effects are likely to be minimal. The maximum projected investment for environmental purposes by U.S. industries is unlikely to exceed 6 percent of their total plant and equipment expenditures in any one year, and should average approximately 3 percent of these expenditures over the 10-year estimating period.

The pollution control expenditures will, of course, place increased demands on the capital market and will displace some private investment, but the Chase Econometrics analyses conclude that the displacement will predominantly be in areas other than plant and equipment expenditures, such as residential construction (*9*).

This conclusion is at least partially confirmed by the results of the first Bureau of Economic Analysis survey of pollution control expenditures, in which only 2 percent of the firms sampled claimed that pollution control expenditures had displaced any of their planned investments for expanding or modernizing their production capacity.

FIGURE II

Projected Economic Growth, 1974-1982

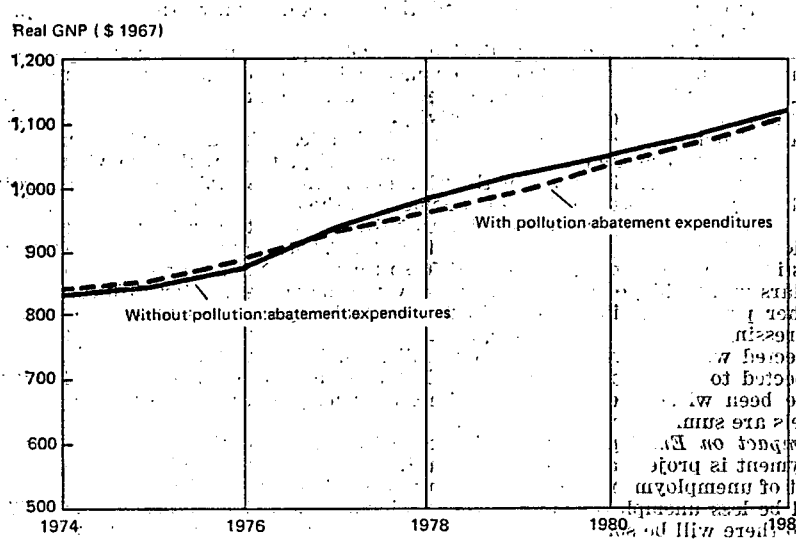
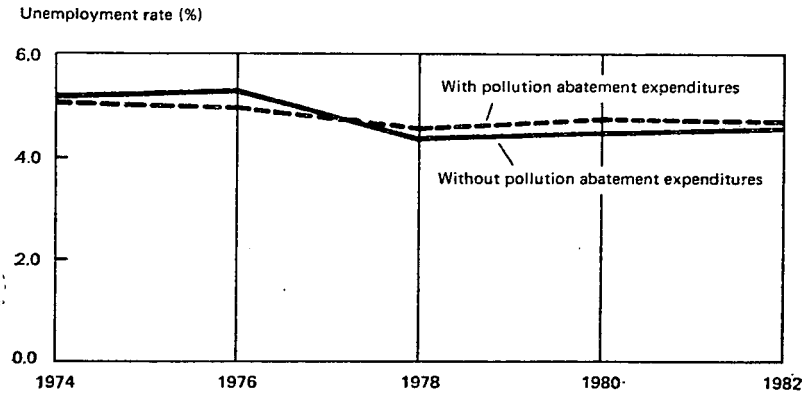


FIGURE III
Projected Unemployment Rates, 1974-1982



Source: Chase Econometrics, Inc., "The Economic Impact of Pollution Control: Macroeconomic and Industry Reports," 1974, prepared for CEQ.

The BEA report concluded, "While it is possible that in some industries pollution abatement restrictions have caused a reduction in investment, the low level of positive response to this question indicates that business as a whole does not think of pollution abatement regulations as reducing investment in new plant equipment." *(10)*

In light of these findings, pollution control expenditures are not expected to delay significantly the expansion or modernization of industrial capacity for producing goods and services, and therefore are not expected to have a measurable adverse impact on labor productivity.

If environmental expenditures have an insignificant impact on plant and equipment expenditures and therefore on productivity, they will have virtually no impact on the rate of growth of the "full employment GNP." However, according to the 10-year forecast by Chase Econometrics, the anticipated peaking of environmentally related expenditures prior to 1978 will create a minor business cycle which will affect the actual growth rate in GNP. These expenditures are expected to stimulate the economy prior to 1976 so that the GNP in current and constant dollars will be higher than it otherwise would have been. After 1976 the slightly higher prices resulting from pollution control expenditures will have a minor depressing effect on the economy, causing the real GNP to dip below the level expected without environmental expenditures. By 1982 this depressing effect is expected to disappear, so that the GNP will be at the same level as it would have been without environmental improvement programs. The projected GNP levels are summarized in Figure II.

Impact on Employment: The impact of environmental expenditures on employment is projected to be insignificant. In the macroeconomic analyses the impact of unemployment is expected to mirror the impact on GNP: before 1976 there will be less unemployment than there otherwise would have been, from 1977 to 1980 there will be somewhat more; but by the end of the decade there will be no significant impact on unemployment. Projected employment rates are given in Figure III.

These macroeconomic analyses do not take account of plant closings caused by environmental regulations, however. EPA, which maintains an "Economic Dislocation Early Warning System" on such closings, had received reports of 69 firms which claimed that they had been forced to close plants from January 1971 through June 1974, at least in part because of environmental regulations. These plants represented a total of approximately 12,000 jobs (about .015 percent of the current labor force). The details on these closures are given in Table V.

It should be noted that the increase in unemployment caused by these plant closings will be less than the 12,000 jobs that the plants themselves represented. The lost production will be shifted to other plants, sometimes within the same firm, and as a result more jobs will be created at these other plants. There is

probably some net loss in jobs because the plants which increase production are likely to be more efficient than the plants which close. It is the relative inefficiency of these plants—they are likely to be older, smaller facilities which are only marginally profitable even without the requirement that they install environmental controls—that leads the firm to conclude that they should be closed rather than modernized. In many instances they would have been closed soon anyway, and environmental regulations tend only to accelerate an otherwise inevitable process.

However, the problem of plant closures should not be understated. As Table V indicates, there is some geographical concentration of the plants which have closed. Many of these plants are also often located in older, industrial towns already suffering relatively high unemployment rates. Their closures can be a serious blow to the local economy and particularly to the workers who may have serious difficulty finding other employment.

TABLE V.—PLANT CLOSINGS WHERE POLLUTION CONTROL COSTS WERE ALLEGED TO BE FACTOR, JANUARY 1971–JUNE 1974

	Industry								
	Paper and allied products	Primary metals	Chemicals and allied products	Food products	Stone, clay, glass, and concrete products	Mining and quarrying nonmetal minerals	Textile mill products	Other industries	Total
Region I:									
Plants	2						3	1	6
Employees	1,013							95	1,108
Region II:									
Plants	3	1	3	1		1	1	8	18
Employees	1,536	44	1,450	102		25	133	1,308	4,598
Region III:									
Plants			2	2				3	7
Employees			610	105				390	1,105
Region IV:									
Plants		1	1						2
Employees		148	78						226
Region V:									
Plants	2	5		3	3			1	14
Employees	500	1,379		165	235				2,279
Region VI:									
Plants		3						1	4
Employees		540						45	585
Region VII:									
Plants									
Employees									
Region VIII:									
Plants			1			2			3
Employees						208			208
Region IX:									
Plants		2		2	2	1		2	8
Employees		400			148	35		529	1,112
Region X:									
Plants	3			1				2	6
Employees	833			38				250	1,121
Total:									
Plants	10	12	7	9	5	4	4	18	68
Employees	3,882	2,511	2,138	410	383	268	133	2,617	12,342

NOTES

1. Dislocation involving less than 25 jobs is not reported.
2. "Other industries" includes all dislocations where the combined "actual" and "threatened" plants amount to fewer than 6.

Source: Environmental Protection Agency, Office of the Administrator, 1974 Second Quarter Report of the Economic Dislocation Early Warning System.

Impact on Government Finances: The major sources of government expenditures associated with the implementation of Federal environmental legislation are for municipal sewage treatment plants, solid waste collection and disposal, and air and water pollution abatement from publicly owned facilities. At the Federal level, the EPA sewage treatment grants program has become the second largest public works activity exceeded only by the Federal highway program. Nevertheless, as indicated in Table VI, environmental expenditures still account for only 1.0 percent of total Federal outlays in FY '74 and 1.3 percent in FY '75.

TABLE VI.—U.S. BUDGET OUTLAYS BY FUNCTION, 1973 ACTUAL AND 1974–76 ESTIMATED

[In billions of dollars]

Description (Function)	1973 actual	1974 estimate	1975 estimate	1976 estimate
National defense	76.0	80.6	87.7	94.8
International affairs and finance	3.0	3.9	4.1	4.3
Space research and technology	3.3	3.2	3.3	3.4
Agriculture and rural development	6.2	4.0	2.7	4.1
Natural resources and environment	.6	.6	3.1	4.1
Commerce and transportation	13.1	13.5	13.4	13.7
Community development and housing	4.1	5.4	5.7	7.4
Education and manpower	10.2	10.8	11.5	12.3
Health	18.4	23.3	26.3	28.6
Income security	73.1	85.0	100.1	107.2
Veterans benefits and services	12.0	13.3	13.6	13.8
Interest	22.8	27.8	29.1	30.3
General government	5.5	6.8	6.8	6.8
General revenue sharing	6.6	6.1	6.2	6.4
Allowances		.3	1.6	4.9
Undistributed intragovernmental transactions	−8.4	−10.0	−10.7	−11.3
Total	246.5	274.7	304.4	329.4

DETAILS FOR NATURAL RESOURCES AND ENVIRONMENT

[In billions of dollars]

	1973 actual	1974 estimate	1975 estimate
Pollution control and abatement	$1.1	$2.6	$4.0
Recreational resources	.6	.8	.8
Water resources and power	2.9	2.9	3.0
Land management	.9	1.0	1.1
Mineral resources	.1	.3	.3
Other natural resource programs	.2	.2	.2
Subtotal all programs	5.8	7.8	9.4
Deduction for offsetting receipts	−5.2	−7.2	−6.3
Net total	.6	.6	3.1

Source: Office of Management and Budget, "The Budget of the U.S. Government: Fiscal Year 1975" (U.S. Government Printing Office, 1974), p. 86.

On the state and local levels, because the Federal Government is presently paying a large proportion (up to 75 percent) of the investments required for municipal sewage collection and treatment works, CEQ projects local government environmental expenditures to be lower than they would have been in the absence of Federal legislation. The fiscal impact of local expenditures will also be reduced by the fact that many of these costs—e.g., for sewage treatment and solid waste collection—are likely to be financed out of user charges rather than general revenues (*11*).

Impact on Foreign Trade: Analyses conducted by the Department of Commerce, other Federal agencies, and independent analysts have not succeeded in identifying any significant impact of our environmental regulations on our foreign trade and balance of payments (*12*). Some U.S. exports will become slightly more expensive, and some imports will become more competitive, but the total effect is small. This is largely attributable to (a) the relatively small price increases for U.S. goods as a result of environmental requirements; (b) the lack of import competition for may commodities which may experience price increases because of the weight, bulk, or U.S. quality requirements for those goods; and (c) the enactment by many competing countries of stringent environmental regulations that will reduce any comparative advantage their industries might have over U.S. firms.

Impact on the Distribution of Income: CEQ and EPA have sponsored studies of the impact of pollution control programs on the distribution of income. These analyses are presently being updated by CEQ (*13*). They show that the medium income family paid approximately 0.5 percent of its family income for incremental pollution control expenditures in 1972 in the form of higher products prices, higher tax revenues, and increased service charges for government services. In 1976, this percentage is expected to increase to about 2.0 percent, falling slightly by 1980. In 1976 and 1980 the increased costs are expected to be relatively evenly divided between higher automobile expenditures, higher prices for other goods and services, and higher taxes.

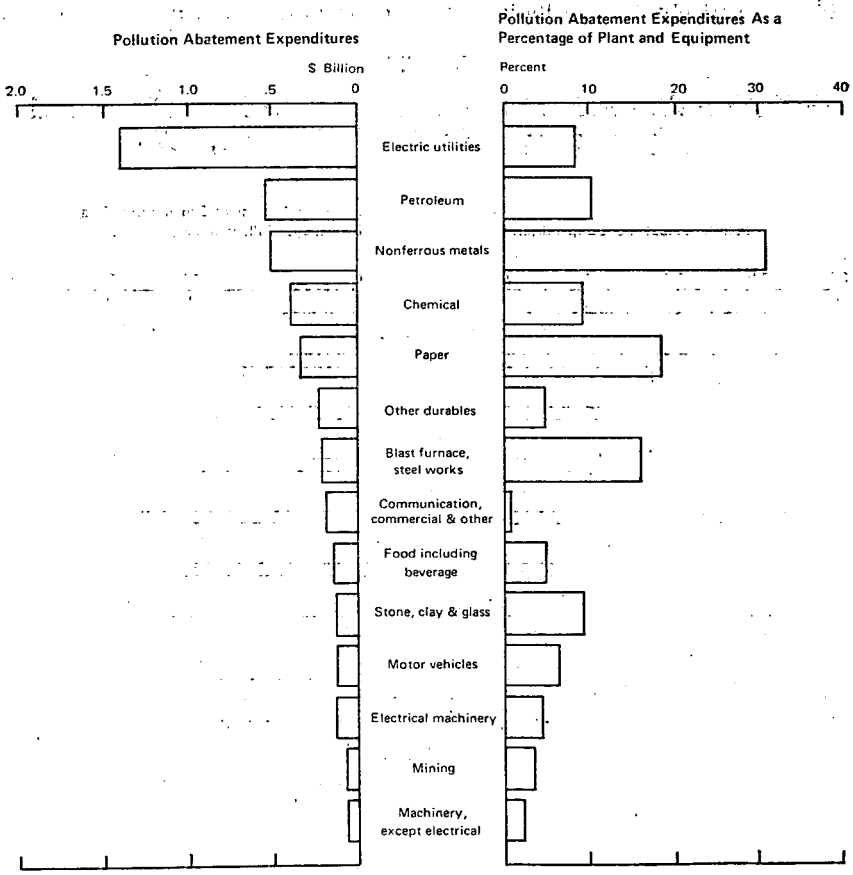
The distributional impact of these expenditures is expected to be mildly regressive. That is, lower income families will pay a slightly higher proportion of their income (although a much smaller dollar amount) for pollution control expenditures than higher income families.

IMPACTS ON SPECIFIC INDUSTRIES

The previous analyses indicated that there was unlikely to be any significant macroeconomic impact of environmental programs. However, the impacts are not spread evenly across all sectors.

FIGURE IV

Pollution Abatement Expenditures for New Plant and Equipment by Selected Industries, 1973



Source: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, vol. 54, July 1974.

Some industries pollute much more heavily than others and will therefore have to undertake significantly greater efforts to abate their pollution to acceptable levels. Figures IV and V summarize the BEA findings about the relative level of investments being made for pollution control among different industries. Clearly, the industries which would appear to be most significantly affected are: Electric utilities, petroleum refining, iron and steel, pulp and paper, nonferrous

and primary metals, stone, clay, glass, and cement, chemicals, and food and kindred products.

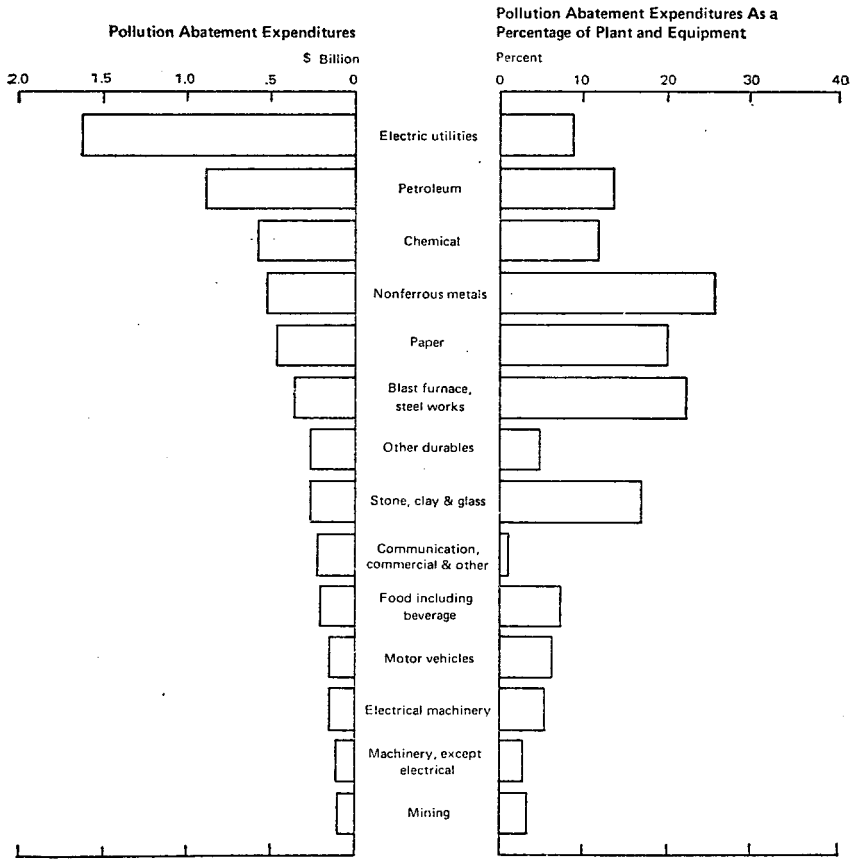
These eight industrial groupings account for four-fifths of the total estimated private pollution control investments in 1974. The proportion of total plant and equipment investment spent for pollution control purposes in these industries—ranging from 10 to 20 percent—is substantially above the national average—less than 6 percent. Of course, a high proportion of total plant and equipment expenditures being allocated to pollution control may indicate only that the particular industry is investing relatively little for capacity expansion in the United States.

As Tables II and III indicate, all of these industries are expecting to increase their pollution control investments substantially in 1974 over the 1973 levels. Specifically, the expected increase will amount to: 17% for electric utilities; 67% for petroleum refining; 65% for iron and steel; 39% for pulp and paper; 6% for nonferrous and primary metals; 100% for stone, clay, glass, and cement; 20% for chemicals; and 52% for food and kindred products.

CEQ and EPA estimates indicate that these industries will continue to experience relatively heavy pollution control expenditures throughout the decade.

FIGURE V

Pollution Abatement Expenditures for New Plant and Equipment by Selected Industries, 1974



Source: U.S. Departemnt of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, vol. 54, July 1974.

Other important characteristics of the industries are that: They are all "basic industries," which means that these price and supply problems ripple through the economy. They are generally energy-intensive industries and (excluding electric utilities) account for more than 73 percent of all energy consumed by all industries, and nearly 20 percent of total U.S. energy consumption. In these industries energy is a significant cost element accounting for nearly 14¢ per dollar of value added, compared to the average of all industries of 4¢ per dollar of value added (*13*). Therefore these industries face serious cost problems because of high energy prices in addition to the costs added by environmental regulations (see Table VII).

Table VIII, however, indicates that even in those relatively most seriously affected industries, environmental expenditures are not a large proportion of total value added in the industry and therefore should not have a substantial impact upon prices or output.

Such projected increases and output reductions would not normally be cause for alarm. However, because of the importance of these industries to the functioning of the economy, the possibility of very tight capital markets' limiting the availability of investment funds, and in some cases, a recent history of depressed profits, further analysis is clearly required. CEQ and EPA are presently in the process of sponsoring such studies.

TABLE VII.—MANUFACTURING ENERGY CONSUMPTION, SELECTED INDUSTRIES, 1967

Industry	Energy consumed per dollar of output (million Btu per dollar)	Total energy consumption (trillion Btu)	Percent manufacturing Consumption	Percent U.S consumption
Cement	463.0	463	3.1	0.9
Petroleum	495.2	2,537	17.4	5.0
Metals	250.1	4,080	27.9	8.1
Paper	140.1	1,156	7.9	2.3
Chemicals	138.3	2,460	16.8	4.9
Subtotal		10,596	73.3	21.2
All other manufacturing	20.9	3,914	26.7	7.7
Total industrial	[1] (69.7)	14,608	100	28.9

[1] Represents the average.

Source: Energy and Environmental Analysis, Inc., "Energy Management in Manufacturing, 1967–90," 1974, prepared for CEQ.

TABLE VIII.—POLLUTION CONTROL EXPENDITURES AS A PERCENTAGE OF VALUE OF SHIPMENTS, SELECTED INDUSTRIES, 1973 AND 1980

SIC industrial sector	Value of shipments (in millions)[1]		Costs[2] as a percentage of value of shipments	
	1973	1980	1973	1980
26 Paper and pulp	$28,167.4	$39,715.5	0.42	0.88
28 Chemical	57,061.5	80,456.7	.40	.86
29 Petroleum refining	28,602.2	40,329.1	.43	.99
32 Stone, clay, and glass	21,430.0	30,216.3	.25	.56
33 Primary metals	58,276.5	82,169.9	.80	2.00
5 industry average			.50	1.00
All manufacturing average			.20	.50

[1] 5 percent annual increase 1973–80.
[2] Calculated on basis of annual costs.

Source: Value of shipments figures for 1973 are from the Department of Commerce.

REFERENCES

(*1*) See the CEQ annual reports, *Environmental Quality—1970; Environmental Quality—1971*, Ch. 4; *Environmental Quality—1972*, Ch. 8; *Environmental Quality—1973*, Ch. 3: (U.S. Government Printing Office).

(2) Environmental Protection Agency, *The Cost of Clean Air*, Ch. 3: (U.S. Government Printing Office, 1974).

(3) Environmental Protection Agency, *The Economics of Clean Water—1973* (U.S. Government Printing Office, 1974).
(4) A list of items providing a more extended description of data sources and assumptions made in estimating abatement costs appears on page 24.
(5) John E. Cremeans, "Capital Expenditures by Business for Air and Water Pollution Abatement, 1973 and Planned 1974," *Survey of Current Business*, Vol. 54, July 1974, pp. 58–64.
(6) Chase Econometric Associates, Inc., "The Economic Impact of Pollution Control," prepared for CEQ and EPA, 1974.
(7) Chase Econometric Associates, Inc., "The Economic Impact of Pollution Control: Macroeconomic and Industry Results—Executive Summary," prepared for EPA, 1973.
(8) Charles L. Schultze and Allen P. Kneese, *Pollution: Prices and Public Policy* (Washington, D.C.: The Brookings Institution, 1974), to be released in December; and information provided by Charles L. Schultze.
(9) The Chase analyses conclude that for every dollar of pollution control investment made, 40¢ of other private domestic investment will be displaced, and most of this displacement will occur in the residential housing sector because it is particularly sensitive to the higher interest rates which would result from increased demands on the capital market.
(10) John E. Cremeans, *supra* note 5, p. 64.
(11) The 1972 Amendments to the Federal Water Pollution Control Act, for instance, require industries disposing of their wastes in municipal systems to reimburse the municipality fully for all costs incurred. The municipality will be able to keep out those revenues representing its own expenditures but also some portion of the revenues covering Federal expenditures.
(12) Department of Commerce. *The Effects of Pollution Abatement on International Trade* (U.S. Government Printing Office, 1973 and 1974).
(13) Nancy Dorfman and Arthur Snow, "Who Bears the Cost of Pollution Control?" prepared for CEQ and EPA by Public Interest Economics Center, Inc., 1973, available from the National Technical Information Service, Department of Commerce (PB–226 447). The CEQ update is expected soon.

NOTES ON METHODOLOGY

Incremental costs were assumed to equal total costs in the following areas: noise, radiation, land reclamation, utilities, thermal water pollution control, control of air pollution from public sources (solid waste and sewer sludge incineration), and mobile sources.

The selection of the discount rates to be used in amortizing capital costs affects the annual cost estimates. In general, a rate of 8 percent has been used for private investment, 10 percent for mobile sources, and 6 percent for public investment. All three rates are probably below the economics' estimates of the "opportunity costs" of investment funds, and they are below interest rates experienced during the past year. Using these rates tends to understate the financial costs of investments made during such high interest rate periods. However, not all investments are financed by borrowing. The assumption that they are, which underlies the CEQ cost analyses, tends to overstate the financial costs.

Other Analyses on Economic Impact of Environmental Programs Released by CEQ

Available from the Council: [1]

	Date
"Cost of Pollution Abatement" (from 1974 CEQ Annual Report), pp. 173–197	1974
"Calculating Abatement Costs" (from 1974 CEQ Annual Report), pp. 219–226	1974
"The Economic Impact of Pollution Control: Macroeconomic and Industry Reports," by Chase Econometrics, Inc. (executive summary)	1974
Impact of Pollution Abatement on Income Distribution	1975

Available from the U.S. Government Printing Office:

1973 CEQ Annual Report, *Environmental Quality: 1973*, "Economics and Environmental Management," ch. 3, pp. 73–117	1973
1972 SEQ Annual Report, *Environmental Quality: 1972*, "The Costs and Economic Impacts of Environmental Improvement," ch. 8, pp. 269–309	1972
1971 CEQ Annual Report, *Environmental Quality: 1971*, "The Economy and the Environment," ch. 4, pp. 99–153	1971

[1] CEQ also has a few copies of the results of the BEA survey on pollution abatement costs reprinted from the July 1974 *Survey of Current Business*.

The Economic Impact of Pollution Control—A Summary of Recent Studies. Prepared for the Council on Environmental Quality, Department of Commerce, and Environmental Protection Agency, 1972.

AVAILABLE FROM NTIS [1]

The Economic Impact of Pollution Control—A Summary of Recent Studies. Prepared for the Council on Environmental Quality, Department of Commerce, and Environmental Protection Agency. 1972. (PB–207 205, $3.75; microfiche, $2.25)

The Economic Impacts of Meeting [Automobile] Exhaust Emission Standards, 1971–1980. Chase Econometric Associates, Inc.

Part I. Executive Summary. (PB–207 200, $3.25; $2.25)

Part II. Baseline Forecasts of Economic Performance. (PB–207 201, $3.75; $2.25)

Part III. The Economic Impact of Pollution Abatement. (PB–207 202, $3.75; $2.25)

Part IV. Appendix. Presentation of Baseline and Alternative Impact Forecasts of Macroeconomic and Industry Performance. (PB–207 203 $5.75; $2.25)

Analysis of Economic Impacts of Environmental Standards on the Bakery Industry. Ernst & Ernst.

Part I. Executive Summary. (PB–207 169; $3.25; $2.25)

Part II. [A descriptive analysis of the bakery products industry detailing industry trends and characteristics relevant to economic impact analysis of environmental standards]. (PB–207 170, $3.25; $2.25)

Part III. [A study of the impact of pollution standards and charges on the bakery industry]. (PB–207 171, $3.75; $2.25)

The Cement Industry: Economic Impact of Pollution Control Costs. The Boston Consulting Group, Inc.

Volume I. Executive Summary. (PB–207 150, $3.25; $2.25)

Volume II. [Industry description, pollution problems, market structure, financial resources, demand, foreign trade, and employment impact]. PB–207 151, $7.00; $2.25)

Possible Impact of Costs of Selected Pollution Control Equipment on the Electric Utility Industry and Certain Power Intensive Consumer Industries. National Economic Research Associates, Inc.

Volume I. Executive Summary. (PB–207 168, $3.25; $2.25)

Volume II. [Introduction, structure of the electric utility industry, and the economic impact of pollution abatement upon the industry and upon selected power intensive consumer industries]. (PB–207 167, $5.25; $2.25)

Economic Impact of Environmental Controls on the Fruits and Vegetable Canning and Freezing Industries. Agri Division, Dunlap and Associates, Inc.

Part I. Executive Summary. (PB–207 140; $3.25; $2.25)

Part II. Industry Structures. (PB–207 141, $5.75; $2.25)

Part III. Impact Analysis. (PB–207 142, $6.25; $2.25)

Part IV. Statistical Supplement. (PB–207 143, $5.75; $2.25)

Study of the Economic Impacts of Pollution Control on the Iron Foundry Industry. A. T. Kearney & Company, Inc.

Part I. Executive Summary. (PB–207 147, $3.25; $2.25)

Part II. The Structure of the Industry. (PB–207 148; $5.25; $2.25)

Part III. The Economic Impact of Pollution Abatement upon the Industry. (PB–207 149, $4.25; $2.25)

The Leather Industry: A Study of the Impact of Pollution Control Costs. Urban Systems Research & Engineering, Inc.

Volume I. Executive Summary. (PB–207 152, $3.75; $2.25)

Volume II. Description of the Industry. (PB–207 153, $6.25; $2.25)

Volume III. Impact of Pollution Control Costs on the Tanning Industry. (PB–207 149, $4.25; $2.25)

The Effects of Pollution Control on the Nonferrous Metals Industries. Charles River Associates Incorporated.

Aluminum: Part I. Introduction and Executive Summary. (PB–207 164, $3.75; $2.25)

Part II. Structure of the Industry. (PB–207 165, $5.25; $2.25)

[1] Prices as of November 15, 1974. Prepaid orders should be sent to the National Technical Information Service, U.S. Department of Commerce, Springfield, Va. 22151.

Part III. The Economic Impact of Pollution Abatement on the Industry. (PB–207 166, $3.75; $2.25)
Copper: Part I. Introduction and Executive Summary. (PB–207 161; $3.75; $2.25)
Part II. Structure of the Industry. (PB–207 162, $5.25; $2.25)
Part III. The Economic Impact of Pollution Abatement on the Industry. (PB–207 163, $3.75; $2.25)
Lead: Part I. Introduction and Executive Summary. (PB–207 155, $3.75; $2.25)
Part II. Structure of the Industry. (PB–207 156, $4.75; $2.25)
Part III. The Economic Impact of Pollution Abatement on the Industry. (PB–207 157, $3.75; $2.25)
Zinc: Part I. Introduction and Executive Summary. (PB–207 158, $3.75; $2.25)
Part II. Structure of the Industry. (PB–207 159, $4.75; $2.25)
Part III. The Economic Impact of Pollution Abatement on the Industry. (PB–207 160, $3.75; $2.25)
Economic Impact of Anticipated Paper Industry Pollution-Abatement Costs. Arthur D. Little, Inc.
Part I. Executive Summary. (PB–207 144, $3.25; $2.25)
Part II. Industry Structure. (PB–207 145, $4.25; $2.25)
Part III. Economic Analysis. (PB–207 146, $4.25; $2.25)
The Impact of Costs Associated with New Environmental Standards upon the Petroleum Refining Industry. Stephen Sobotka & Company.
Part I. Executive Summary. (PB–207 197, $3.25; $2.25)
Part II. Structure of the Industry. (PB–207 198, $4.25; $2.25)
Part III. The Impact of Environmental Control Costs (PB–207 199, $4.25; $2.25)
A study of the Economic Impact on the Steel Industry of the Costs of Meeting Federal Air and Water Pollution Abatement Requirements. Booz-Allen Public Administration Services, Inc.
Volume I. Executive Summary. (PB–211 917, $3.25; $2.25)
Volume II. The Structure of the Steel Industry. (PB–211 918, $5.25; $2.25)
Volume III. Economic Analysis. (PB–211 919, $5.75; $2.25)
Volume I, II, III. (PB–211 920, $12.00)
The Chase Econometrics Macroeconomic and Inter-Industry Forecasting Models. Chase Econometric Associates, Inc. (PB–207 204, $5.25; $2.25)
Who Bears the Cost of Pollution Control?: The Impact on the Distribution of Income of Financing Federally Required Pollution Control. Public Interest Economics Center. 1973. (PB–226 447, $5.75; microfiche, $2.25)

Senator PROXMIRE. Mr. Train, please proceed.

STATEMENT OF HON. RUSSELL E. TRAIN, ADMINISTRATOR, ENVIRONMENTAL PROTECTION AGENCY

Mr. TRAIN. Mr. Chairman, I will ask that my full statement be made a part of the record and I will summarize since the first part of my statement deals with some of the same macroeconomic impacts that have been covered by Mr. Busterud.

Senator PROXMIRE. We will be happy if you will do that.

Your full statement will be printed in the record and also the documentation will be printed in full in the record.

Mr. TRAIN. Thank you, Mr. Chairman.

In general it is our belief that pollution control expenditures as a percentage of GNP, for example, are not of any great magnitude, ranging somewhere less than 1 to 2 percent as we presently see them.

I would expect that possibly pollution control expenditures would be rising somewhat higher than that in due course, but still as a percentage of the total it will not be a very large figure.

Likewise, the impact on the rate of inflation we agree is relatively negligible. With respect to the Wholesale Price Index. I think we see about 0.5 percent out of a total of 17-percent rise in the Wholesale Price Index in the year ending March 1974. With respect to the Consumer Price Index, we foresee an average annual increase of less than 0.1 percent over the next decade, according to the recent Chase Econometrics forecast.

So I think these figures are important in terms of keeping the problem in perspective.

Likewise, my statement does point out that the impact of environmental controls on plant closings and on job losses has been relatively small. We recognize it is often difficult to identify what the true causes of a plant closing may be. Environmental costs may be part of the picture, but they seldom represent the total cause. Most often what we find is that a plant that gets into difficulties, including environmental cost problems, is probably a marginal plant, probably obsolescent and inefficient in the first place.

As a rule the conclusion we would reach is that such closings or partial curtailments of plant operations as there have been—we have identified 69 plants over the past years—possibly attributable to environmental controls or at least allegedly attributable to environmental controls, represent a fairly small portion of total impact.

Approximately 12,000 jobs all told have been involved in those closings that we have identified.

Now, I hasten to say we are not insensitive to any plant closing or any job loss. Every one of them is important, and even though in terms of aggregates these are really insignificant figures in human terms they are not insignificant.

We work with the Department of Labor in particular to try to identify problems of this sort in advance insofar as we know about them, to make possible ameliorative action wherever this can be accomplished.

In terms of inflation impacts again, while we would, of course, agree that there is bound to be some impact on prices of any increase in demand on available resources, we would also want to be quite clear that in our view the public is getting value in terms of improved health and improved environment for the dollars spent as part of these increased prices. This is a value received and is no more inflationary than any other increase for an increased value.

The real issue, it seems to me, is what do we want to spend our resources on in the country. There is nothing any more inherently inflationary about environmental expenditures than an expenditure for defense or transportation or health or whatever.

They all put pressures on the price system and on available resources. So it is really a matter of choice in our society as to how we wish to spend and allocate our resources.

Our own computations would indicate that the value of the damages from environmental problems are generally far in excess of the costs of abatement that we are imposing. I think our most recent estimates would indicate that the damages from air pollution in the form of sulfur oxides and particulates in this country are running something over $11 billion while the cost of abatement is running at less than half that

figure. So that one could generalize by saying in the case of air pollution that there is very obviously a net profit to our society in cleaning up.

I would also hasten to point out that our ability to analyze precisely the benefits in cases such as this is far from perfect, and one can argue over figures such as this, but I think that in round terms they are quite good.

The costs of both the air and water programs in terms of Government expenditures and private sector expenditures are largely based upon analyses done by EPA in its annual reports to the Congress. I would like to leave with the committee a copy of one of our reports on the Cost of Clean Air and a copy of the report on The Economics of Clean Water. These are our annual studies. They are very thorough and provide a basis for much of the estimation and projections which we are giving you.

I think at this point I will pick up, Mr. Chairman, with the last part of my statement.

Recognizing that the macro effects, if you call them that, both in terms of inflation and employment and in terms of prices, costs, are not in our view large in the aggregate, still, in individual cases they can be and are very significant. It is essential that as we develop regulatory programs and statutory programs that we analyze, understand and give full account to these macro effects, if you will.

Thus, I state that we must be concerned with this problem on a case-by-case basis as we set standards. It may not be a problem for an industry which generates enough funds through retained earnings to investment in both capacity expansion and pollution control, or for an industry with low capital needs for expansion. But it could be a problem for industries facing high capital requirements, high capital costs, high pollution control expenditures, and low profits.

Identification of these problem areas requires careful analysis of each individual case.

EPA has responded in several ways to this problem. We perform economic analyses of the impact of all of our significant actions and we have used the results of those analyses in several ways.

Again, let me just, for the interest of the committee, leave three examples of economic studies done by and for the agency in particular areas.

This is the economic analysis for steam electric powerplants.

This is the economic analysis of proposed effluent guidelines for the beet sugar industry and an analysis of effluent guidelines for the meat-packing industry.

There are enough of these to build a fairly substantial wall the strength of this table. I do not suggest you want to read all of these, but I think you may find them of interest and simply getting an impression of the depth of analyses and scope of analyses that EPA does undertake as part of its standard-setting regulatory activities.

We have tried to balance our environmental and economic factors in accordance with our legislation and we have suggested legislative changes where we think we are justified on economic grounds.

Our concern for balancing of environmental and economic concerns has been reflected in EPA actions; a number of effluent guidelines have

been modified on the basis of EPA economic studies and public comments. These studies which I have offered to the committee are part of that picture.

The steel industry effluent guidelines are currently under review in the agency to determine if industry projections of major impacts on the Mahoning Valley region of Ohio are valid. This involves the Youngstown, Ohio, steel plant. If these projections are valid a separate set of guidelines may be issued for that region.

The thermal effluent guidelines for the electric utility industry underwent a very thorough review of the impact for all levels of control on the utility industry and its customers, with the final guidelines reflecting substantially lower costs commensurate with effective environmental protection. This was a process lasting from the time we proposed the guidelines last March until we promulgated the final guidelines this past month, a 6-months-or-so period, and included a very extensive effort by the agency to analyze and identify the full range of economic costs involved, and to insure to the extent possible that the environmental benefits to be secured by the levels of control selected justified the very substantial expenditures involved.

I think that the final guidelines we promulgated represent that kind of effort to accommodate environmental and economic considerations reasonably and effectively.

As another example a Clean Air Act amendment has been sought to ease the emissions standards for imposition in 1978. The major factor was the likelihood that the required technology would not be available in time.

EPA has also utilized extended compliance schedules to allow the continued use of available coal. These efforts will insure that all available domestic coal can continue to be used if progress is being made to put in place necessary environmental controls.

Naturally, we are using our enforcement program to make sure the controls needed to prevent health damages are installed as rapidly as possible in order to minimize the risk of health damages in the interim.

In particular I am referring to flue gas desulfurization, commonly referred to as scrubbers, and other technology which can permit constant control of emissions without posing unreasonable constraints, unnecessary development, while at the same time fully protecting the integrity of Federal air quality standards. Also low lead gasoline regulations contain a delayed imposition for small refiners who need additional time to install delayed imposition for small refiners who need additional time to install octane-boosting equipment.

In addition to the normal analyses of economic impact of our individual regulations on industry, EPA is currently assessing the combined impact of all of its regulations upon six industries, in particular those most seriously affected by pollution control regulations as well as examining the effect of its regulations upon capital markets and the cost of capital for these industries.

We do have one special study underway with respect to the capital market impact of environmental programs. The six industries in which we are conducting special macroeconomic studies are the electric utility industry, pertoleum refining, steel, chemicals, nonferrous metals, and pulp and paper.

Hopefully these studies will help us identify the tradeoffs I mentioned earlier between expenditures, pollution control, and for capital capacity expansion.

All in all, EPA is trying to steer a middle course between our environmental needs on the one hand and the clear requirements for caution in levying expenditure requirements on the other hand.

We must proceed carefully, weighing the alternatives and consequences for each separate position.

Mr. Chairman, I will be glad to answer any questions that the committee might have.

[The prepared statement of Mr. Train follows:]

PREPARED STATEMENT OF HON. RUSSELL E. TRAIN

Mr. Chairman and members of this Committee: I welcome this opportunity to discuss with you the economic impact of Federal environmental regulations.

The Council on Environmental Quality forecasts the Federal environmental program will cost $195 billion over the decade 1973-1982. In a recent survey by the Department of Commerce, U.S. industry reported capital investment for pollution control of $4.9 billion in 1973. There are some who view these expenditures as inherently inflationary and non-productive and say that, in a time when inflation is high and capital hard to come by, these expenditures should be stretched out or cut back.

In order to put this matter in its proper perspective, I would like to briefly touch on the overall impacts of environmental programs on the economy, the impacts on particular plants and industries, and finally the actions we have taken and will be taking to insure that environmental and economic objectives are balanced appropriately. In addition to my remarks this morning I am providing the Committee with a more detailed statement addressing the questions in the Chairman's letter.

Environmental regulations are alleged to contribute to inflation in two ways. First, it is said that the rise in prices to cover all or part of the cost of pollution controls is inflationary. I think this allegation is incorrect. Inflation only occurs when prices rise more than the value of increased output. As long as price increases resulting from pollution control costs are matched or exceeded by the value of the improved product resulting from these controls, the inflationary label is inappropriate. Were the various inflation indices and GNP to adequately measure the beneficial results of pollution control, we would not have to deal with erroneous assertions that the costs of this control were non-productive or inflationary.

It is true that in certain specific instances pollution expenditures may be larger than the benefits to be derived. What we are really talking about in these cases are bad investments in pollution control and not inherently inflationary effects. It is exceedingly difficult to compare costs and benefits of each element of our program because of the difficulty of putting a price tag on life, death, pain, or beauty. At this point we can only assess the quantifiable benefits and costs and make judgments about the rest.

Several studies which have been done comparing quantifiable costs and benefits have supported our standards. For example, the National Academy of Sciences study of the automotive emissions standards for the Senate Committee on Public Works found that benefits would be commensurate with expected costs, if the statutory nitrogen oxide emission standard were eased as I recommended to Congress last year. Furthermore, EPA research has shown that measurable damages of $11.2 billion annually from sulfur oxide and particulates are more than double the annual expenditures needed for control.

Of course, as the NAS automotive emissions cost/benefit study also points out, even if the total benefits of a major program are greater than the total costs, the program still may not be optimal. There may be specific parts of the program for which the benefits exceed the costs. In theory, we would like to make sure that the marginal benefits exceed the marginal costs for each action that we take. While the ability to estimate marginal costs and economic impacts of our standards is well developed, the ability to assess the marginal benefits of individual

standards is not nearly as advanced. Hence, we must use qualitative judgments in making these marginal tradeoffs.

It has been suggested that we could ensure that marginal benefits exceed marginal costs by using economic incentives such as emissions charges as the chief regulatory approach—an approach requiring the incorporation of the cost of environmental damages into market prices. Of course, much more accurate information on benefits is needed before this step could be used as the sole approach for optimizing environmental quality. Since we have made tremendous progress in implementing an effective regulatory program for environmental control, I think it would be a mistake to substitute an economic approach at this time. I do believe that economic incentives can be an effective supplement to our regulatory program. I have supported the sulfur tax proposal and would support other approaches which would result in market prices reflecting the environmental costs of goods; that is, their true cost.

It is also claimed that pollution expenditures cause inflation by creating excess demand for scarce resources. While this statement is technically correct, it is *not* correct to assert that pollution control costs are more inflationary than any other demand on scarce resources, whether it be spending for highways or defense or medical care.

The real question then becomes: which expenditures should be cut when the cure of inflation requires some lessening of total demand. There is no reason to give environmental spending the lowest priority. To put environmental demands last in line among competing demands is like refusing to admit a critically ill man to an overcrowded hospital without first comparing his needs with those of the patients currently treated. And to take the analogy one step further, to blame environmental demands for our inflation is akin to blaming the last patient admitted for the hospital's overcrowded condition.

Analysis of the inflationary impact of environmental expenditures shows just how apt this analogy is. Preliminary results of a study by Chase Econometrics Associates which was sponsored jointly by EPA and CEQ forecast that pollution programs will add about 0.3 percent to the Consumer Price Index over the period 1973–1978, with practically no discernible effect on the average price level over the decade 1973–1982. To me these results indicate that any conceivable alteration of the environmental program would not make a dent in our inflationary problem, because more fundamental causes are involved in inflation. Yet by drastically cutting the program, we would be tacitly accepting continued environmental damages of very large magnitudes. Furthermore, the unusual mixture of inflationary and recessionary tendencies in the economy means that some depressed sectors, such as the construction sector, would be hurt rather than helped by a broad easing of environmental controls.

Another significant criticism of the Federal environmental program is that it hurts employment and production by shutting down many existing plants. The argument that many plants have been shut down at a time when capacity is needed and unemployment high is just not supported by hard evidence. Since January 1971, EPA has learned of only 69 industrial plant closings, involving 12,000 jobs, for which pollution control was cited as a significant factor. Of these, only 14 closings involved Federal enforcement action, five of which involved State action as well. I am concerned about the impacts these closings have on employees, their families, and communities; and we are working to ensure that these people get the full benefit of various assistance programs available to them. While the local impacts may be quite serious, I do not think anyone could claim that this level of impact has significantly affected the nation's productive capacity or its unemployment problem. Furthermore, most of the plants involved have been small, old marginal plants whose demise may have been accelerated slightly by pollution standards, but which would have closed soon anyway due to more fundamental economic problems.

Several positive employment impacts must be considered along with the negative impacts. Based on a 1973 study by the Bureau of Labor Statistics, approximately 20,000 on-site, year-long jobs are generated for each billion dollars of sewage treatment facility construction activity. Of this figure, 13,000 jobs were in the construction trades, which include bricklayers, electricians, operating engineers, iron workers, carpenters, and plumbers, and 7,000 were laborer jobs. Excluded from the study was the off-site manpower required to produce or transport the materials and equipment used in the actual construction of a

project as well as the engineering and technical manpower required to design, plan and evaluate the operational performance of sewage treatment facilities.

We believe that the Bureau's figure is useful for the purpose of gauging the impact that our program can have on unemployment. Based on the total Federal and municipal outlays under this program of approximately $3.2 billion during fiscal year 1974, there are more than 50,000 persons working on-site to build sewage treatment plants at this time. More important, this number can be expected to increase by about *50 percent per year* for the next three fiscal years as outlays for sewage treatment facility construction increase. This means that by June 30, 1977, we can look forward to approximately 125,000 persons engaged in EI'A-financed construction activity. Jobs are also being created in the pollution control abatement equipment industry. According to a 1972 Arthur D. Little study, approximately 75,000 jobs will be created as a result of the Federal legislation of this decade.

Preliminary results of the Chase Econometrics study show that the combined impact of these various employment effects is likely to be an initial stimulus to employment in the next several years due to the increased investment for pollution control. The unemployment rate is projected to be 0.4 percent lower in 1975 due to pollution controls, to be offset by a 0.4 percent increase in unemployment by 1979, with no change in the overall average unemployment rate for the decade 1973–1982.

This review of inflationary and employment effects of pollution control leads me to conclude that those who accuse the environmental program of having serious detrimental effects on the overall economy are mistaken. I think the primary focus of attention in this discussion should be on specific industrial and regional sectors of the economy which may be significantly impacted by environmental programs even if these impacts do not have large effects on overall rates of inflation, growth, or employment.

The strongest argument is that certain capacity-constrained industries such as steel, paper, and chemicals must expand their capacity to meet demand in order to lessen inflationary pressures and that EPA regulations divert capital away from this necessary capacity expansion. We know that this is not likely to be a problem throughout the economy, as only 2 percent of the firms included in the Department of Commerce survey I mentioned earlier state that they have reduced plant and equipment expenditures due to pollution control.

Nonetheless, we must be concerned with this problem on a case-by-case basis as wet set standards. It may not be a problem for an industry which generates enough funds through retained earnings to finance investment in both capacity expansion and pollution control or for an industry which has low capitol needs for expansion. But it could be a problem for industries facing high capital requirements, high capital costs, high pollution control expenditures, and low profits. Identification of these problems areas requires careful analysis of each individual case.

EPA has responded in several ways to this problem. We perform economic analysis of the impact of all of our significant actions, and we have used the results of those analyses in several ways. We have tried to balance environmental and economic objectives to the extent dictated by our legislation, and we have suggested legislative changes where we think they are justified on economic grounds.

Let me cite just a few examples where our concern for balancing of environmental and economic concerns has been reflected in EPA's actions:

A number of effluent guideline limitations on industrial water pollution have been modified on the basis of EPA studies and public comments.

The steel industry effluent guidelines are currently under review to determine if industry projections of major imacts on the Mahoning Valley region of Ohio are valid. If they are, a separate set of guidelines may be issued for that region.

The thermal effluent guidelines for the electric utility industry underwent a very thorough review of the practicability of alternative levels of control for the utility industry and its customers, with the final guidelines reflecting substantially lower costs commensurate with effective environmental protection.

A Clean Air Act amendment has been sought to ease the statutory nitrogen oxide automotive emissions standard now scheduled for imposition in 1978. The major factor in this decision was the likelihood that the required technology would not be available in time.

EPA has sought to persuade States whose sulfur oxides emissions standards are more stringent than required to meet health-related standards to eliminate the "overkill." This would allow the continued use of available fuels by each fuel user until acceptable control is available. This policy has been supplemented by the use of extended compliance schedules to allow the continued use of available coal. Together these efforts will ensure that all available domestic coal can continue to be used if progress is being made put in place necessary environmental control. Naturally, we are using our enforcement program to make sure that controls needed to prevent health damages are installed as rapidly as possible in order to minimize the risk of health damages in the interim.

Nondegradation regulations have been structured to mesh with State economic development planning without posing unreasonable constraints on necessary development while at the same time fully protecting the integrity of Federal air quality standards.

The low-lead gasoline regulations contain a delay in imposition upon small refiners who need more time to finance and arrange the installation of octane-boosting equipment.

In addition to the normal analysis of economic impacts of our individual regulations on industry, EPA is currently assessing the combined impact of all of its regulations upon six industries most seriously affected by pollution control regulations, as well as examining the effects of its regulations upon capital markets and the cost of capital for these industries. Hopefully, these studies will help us identify the tradeoffs I mentioned earlier between expenditures for pollution control and for capacity expansion.

All in all, EPA is trying to steer a middle course between our environmental needs on the one hand and the clear requirement for caution in levying spending requirements on the other hand.

I think we must proceed carefully, weighing the consequences and alternatives for each separate decision. We cannot afford a position that accepts any environmental improvement as mandatory, without regard for the consequences; nor can we afford blanket condemnation of every costly environmental improvement.

I would be pleased to answer any questions you may have at this time.

RESPONSE OF HON. RUSSELL E. TRAIN TO WRITTEN QUESTIONS POSED BY THE JOINT ECONOMIC COMMITTEE IN THE INVITATION TO TESTIFY

Question 1. What are the most recent estimates of pollution abatement expenditures for industries, going back to 1970 and projected through 1977? It would be useful if this table could be broken down into the following categories: air, water and other forms of pollution; the percentage these pollution abatement expenditures are of total capital expenditures; and a separation into initial capital expenditures and operating expenditures.

Answer 1. The best projections of industrial pollution control expenditures are made by the Council on Environmental Quality (CEQ) in its annual report. Table I presents the projections which will be published in the forthcoming 1974 *CEQ Annual Report*, presented here with permission of CEQ. The pollution control expenditures shown in Table I are incremental in that they represent the difference between the level of costs under Federal legislation and the level which would occur with no Federal legislation. Hence, Table I projects that Federal legislation (including some not yet passed) will cost $194.8 billion for the decade 1973–82, of which $23.1 billion is the cost of industrial water pollution control excluding utilities, $3.5 billion is the cost of water pollution control for utilities, $24.5 billion is the cost of industrial air pollution control excluding utilities, $29.0 billion is the cost of air pollution control for utilities, and $74.4 billion is the cost of mobile source pollution control (primarily the incremental cost to consumers of purchasing and operating cars).

The costs in Table I should be differentiated from two other types of forecasts. First, forecasts of total rather than incremental pollution control costs include the costs of meeting State or local regulations or even standard industry practice. For example, most total pollution control cost projections include the cost of municipal garbage collecting. The Table I figures exclude State, local and industry practice costs.

TABLE I.—ESTIMATED INCREMENTAL POLLUTION CONTROL EXPENDITURES [1]

[In billions of 1973 dollars]

Pollutant/medium	1973			1982			Cumulative, 1973-82		
	O. & M.[2]	Capital costs[3]	Total[4] annual costs	O. & M.[2]	Capital costs[3]	Total annual costs[4]	Capital investment	O. & M.[2]	Total[4] annual costs
Air pollution:									
Public	0.1	0.1	0.2	0.5	.2	.7	1.7	3.8	5.4
Private:									
Mobile	1.2	.2	1.4	8.4	4.9	13.3	31.3	49.9	74.4
Industrial	.5	.7	1.2	1.3	1.1	2.4	8.4	11.6	24.5
Utilities[5]	.5	.3	.8	2.7	1.2	4.0	7.9	19.6	29.0
Total	2.3	1.3	3.6	12.9	7.4	20.4	49.3	84.9	133.3
Water pollution:									
Public:									
Federal	.2	NA	NA	.2	NA	NA	1.8	NA	NA
State and local	1.1	.1	1.1	1.4	1.3	2.7	14.8	12.8	24.4
Private:									
Industrial	.5	.5	1.0	1.5	1.2	2.6	9.8	12.3	23.1
Utilities[5]	0	0	.01	.4	.3	.7	4.4	2.2	3.5
Total	1.8	.6	2.1	3.5	2.8	6.0	30.8	27.3	51.0
Radiation: Nuclear powerplants	NA	NA	NA	.05	.05	.07	.3	.08	.3
Solid waste:									
Public	.1	.1	.2	.3	.1	.4	1.0	2.2	2.9
Private	.1	<.05	.1	.5	<.05	.5	<.05	2.3	2.3
Total	.2	.1	.3	.8	.1	.9	1.0	4.5	5.2
Land reclamation: Surface mining[6]	.3	0	.3	1.6	0	.6	0	5.0	5.0
Noise[7]	NA	.1	NA	NA	1.0–1.4	NA	6.0–8.7	NA	NA
Grand total[7]	4.6	2.0	6.3	18.8	10.4	28.0	81.4	121.8	194.8

[1] Incremental costs are expenditures made pursuant to Federal environmental legislation, beyond those that would have been made in the absence of this legislation.
[2] Operating and maintenance costs.
[3] Interest and depreciation.
[4] O. & M. plus capital costs.
[5] Includes expenditures by public sector owned utilities (such as TVA).
[6] Only includes coal mining.
[7] Noise abatement costs not included in grand total.

Secondly, the CEQ estimates are largely derived from studies by independent consultants; while some studies derive their forecasts of past or future pollution control costs from surveys which ask polluting firms what they have paid or will pay for pollution control. These surveys tend to suffer from several flaws—lack of definition of what a pollution control expenditure includes and lack of validation of possibly biased industry claims concerning expenditures. The Department of Commerce recently published a survey of industrial pollution control capital expenditures conducted by its Bureau of Economic Analysis. Table II presents the results of that survey, which estimates $4.9 billion of investment in 1973 and $6.5 planned in 1974. Although this survey lacks validation of reported expenditures, it is much more specific than prior surveys in defining what expenditures could be included. Unfortunately it is impossible to compare the capital expenditures reported in Table II with the figures in Table I because there is no way to tell what percentage of overall pollution control requirements for the decade is accounted for by the capital expenditures reported for 1973 and 1974. Furthermore, Table II reports on capital *investment* for 1973 and 1974, while Table I reports on capital *costs* (interest and depreciation). Finally Table I reports only costs due to Federal legislation, while Table II reports total costs for all pollution control expenditures.

TABLE II.—CAPITAL EXPENDITURES BY U.S. BUSINESS FOR THE ABATEMENT OF AIR AND WATER POLLUTION[1], ESTIMATED 1973 AND PLANNED 1974

[In millions of dollars]

	Expenditures for new plant and equipment							
	1973				1974			
		Pollution abatement				Pollution abatement		
	Total[2]	Total	Air	Water	Total[3]	Total	Air	Water
All industries	100,076	4,938	3,176	1,762	112,114	6,543	4,346	2,196
Manufacturing	38,003	3,153	2,050	1,103	44,404	4,446	2,929	1,517
Durable goods[4]	19,389	1,579	1,207	372	22,611	2,603	1,523	540
Primary metals[4]	3,481	814	712	101	4,337	1,003	841	163
Blast furnace, steel works	1,407	230	163	67	1,712	381	304	78
Nonferrous	1,679	523	492	31	2,156	553	469	83
Electrical machinery	2,895	129	44	85	3,179	175	53	122
Machinery, except electrical	3,478	80	52	28	3,975	118	74	44
Transportation equipment	3,063	170	96	74	3,570	195	112	83
Motor vehicles	2,244	143	81	62	2,682	178	103	75
Aircraft	531	20	11	10	580	13	7	6
Stone, clay and glass	1,503	144	123	22	1,683	282	244	39
Other durables[4]	4,969	243	180	63	5,867	290	200	90
Nondurable goods[4]	18,614	1,574	843	731	21,793	2,383	1,406	977
Food including beverage	3,048	152	68	84	3,276	230	112	118
Textile	787	29	9	20	773	43	17	26
Paper	1,893	355	174	181	2,484	500	326	174
Chemical	4,324	416	203	213	5,249	608	293	316
Petroleum	5,409	555	352	203	6,888	926	610	316
Rubber	1,567	48	26	23	1,580	51	33	18
Other nondurables[4]	1,586	19	12	7	1,543	24	16	9
Nonmanufacturing	62,073	1,785	1,126	659	67,710	2,097	1,418	679
Mining	2,759	91	41	50	3,143	100	53	47
Railroad	1,939	16	5	11	2,272	19	3	16
Air transportation	2,413	15	12	4	2,160	9	4	5
Other transportation	1,605	11	6	5	1,617	17	10	7
Public utilities	19,087	1,451	921	530	22,163	1,696	1,179	518
Electric	16,250	1,409	906	503	18,808	1,651	1,160	491
Gas and other	2,837	42	15	27	3,355	46	19	27
Communication, commercial, and others[5]	34,270	201	142	58	36,355	256	170	87

[1] Date exclude expenditures of agricultural business and outlays charged to current account.
[2] Preliminary.
[3] Estimates are based on expected capital expenditures reported by business in late November and December 1973. The estimates for 1974 have been adjusted when necessary for systematic biases in expectational data.
[4] Includes industries not shown separately.
[5] Includes trade, service, construction, finance, and insurance.

Note: Details may not add to totals because of rounding.

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

More detailed data on costs to particular industries are available from several sources. Table III is taken from the *1974 Cost of Clean Air* report and shows expenditures for air pollution control for the decade 1971–79 for all the industries which are major air polluters. Estimation of industrial water pollution control costs is more difficult now because some of the effluent guideline limitations for specific industries have not been promulgated yet. Table IV shows costs forecast for the 1977 Best Practicable Technology (BPT) regulations in *The Economics of Clean Water—1973*. These projections were based in large part upon assumed standards. On the other hand Table V shows the costs forecast in specific studies

of the first thirty BPT regulations promulgated. These costs are more realistic than those of Table IV because they are based on the actual standards involved. They are incomplete, however, because for many industries the regulations only cover a fraction of the industry.

TABLE III.—INCREMENTAL NATIONAL COSTS FOR AIR POLLUTION ABATEMENT FROM FISCAL YEAR 1971 THROUGH FISCAL YEAR 1979

[In millions of dollars]

	Cumulative investment			Annualized costs (fiscal year 1979)[1]		
	Expected	Minimum	Maximum	Expected	Minimum	Maximum
Subtotal, mobile sources	23,107.0	23,107.0	23,107.0	[2] 7,382.0	[2] 7,382.0	[2] 7,382.0
Fossil fuels:						
Steam electric power	7,460.0	5,990.0	9,310.0	4,630.0	3,450.0	5,530.0
Commercial and industrial	5,534.0	3,433.0	7,186.0	1,479.0	667.0	2,212.0
Subtotal, fossil fuels	12,994.0	9,423.0	16,496.0	6,109.0	4,117.0	7,742.0
Fuel industries group:						
Coal cleaning	15.8	14.5	17.2	3.3	3.1	3.6
Natural gas processing	90.0	79.0	105.0	27.3	23.9	30.9
Petroleum industry	850.0	716.0	993.0	240.8	170.4	302.0
Chemical industries group:						
Carbon black						
Chlor-alkali	16.7	15.2	18.4	6.4	6.0	6.8
Nitric acid	35.4	28.6	42.0	14.2	12.8	15.9
Phosphate fertilizer	19.4	16.8	21.7	9.8	8.9	10.6
Sulfuric acid	407.2	366.4	457.1	105.6	96.2	114.3
Metals industries group:						
Ferroalloy	74.3	70.8	77.9	29.4	28.4	30.7
Foundries (iron)	339.0	241.0	422.0	180.0	149.0	234.0
Foundries (steel)	77.2	70.9	83.6	25.5	24.1	27.0
Iron and steel	2,039.0	1,963.0	2,113.0	687.9	667.9	708.2
Primary aluminum	1,047.0	998.0	1,098.0	424.0	411.0	438.0
Primary beryllium						
Primary copper	491.0	449.0	539.0	147.0	138.0	156.0
Primary lead	27.3	16.8	38.6	6.8	4.1	9.5
Primary mercury	.9	.8	.9	.2	.2	.3
Primary zinc	32.4	27.3	39.6	8.2	6.9	10.0
Secondary aluminum	18.5	15.6	23.4	5.7	4.9	6.8
Secondary brass and bronze	9.5	7.2	12.8	3.8	2.9	5.0
Secondary lead	10.8	6.4	15.1	2.5	1.2	3.8
Secondary zinc	2.1	1.2	2.9	.7	.4	.9
Burning and incineration group:						
Dry cleaning	144.0	120.2	170.3	12.1	6.7	17.9
Sewage sludge incineration	62.7	54.5	70.7	15.5	13.7	17.4
Solid waste disposal	1,638.0	1,520.0	1,880.0	694.0	619.0	766.0
Teepee incinerators						
Uncontrolled burning:						
Agricultural						
Coal refuse						
Forest fires						
Structural fires						
Quarrying and construction group:						
Asbestos industry	11.3	10.4	12.9	3.9	3.3	4.3
Asphalt concrete industry	604.0	401.0	828.0	119.0	89.0	155.0
Cement industry	444.0	364.0	526.0	129.0	113.0	144.0
Crushed stone, gravel, sand						
Lime manufacturing	60.8	52.1	68.9	13.3	12.0	14.9
Food and forest products group:						
Feed mills	1,377.0	1,228.0	1,537.0	255.0	231.0	281.0
Grain handling	985.0	827.0	1,111.0	149.0	125.0	170.0
Kraft paper	234.0	201.0	272.0	78.0	70.0	92.1
Semichemical paper	26.7	22.7	31.2	12.3	10.5	14.5
Subtotal, industrial sources	11,191.0	9,895.4	12,629.2	3,410.2	3,053.3	3,791.4
Total	47,292.0	42,425.4	52,232.2	16,901.2	14,552.3	18,915.

[1] Estimated on the basis that all the required capital investment has been made as in fiscal year 1979.

[2] The annualized cost for mobile sources for the year fiscal year 1979 is that estimated actually to occur in fiscal year 1979. This annualized cost includes estimated operating and maintenance expense for light and heavy-duty vehicles, plus an estimated $1,085,000,000,000 for the cost of implementing in transportation control plan.

Source: "The Cost of Clean Air," 1974, p. I-3.

There is no independent estimate on an industry-by-industry basis of the percentage of total capital expenditures accounted for by Federal pollution control requirements, although the Bureau of Economic Analysis survey does provide unvalidated industry estimates of the percentage of total plant and equipment accounted for by total (not incremental) pollution control investment.

Although the Committee requested data from 1970 to 1977 on pollution control csts, the data is not available for those years. The cost estimates supporting Tables I to V identify the total cost for compliance with regulations. To answer the question for the years 1970 to 1977 would require some crude assumptions as to how fast expenditures and compliance would take place, as well as requiring nonexistent data on how much has been spent by industry since 1970. It was deemed preferable to avoid distorting the available cost data in an attempt to fit the 1970–77 time frame. Table I does, at least, serve to bring all the costs together in the same time span (1973–82).

Question 2. Using the above figures the key question we would like answered is to what extent these increased costs have been passed through in the form of product price increases. Please be as specific as possible as to how this estimate was derived and its component parts.

TABLE IV.—COST FOR EXISTING AND PROJECTED PLANTS TO MEET 1977 EFFLUENT STANDARDS (SCENARIO NO. 3) [1]

[In millions of 1972 dollars]

SIC code No. and industry	Total capital needed by 1977	Total O. & M. costs	Total annual costs	Capital in place 1972	Total capital to be added by 1977	Average capital expenditures needed per year	Capital expenditures 1972 [2]	1972 expenditures as percent of average annual needs
02—Animal feedlots	1,274	113	247	459	815	204	([3])	([3])
20—Food and kindred products	1,718	503	721	325	1,393	348	68	20
22—Textile mill products	860	181	290	74	768	196	10	5
24—Lumber and wood products	1,123	399	541	([3])	([3])	([3])	([3])	([3])
26—Paper and allied products	2,006	237	492	597	1,409	352	149	42
28—Chemicals and allied products	2,761	234	585	1,194	1,567	392	214	55
29—Petroleum refining and related industries	1,991	209	290	892	1,099	275	189	69
30—Rubber and miscellaneous plastic products	441	167	223	86	355	89	31	35
31—Leather and leather products	259	53	85	([3])	([3])	([3])	([3])	([3])
32—Stone, clay, glass, and concrete products	1,269	26	187	146	1,123	281	43	15
33—Primary metals	2,133	90	361	763	1,370	342	119	35
34—Fabricated metal products	994	56	182	392	602	105	42	40
35—Nonelectrical machinery	774	50	140	171	603	151	53	35
36—Electrical and electronic machinery	631	28	108	159	472	118	36	31
37—Transportation equipment	491	17	79	211	280	70	62	89
Total	18,725	2,363	4,540	5,469	11,874	2,923	1,016	33

[1] Including capital needed for treatment facilities at new plants as well as at existing plants.

[2] Based on Annual McGraw-Hill Survey of Pollution Control Expenditures, 5th and 6th editions.

[3] Not available.

Source: "The Economics of Clean Water—1973," p. 42.

Answer 2. Information on price increases in response to these costs comes primarily from macroeconomic modelling work done for EPA and CEQ by Chase Econometric Associates. The model is run first without and then with pollution control costs, and the differences are noted. The model forecasts an average annual increase in the Consumer Price Index of about 0.25% from 1973–78 and an average annual increase of 0.5% for the Wholesale Price Index. The extent to which pollution control costs are passed on in the form of higher prices for specific goods is determined in the Chase Econometrics model to range from about 85% up to 100%. This coincides with the conclusion drawn in a number of micro-economic studies that an average of about 90% of the increased costs are passed on in higher prices, though there is a great deal of variation among industries.

CEQ has also performed analysis of the inflationary impact of pollution controls over the year ending April 1974. This analysis measures the inflationary impact experienced over a year on the Wholesale Price Index (WPI). Of the 17% increase in the WPI over the year ending March 1974, pollution control expenditures accounted for less than 0.5%.

Question 3. As for the near future, how much will pollution abatement expenditures be in the next three-to five years and in what year will each major industry have met the standards which are currently in effect? What price increases may be expected in this time frame due to the environmental regulations?

Answer 3. As was discussed at length in the answer to Question (1), the available data identifies costs for total compliance with Federal regulations. The rate at which these costs will be incurred over the time span involved is sheer speculation, since it is not know precisely when industry will comply or even what equipment is now in place in certain industries. If compliance is on schedule, then stationary source emission limits under the Clean Air Act will in large measure be attained in mid-1975, BPT limits under the Federal Water Pollution Control Act will be attained in 1977, BAT limits will be attained in 1983, etc. Divergence of expenditures from the schedule needed to attain compliance could result either from Clean Air Act variances or extended compliance schedules on the one hand or lengthly lawsuits on the other. Hence, the timing of pollution abatement expenditures is unknown.

Price increases at the macroeconomic level were discussed in response to Question (2). Table V contains price increases in specific industries covered by the first 30 effluent guideline limitations promulgated.

Question 4. Has compliance with the environmental regulations caused the industries to reduce expenditures for new plant and equipment in 1973–74 from what they otherwise would have been? If so, to what degree and what specifically was the cut back? What do you expect in the future in this area?

Answer 4. The only pertinent data available is the response to a question in the Bureau of Economic Analysis survey as to whether pollution regulations have caused the firm to reduce expenditures for equipment in 1973–74. Only 2% of the survey participants responded that reduced investment in plant and equipment had resulted in 1973 or would in 1974. There is no reliable data on the amount of expenditures cut back.

In the future, the level of investment cutbacks could increase as pollution control investment requirements increase. It is important to note though that pollution control capital does not replace other capital investment dollar for dollar. In most cases, when pollution control investment projects are added to a firm's capital needs, the cost of capital rises slightly, perhaps causing some marginal investment projects to be dropped. Since the higher cost of capital allows more capital to be raised, the value of capital projects dropped is generally much smaller than the value of pollution control projects added.

Question 5. Be as specific as possible in delineating the adverse economic impacts these standards may have had in the major industries in terms of construction delays, plant closings, increased layoffs, etc. Please substantiate that these effects were due specifically to environmental regulations.

TABLE V.—SUMMARY OF ECONOMIC IMPACT OF BPCTCA (PHASE 1)

Industry	Number of plants	Direct dischargers	Total investment required for BPTCA (millions)	Increase in annual cost required for BPTCA (millions)	Expected price increases (percent)	Number threatened plants	Possible unemployment	Percent of total industry employment
Asbestos	68	----------	$3.3	$0.8	0.1–1.0	1–3	275	2
Beet sugar	52	47	4.3–7.7	.4–.8	0–1.4	1–2	50–100	2–4
Builders paper	56	28	7.0	2.5	3.0–7.0	3–4	250–350	2–3
Canesugar	29	----------	5.6	1.8	0–.1	3–5	300–1,950	2–16
Cement	166	----------	18.0	5.9	0.5–1.5	0	0	0
Dairies	4,870	1,375	275.0	28.4	0–1.1	102	850	0.3
Electroplating	2,374	546	119.0	35.0	16.5	.93	580	1.7
Feedlots	3,500	----------	40.0	2.0–3.0	<0.3	Minor	Minor	Minor
Ferroalloys	22	----------	9.5	4.0	1.2	0	0	0
Fertilizers	180	----------	100.0	67.0	0–3.5	23–61	250–1,620	1–12
Fiberglass	31	20	10.0	3.7	0	0	0	0
Flat glass	53	----------	1.0	.25	0–.4	0	0	0
Fruits and vegetables	373	----------	26.0	3.6	0.5–1.0	6	232	<1.0
Grain milling	40	7	13.0	1.2	0–1.9	0	0	0
Inorganic chemicals	529	----------	274.0	91.0	0–19.0	10–19	Minor	Minor
Iron and steel	63	----------	145.0	40.0	0.2	0–8	0–29,000	0–5.7
Leather	210	104	46.0	10.3	0.6–1.3	21	950	4.0
Meat processing	1,420	570	179.0	39.0	0.1	1	25	0.04
Nonferrous (Al)	126	----------	107.0	35.0	0.8–1.0	4	160	<1.0
Organic chemicals	665	276	1,030–2,880	210.0–590.0	1.7–3.7	Minor	Minor	Minor
Petroleum	251	----------	1,112.0	289.0	<1.0	2–11	500	0.3
Phosphates	80	----------	9.3	4.9	0.6–1.6	0	0	0
Plastic and synthetics	278	----------	300.0	66.0	0.1–2.4	6–53	1,100–3,200	1.0
Pulp and paper	188	84	210.0	58.0	3.0–6.0	7–10	810–1,250	1.1–1.6
Rubber	119	----------	55.0	21.0	0.4–2.1	0	0	0
Seafoods	327	270	20.1	4.8	0–1.4	11	400	0.3
Steam Electric [1] (after 316(a))	1,000	----------	1020.0	470.0	0.2	0	0	0
Soaps and detergent	1,000	20	14.0	5.0	0–0.6	0	0	0
Textiles	7,080	5,680	80.0–100.0	28.0–30.0	0–2.0	4	365	1.0
Timber	993	----------	38.0	13.0	0–8.0	0–75	0–2,150	0–2.6
Total	26,143	9,027	5,271–7,145	1,440–1,925	----------	300–493	7,437–43,957	----------

[1] Note that most of the $4,106,000,000 costs projected for steam-electric plants will result from BAT regulations and are not shown in this chart.

Answer 5. EPA keeps track of plant closings and layoffs allegedly caused by environmental regulations through its Economic Dislocation Early Warning System. EPA immediately notifies the Department of Labor, the Small Business Administration, and the Economic Development Administration as soon as it learns of a potential or actual plant closing. Since this system began in January 1971, 69 plants have closed, involving the loss of 12,000 jobs. The characteristics of these 69 plants and of the 81 plants now threatening to close are shown by Table VI, VII, and VIII.

Of the 69 plants that have closed, only 9 involve solely Federal enforcement action, while 5 more involve both Federal and State action. The most heavily impacted industries are primary metals, paper and allied products, and food products, and chemicals.

It is impossible to substantiate that these plant closings and layoffs are due solely to environmental regulations. The plants that close are typically small, old, and marginal plants. A variety of reasons cause these plants to be economically marginal to begin with, making the environmental regulations simply one of a number of contributing factors. In a number of cases, it is hard to tell whether a plant would be viable if environmental requirements had not been a factor.

Construction delays are discussed in the answer to Question 4.

Question 6. Have there been any positive effects (benefits) for the industries resulting from their complying with the standards? For instance, have any processes become more efficient, has productivity increased or have materials been conserved because of process changes, etc.?

Answer 6. There are several ways in which positive effects result from pollution control requirements. Pollution control requirements can lead to net financial benefits in some cases through raw materials recovery, water reuse, and energy recovery. Examples of these productive measures include (1) save-alls leading to fiber recovery in pulp and paper mills, (2) recycling in water deficient areas for tire manufacturers and smelters, and (3) heat recovery for water recycle, bark and waste liquor incineration for pulp and paper mills. At this point there are few businessmen like Dow Chemical Company Chairman Carl Gerstacker who says, "We have been making a profit from pollution control investments." But even where profitable production is not possible, financial returns from recycling and reduced water use can in some instances substantially reduce the costs of pollution control.

Another positive effect of pollution control is that it can lead to development of technology which is improved in non-environmental respects. For example, the auto emissions standards have spurred much technological development which may pay off in better fuel economy or better performance. Still another positive effect is the saving of energy along with reduced environmental damages. Many energy conserving actions also tend to reduce environmental damages. Examples are transportation control plans and combustion of solid waste in municipal incinerators.

Question 7. In the energy area, to what extent have environmental regulations caused conditions of demand greater than supply for clean fuels (through delaying increases in supply) and therefore put upward pressure on fuel prices? What is EPA's official stance concerning the popularized "energy-environmental tradeoff"? Will Project Independence be hindered severely because of environmetal stadards?

Answer 7. A distinction must be made between environmental regulations that are promulgated by EPA as a result of provisions in the Clean Air Act on FWPCA and court suits brought by other organizations to stop or delay specific projects. In general, there have been no significant delays that can be attributed directly to EPA regulations. The most notable instances of delays have occurred through court suits or through local opposition. For instance, Calvert Cliffs vs. AEC, which imposed additional requirements on Environmental Impact Statements, was a suit brought by a private organization. Similarly, OCS leasing the Trans-Alaskan Pipeline, and several refineries, have been blocked or delayed through court action. It should be noted that the grounds for decision in a number of cases were based upon legal technicalities or procedural questions, rather than the failure of a specific project to meet environmental standards.

Although EPA has taken no action to stop the burning of existing coal, there probably has been some delay in low sulfur coal development as a result of sulfur regulations, primarily due to uncertainty about whether several outspoken utilities would be successful in their effort to get changes in EPA's sulfur oxide enforcement policy. This has been but one of several important influences on coal development, others include price controls and uncertainty about future strip mining regulations.

EPA's stance with respect to energy-environmental tradeoff's is that enough energy supply and conservation options exist to enable the Nation to reconcile energy needs with environmental protection. Our preferences are:

TABLE VI.—PLANTS AFFECTED—ACTUAL AND THREATENED CLOSINGS WHERE POLLUTION CONTROL COSTS WERE ALLEGED TO BE A FACTOR, JANUARY 1971 THROUGH JUNE 1974

Industry	Paper and allied products	Primary metals	Chemicals and allied products	Food products	Stone, clay, glass, and concrete products	Mining and quarrying nonmetal minerals	Textile mill products	Other industries	Total
Region I:									
Actual	2						3	1	6
Threatened	5					1	1	4	11
Region II:									
Actual	3	1	3	1		1	1	8	18
Threatened	1	2						2	5
Region III:									
Actual			2	2				3	7
Threatened		1	2	1	1			4	9
Region IV:									
Actual		1	1						2
Threatened	4		4		1		1		10
Region V:									
Actual	2	5		3	3			1	14
Threatened	10	11	5					2	28
Region VI:									
Actual		3						1	4
Threatened	1	2							3
Region VII:									
Actual									
Threatened									
Region VIII:									
Actual			1			2			3
Threatened									
Region IX:									
Actual		2		2	2	1		2	9
Threatened	1	5	3	2		1		1	13
Region X:									
Actual	3			1				2	6
Threatened	1	1							2
Total:									
Actual	10	12	7	9	5	4	4	18	69
Threatened	23	22	14	3	2	2	2	13	81
Grand total	33	34	21	12	7	6	6	31	150
Percent	22	23	14	8	5	4	4	21	100

TABLE VII.—JOBS AFFECTED—ACTUAL AND THREATENED CLOSINGS WHERE POLLUTION CONTROL COSTS WERE TO BE A FACTOR, JANUARY 1971 THROUGH JUNE 1974

Industry	Paper and allied products	Primary metals	Chemicals and allied products	Food products	Stone, clay, glass, and concrete products	Mining and quarrying nonmetal minerals	Textile mill products	Other industries	Total
Region I:									
Actual	1,013					200		95	1,168
Threatened	624						250	175	1,249
Region II:									
Actual	1,536	44	1,450	102		25	133	1,308	4,598
Threatened	141		155					513	809
Region III:									
Actual			610	105				390	1,105
Threatened		50	2,040	81	87			1,692	3,958
Region IV:									
Actual		148	78						226
Threatened	942		1,566						2,508
Region V:									
Actual	500	1,379		65	235				2,279
Threatened	2,271	24,562	1,110					3,200	31,143
Region VI:									
Actual		540						45	585
Threatened	850	1,241							2,091
Region VII:									
Actual									
Threatened									
Region VIII:									
Actual						208			208
Threatened									
Region IX:									
Actual		400			148	35		529	1,112
Threatened	50	415	336			350		50	1,201
Region X:									
Actual	333			38				250	1,121
Threatened	346	800							1,146
Total:									
Actual	3,882	2,511	2,138	410	383	268	133	2,617	12,342
Threatened	5,224	27,068	5,207	89	87	550	250	5,630	44,105
Grand total	9,106	29,579	7,345	499	470	818	383	8,247	56,447
Percent	16	52	13	1	1	1	1	15	100

TABLE VIII.—PLANTS AFFECTED: ACTUAL AND THREATENED CLOSINGS WHERE POLLUTION CONTROL COSTS WERE ALLEGED TO BE A FACTOR BY CONTROL PROBLEM AND ENFORCEMENT ACTION, JANUARY 1971 THROUGH JUNE 1974

	Control problem			Enforcement action					
	Air	Water	Air and water	State	Federal	Federal and State	Local	Other	Total
Region I:									
Actual		5	1	2	4				6
Threatened	6	4	1	6	4			1	11
Region II:									
Actual	10	5	3	17	1				18
Threatened	4	1		5					5
Region III:									
Actual	2	5		6	1				7
Threatened	4	5		7	2				9
Region IV:									
Actual	2			1			1		2
Threatened	2	8		3	1	4	2		10
Region V:									
Actual	9	4	1	10		2	2		14
Threatened	4	18	6	8	7	5		8	28
Region VI:									
Actual	4			4					4
Threatened	2	1		2	1				3
Region VII:									
Actual									
Threatened									
Region VIII:									
Actual		2	1			1		2	3
Threatened									
Region IX:									
Actual	6	3		3	3	1	2		9
Threatened	10	3		8	3	2			13
Region X:									
Actual	1	4	1	2		1	1	2	6
Threatened	1	1				1	1		2
Total:									
Actual	34	28	7	45	9	5	6	4	69
Threatened	33	41	7	49	18	12	3	9	81
Grand total	67	69	14	84	27	17	9	13	150
Percent	45	46	9	56	18	11	6	9	100

Conservation should be given the highest priority.

Environmentally preferable sources of energy should be developed first.

Energy sources with high environmental risks should be avoided whenever possible.

Environmental protection measures on all energy development projects should incorporate the best technology available.

With respect to the Project Independence question, there are three areas where environmental regulations could possibly hinder rapid expansion of energy supplies between now and 1980. The shortage of clean fuels and scrubbers to meet sulfur oxide restrictions could cause a problem. However, EPA's Clean Fuels Policy of seeking State revision of sulfur oxide limits more stringent than needed to meet primary standards should permit us to solve this problem by 1980. A second possibility is the potential restriction on coal mining activity caused by an overly strict strip mining bill. However, the Bill now under consideration is not overly limiting and would allow sufficient mining of coal with adequate protection to the environment. Finally, the development of OCS leases should be preceded by adequate environmental monitoring to determine the environmental protection steps to be taken. This will not slow down development of these leases if the research program is initiated promptly.

On the other hand, Project Independence indicates that equipment shortages, specifically shortages of draglines and oil drilling rigs, limit expansion in the near term much more significantly than to environmental considerations.

Question 8. As for the EPA standards, which (if any) have been relaxed in the past year and which are currently under consideration for relaxing in the near future? What are the specific reasons for the relaxation, particularly those

related to their economic effect, actual or potential? Do you foresee many of the current standards being tightened at all, and if so, what effect will this have on industry pollution abatement expenditures? (This is a prime industry fear, that currently installed equipment will become quickly obsolete.)

Answer 8. The oral testimony includes discussion of a list of instances where EPA standards have been eased, changes are under consideration, or legislative changes have been requested. These include:

Effluent guidelines (a number of changes after proposal)

Mahoning Valley steel mills (effluent guidelines currently being reviewed)

Thermal guidelines for power plants (eased after proposal)

NO_x auto standard change (recommended legislation due in part to unavailable technology)

"Clean fuels policy" (seeking relaxed State regulations to match low sulfur fuel demand and supply)

Low-lead regulation (eased for small refiners after proposal).

In addition to these actions, a number of individual sources may also face eased regulations. The Clean Air Act allows EPA to grant a stationary source a 1-year extension at the request of the Governor. Furthermore, EPA may revise Phase I effluent guidelines in special instances where the combined effect of Phase I and Phase II guidelines on the same industry is too expensive to be practicable.

There are only a few areas where a tightening of standards is possible. These include:

A sulfate ambient air quality standard might be issued. If so, it probably would not require any improvement in control technology beyond the levels now attained with sulfur oxide controls.

1983 standards for BAT under the FWPCA are tighter than BPT, but industry knows what these are and can plan accordingly.

As new toxic pollutant emission standards are issued under Section 307(a) of the FWPCA, industrial water polluters will have to control for them.

All in all, the "moving target" problem should be quite minimal with only a few well-known changes coming along.

Question 9. Have each of the standards, as they have come "on-line," been subjected to rigorous cost-benefit analysis in order to establish not only their environmental value but also their economic validity? Is this an on-going effort and what are EPA's future plans in this area?

Answer 9. Unfortunately, cost-benefit analysis has limited applicability due to the state-of-the-art of benefits assessment. Comparing costs and benefits is very difficult because it is hard to quantify the benefits in terms comparable with costs. It is difficult to put a dollar figure on an increased life span, less pain from illness, or conservation of the beauty of our land, air, and water. All we can do at this point is to measure the quantifiable benefits such as decreased medical costs, decreased absenteeism, and increased property values. Then we can compare these measurable benefits with the costs of control and use judgment about the economically unquantifiable benefits to determine where the balance lies.

The National Academy of Sciences' cost-benefit study of the auto standards and EPA's cost-benefit study of the sulfur oxide and particulate standards seem to indicate that the total costs incurred are commensurate with the total benefits derived. But the current state of benefits assessment does not allow us to perform cost benefit analysis of marginal or incremental decisions such as we face when we set an emissions standard or grant a permit. Benefits assessment is still very much in the realm of research. It is important that we develop this research rapidly so that we can ultimately make environmental decisions on a solid theoretical basis, but at the current time cost-benefit analysis is not a very useful tool in environmental policy analysis.

Instead of cost-benefit analysis we must rely primarily on assessment of the cost and economic impacts of alternative levels of control. With this type of analysis we can at least identify what the effects of the control costs will be for several alternative standards and consider which standard is warranted based on our judgment of the value of the environmental improvement.

In the immediate future EPA will continue its current policy of assessing the economic impacts of each significant standard and regulation. At the same time we must continue to invest research funds in the development of techniques to apply cost-benefit analysis in a practical way to the types of incremental environmental/economic decisions which are the heart of environmental policy-making.

Question 10. Many supporters of environmental control measures have indicated the existence of a new market being established, the pollution control industry. How large is this industry in terms of sales, capital expenditures, return on equity, employment, etc.?

Answer 10. The pollution equipment industry is well established and growing. A 1972 analysis by Arthur D. Little, Inc. revealed that there were approximately 300 firms in the air equipment industry and an estimated 400 firms involved in the water treatment and water pollution control industries. Total sales (hardware plus auxiliary costs) were estimated at $466 million for air in 1971 and $475 million for water ($275 million wastewater, $200 million water treatment). Comparable figures for 1973, roughly estimated for all pollution control industries (including air, water, thermal, solid wastes, and related industry) would probably be in the order of $2 billion. According to Ken Leung of F. Eberstadt and Co., Inc. approximately 50 percent of this was concentrated in ten firms. The return on equity for the ten firms ranged from 8.0 percent to 14.5 percent with the average somewhat above 10 percent. Employment and capital expenditure figures, even if they were readily available for the firms in the industry, are not particularly indicative of the size of the industry because much of the actual work of even the larger firms is jobbed out to small steel fabricators.

Senator PROXMIRE. Thank all of you gentlemen very much for an excellent presentation, and certainly a very strong case in favor of proceeding vigorously with our environmental program, and a general, very competent analysis of the limited inflationary effect, if any, of the perhaps countercyclical economic effect it may have.

Nevertheless, I do want to come right away to the question that I think is of great concern to many people.

As you know, Mr. Train, the automobile industry has suffered very serious deterioration in the last few weeks, so severe that a number of the top economic advisers of the President have revised their figures sharply, indicating they expect much heavier unemployment in the future, a real slowdown in the economy, a serious recession.

The heart of it, as I say, is the automobile industry, the automobile industry itself and the suppliers and other related industries that depend on it is estimated to account for about 20 percent of our gross national product and is therefore of very great importance.

The automobile people are not at all bashful in arguing that one of the reasons for increase in prices has been the requirement for reducing their polluting emissions, a very sharp element in their increase in prices. Many people argue that the reason for the big drop-off in automobile sales has been because the prices are up and you have buyer resistance. This does seem logical.

In looking at your statement, I did not see any analysis of this particular effect. I thought you made some references to the situation with respect to some industries, but you did not seem to relate it to the automobile industry.

I wonder if you could give us some reaction now to the possible effects on the recession on automobiles being the result of this.

Mr. TRAIN. I would be delighted to.

Let me point out, the committee submitted to each of us extensive questions——

Senator PROXMIRE. That is correct. You answered those in order.

As I said, I am starting off on something a little out of line with that because this automobile situation has developed quite recently.

Mr. TRAIN. In our written statement of answers, there is some data with regard to the automobile industry.

Now, beyond that let me make these additional comments for the information of the committee.

There is no question at all that any increase in price or cost to the automobile industry reflected in the price of a car is going to have some depressing effect upon the sale of the car. We just have to assume that as an economic fact under any economic circumstance.

One would assume that there is that kind of elasticity in the automobile market.

With respect to the existing 1975 model automobiles, as compared to uncontrolled 1968 cars, the increased costs due to emission controls is at our estimate about $250 of the price on the average. This is the sticker price. Our exact figure is $248, but I think $250 is probably as accurate.

This is the additional cost of today's 1975 car——

Senator PROXMIRE. Let me say that sounds as if that would be a substantial element.

Senator Mansfield in our caucus yesterday said the price of automobiles is up about $350, something like that. If $250 of this increase is because of the antipollution requirements, it would appear that one important element could be, very important element could be these environmental requirements.

Mr. TRAIN. I think we better be careful——

Senator PROXMIRE. I realize that when you say $248 you are talking about——

Mr. TRAIN. I am talking about the total increase since 1968, and automobiles have gone up in a price about $1,200 on the average since 1968.

Senator PROXMIRE. You would have to make the assumption that you could eliminate all the automobile requirements back to 1968 and still not get a reduction.

Mr. TRAIN. You would have to totally decontrol the emission standards in order to achieve a reduction of $250 in cost.

Senator PROXMIRE. Is there any kind of relief that would be consistent with progress in reducing air pollution and also ease the economic burden on automobile producers that would amount to enough to have an effect on automobile sales?

Mr. TRAIN. Let me, before I answer that question, give you automobile pollution costs so we can have as complete a record as I can provide here.

I gave you a figure of the cumulative increase in cost due to emission controls from 1968 to the 1975-year model. The average cost increased over the previous year's model by about $165. That was because of the introduction of the catalytic converter and other improvements on most American cars in order to achieve the somewhat higher 1975 standards. So that, of the $248, $165 represents the improvement from 1974 to 1975. I just mention that for the record.

In terms of investment by the automobile companies themselves, these are figures that have been submitted by the automobile companies. They cover research and development and investment in production lines that are involved in emission control changes We have not been able to validate these figures, but I have no reason to question them.

The figure for 1972 for the industry as a whole was $423 million; for 1973, $738 million; estimated 1974, $967 million; estimated 1975,

$765 million, and that would indicate to me that research and development on emission controls represents around 20 percent of the total research and development effort of the industry.

As I say, we have not validated these figures. They are hard to come by. But these are the industry estimates that have been given us.

The objective of your question is, I assume to find out what adjustments could be made in order to lower the sticker price. If we simply went back to the 1974 control situation and the manufacturer took off the catalytic converter and other adjustments which may have been added, you would be suffering a very substantial fuel penalty because we estimate that on a sales weighted average the 1975 cars at the higher level of emission controls are obtaining on the average 13½ percent improved fuel economy over the 1974 cars.

That of course, is not a front-end saving insofar as the companies are concerned. The company would save a front-end cost of the sticker price of let's assume $168, if my figure is right, in the cost of the catalyst and other improvements in going back to the 1974 standard. The consumer would pay the penalty of a 13½-percent increase in fuel costs. How this balances out exactly, I am not sure, but I think you would find that the increase in fuel economy as far as the society as a whole is concerned would far outweigh the cost of the additional catalyst.

An additional factor to the driver or owner of the car is the fact that with the 1975 catalyst the car must use no-lead gas, and this means to the consumer again, on the average a saving of about $47 a year in automobile maintenance costs using General Motors figures.

So there are these kinds of trade-offs to take into account.

One area of adjustment, which we ourselves have suggested in terms of the statutory requirements for emission controls, is in the area of nitrogen oxide standards. The present standard is 3.1 grams per mile. This is scheduled to go to a 0.4 grams per mile standard by 1978, and we have suggested that Congress consider adjusting that particular standard to a 2.0 grams per mile for a fairly substantial length of time. This level—not standard—is probably the most difficult and the most costly element in achieving the statutory standards.

So looking down the road, if you were looking for ways to lighten the costs insofar as emission controls are concerned, this would be one thing you could do.

Senator PROXMIRE. My time is up.

Let me just ask, though, has there been any initiative on your part or in the automobile industry in view of the present crisis to get together with the automobile industry and see what could be worked out that would be consistent with a sensible environmental policy in reducing air pollution while at the same time easing the cost for the time being at least in this industry? Because, as I say, it is having a very, very serious impact all over the country and it is perhaps our most immediate economic recession problem.

Mr. TRAIN. There is no question that there is a very serious problem, and my own judgment would be that the overall economic situation in the aggregate is the major factor impeding new car sales. I do not think you can identify certain emission controls as being the reason why the sales of cars are down.

Senator PROXMIRE. With all respect, I think it is obvious, and you put your finger on it, that the answer is the cars cost more. They are pricing themselves right out of the market, and people are buying used cars but the price of new cars has gone up so sharply they simply cannot buy them. They do not have the same pattern of consumer caution elsewhere. We do have an economy which is stagnant and has not progressed much, but not as sharp as here where you have the prices going up and of course it does not seem to be all reasonable.

The old-time religion was, if you slow down economy, demand drops so prices do not go up or do not go up as fast. One of the alibis they give, which may or may not be valid, is that they have been forced by the Government to charge more because they have to improve their antipollution equipment.

Mr. TRAIN. The administration has been addressing this issue I think very vigorously. The President, as you know, in his economic message to the Congress called upon the automobile industry to come up with a voluntary program for achieving a 40 percent reduction or improvement in fuel economy by 1980. This primarily was being addressed to the Nation's pressing need to conserve energy.

The Energy Resources Council, chaired by Rogers Morton—and perhaps Mr. Zarb as the Executive Director of that Council, would be the one to address this more than myself, though I am a member of the Council—undertook an immediate implementation of this goal with the automobile industry and directed Secretary Brinegar and myself to meet with the manufacturers and the importers to address the goal which the President had announced and to ask for their response. We met with them 2 to 3 weeks ago. I cannot give you the exact date now. We had representatives and heads of all the American manufacturers, and representatives of substantially all of the foreign imported car manufacturers.

We presented them with the President's goal. We likewise presented them with the joint EPA–DOT fuel economy study and report, directed by the Congress in the Energy Supply and Energy Conservation Act of 1974. That report perhaps should be submitted to this committee. I do not think we have it with us.

We have held other meetings with company representatives. Two days ago, as I recall, we met with each company individually to get their response to this problem. This has been a fairly short period of time within which to get any very careful layout of data.

I personally feel that we probably have quite a good deal further to go. The companies have indicated, generally speaking that they can meet a 40 percent fuel economy goal, but only if there is at least a 5-year stretchout in the current emission standards; in other words, keeping the 1975 standards in effect for a 5-year period.

I believe this might include going down to a 2-gram-per-mile level. I am not too certain just how that came out.

Likewise they have spoken very forcefully of the economic situation faced by the industry. I discussed this with Secretary Brinegar earlier this morning. I know he is planning to get into this particular problem in much more depth with each of these companies. He plans to get a much clearer fix on the details of the financial situation, their outlays for research and development in various areas of interest to

us, and a much better picture than we now have of the impact of safety and emission control devices, and all of the other factors that do go into the automobile price picture.

We are engaged in doing this at the present time. I cannot give you any sort of bottom line answers to your question, but I do assure you that through the Energy Resources Council and the particular agencies with responsibilities in this area we are addressing these issues very vigorously. We certainly recognize the almost overriding input of the health of the automobile industry on our economy.

Senator PROXMIRE. Congressman Moorhead.

Representative MOORHEAD. Thank you, Mr. Chairman, and thank you, gentlemen.

One thing that worries me was stated very well by Mr. Zarb in his prepared statement, that when we first enacted the legislation to protect the environment, energy prices were low. So we were operating on one basic assumption which clearly no longer exists. You say, "whereas environmental regulations that require greater energy use appear somewhat inconsistent with our energy goals."

What environmental regulations in particular were you referring to, Mr. Zarb?

Mr. ZARB. I think the Administrator has reviewed some of them as they relate to the consumption of energy. When these standards were set and a program was outlined by EPA with respect to emission controls, they were established within the framework of a nonenergy crisis.

There are other areas that we are forced to reexamine in this new framework.

The question of the ability to use coal in generating electricity and to do it in a way that is environmentally acceptable is one which takes on new dimensions as we find ourselves with high energy costs and the new threat of interference in our foreign sources of petroleum.

I would say that virtually all of the major energy sources that have an environmental constraint are being looked at by the Energy Resources Council, of which the Administrator and Governor Peterson are members. In each instance representatives of EPA, CEQ, as well as the functional agency involved, such as the Departmment of Transportation, are reviewing some of the regulations promulgated and some of the legislation to determine whether or not we need to submit requests for new legislation or to modify regulations in a way that would take into consideration the new energy environment and at the same time not abandon our environmental goals.

Representative MOORHEAD. Would I not be correct in saying that reduction in the consumption, let's say, of gasoline, would be consistent with both the environmental goals and the conservation of energy goals?

Mr. ZARB. Yes, sir; that would be correct. If both could be achieved that would be consistent with both objectives.

Representative MOORHEAD. If I heard you correctly, Mr. Busterud, you said there were eight independent industry groupings that had special problems and Mr. Train listed six. Is there any inconsistency or do you have two additional industries beyond the six that he lists?

Mr. BUSTERUD. In the memorandum we submitted to you we list the increase for certain industries, particularly electric, petroleum refining, iron and steel, pulp and paper, nonferrous and primary metals, stone, clay, glass and cement; chemicals; and food and kindred products.

Now, it may be that Mr. Train has selected from that list or has some other reason for what he said, but those are the ones we find that have been particularly impacted.

Mr. TRAIN. Congressman Moorhead, I do not think there is any particular discrepancies between the two statements. I was simply listing the six industries we are currently studying. This is not to say we could not add others, but these are the six we are doing.

We are not doing studies of the stone and glass and cement industries.

Mr. ZARB. Congressman, it might be useful if I just added a small bit to that response.

The Administrator and I have met perhaps some 5 or 6 months ago on the need to accumulate data on any matter which affects industry wherever environmental rules are promulgated. I would like to stress the fact that this new endeavor to analyze the impacts both in a retrospective and prospective basis is not just confined to selective industries. The Administrator has agreed to and built the capability to analyze impact wherever these rules may be having an effect.

Representative MOORHEAD. Mr. Train.

Mr. TRAIN. I think the committee would be interested in our analysis of the energy impact of environmental programs. There is no question that very frequently, though not necessarily, they do impose a new pollution abatement control requirement and it will involve the expenditure of additional energy.

Looking at EPA air and water programs in particular, we roughly estimate that the additional energy costs to society would come to about 525,000 barrels of oil per day by 1980.

Now, this includes the operation of all the sewage treatment plants in the country, the additional energy costs to the electric power generating industry, and the automobile costs.

I gather these figures have already been presented to your staff so I won't expand upon these beyond adding that there are in addition to those costs tradeoffs in the other direction which I have not identified.

For example, in the solid waste field the growing recovery of energy from mixed municipal waste as a result of technologies demonstrated by EPA have a very substantial potential for energy savings, if we estimate something like 65,000 or so barrels of oil per day. Recycling of material, generally, in our society could tremendously reduce energy expenditures and process changes are processed within industry can be much more efficient in terms of the use of energy. There are substantial offsets and what I have really given you in terms of the 525,000 barrels of oil per day by 1980 is simply the gross increase in expenditure and not what might be a much smaller net.

Representative MOORHEAD. I am interested in how you gentlemen qualify, in dollar terms, the benefits from the environmental protection regulations and laws.

I could support this on the basis of improved quality of life without dollars, but I did not know how you could reduce it to dollars.

Mr. TRAIN. As I have mentioned in my opening remarks—to do this with any precision is very imperfect, and I don't assume full blame in EPA or CEQ or anywhere else in the Government for that imperfection. This is just something that the economic profession has not developed to the level we would all like to see it. Both EPA and CEQ are endeavoring to do more in this area. There are some things you can quantify the costs of not cleaning up, for example, the increased cost of doctor bills.

We can also quantify, to some extent, physical damages to plant and equipment, the outside of buildings, the cleaning bills required, and the damages to furnishings and draperies from air pollution. We can also quantify the damages to crops from air pollution.

We can get at all those things quite accurately, but having said that, we recognize there are vast areas of intangibles that are exceedingly hard to quantify. Esthetics, I suppose, would be one kind of an example. When you look at the problem of power generation in the Four Corners area of the Southwestern United States, air visibility or lack of visibility, or impeded visibility is certainly an important factor. Yet how do you quantify the value of being able to see 100 miles as compared to 10 miles or what have you? With this kind of problem we obviously have a long way to go before we are able to deal with it in any very precise way, if we ever can.

Representative MOORHEAD. What I would like to know, Mr. Train, is whether in these figures that Mr. Zarb presented, the EPA estimate of benefits in the year 1970 or benefits of water pollution controls, $13 billion, and did that include some esthetic thing or are these attempts to quantify hard-dollar things?

Mr. TRAIN. No, these figures include only the hard quantifiable dollars. They do not include intangibles such as being able to look at a clean river or being able to go swimming or fishing. These are much harder to get at.

Mr. ZARB. Even those numbers which are harder, I should add, are under challenge by others who suggest that the values placed on one thing or another have been incorrect. We have attempted to work with various sectors of government and the public to resolve these differences.

Representative MOORHEAD. My time has expired, Mr. Chairman. I hope I can come back with the steel industry which I want to discuss with Mr. Train.

Senator PROXMIRE. Mr. Zarb, I would like to follow up on the unemployment recession kind of discussion I had with Mr. Train.

I would like to ask you if we are facing a sharp recession, wouldn't this be an excellent time to forge ahead with the environmental transformation of our economy? During a recession, couldn't we achieve some of our goals otherwise wasted through unemployment? This would get the job done and also help sustain employment when we need it. Wouldn't a full commitment actually improve the economic outlook?

In his statement Mr. Train made various estimates. One was by June 30, 1977, there will be 125,000 persons engaged in this activity and Arthur D. Little said there will be an increase of 75,000 jobs.

Further, he said in 1975 there will be a reduction in unemployment of four-tenths percent because of environmental activity and that would be lost later in the decade.

I wonder to the extent we might speed this up and take policy actions here in the Federal Government that would encourage more employment now that we are sure we need it. Unemployment is at 6 percent. The expectation is it will go to 7.

Is there anyway we can use these resources?

Mr. ZARB. Mr. Chairman, whatever we can do to reduce unemployment clearly is a good thing, and to the extent that——

Senator PROXMIRE. Let me interrupt to say that we have been told that we want public service jobs, some of those jobs are fine, some may not be. We don't want to go back to the leaf-raking situation we had in the depression, but there is a tendency for some employment not to be really as useful in the long run. Here is something the whole country will agree is useful. We want to improve our environment.

What can we do to take advantage of these resources to the extent they develop?

Mr. ZARB. To the extent that already announced public-service employment and other areas of Government can be redirected toward conservation of our environment I think that would be very useful, and I am not equipped to talk about certain programs.

We do have to continue to look at the inflationary aspects of Government spending as well, and therein lies the dilemma. In each instance where we make a new commitment, and we have a very heavy commitment to the environment and to conservation, in general, financially, we need to look at its inflationary aspects. To the extent that we can increase our resources in given areas without increasing our total feeding of inflation, that would be very useful.

Senator PROXMIRE. The first thing we have to do is to get OMB and the President aware that we do not have a demand type inflation. We are operating at a far lower level of capacity utilization, when people are working the shortest hours in the history of our country. We have never had a year when people have worked less than 37 hours a week until this year. Under those circumstances it is very hard to show, that in spite of the 12 percent of inflation it very hard to show people are spending too much money or resources are too tight. The kind of people that work on sewage programs are not in tight supply. Manpower is not short. It would seem to me this is an ideal time to put to work resources that are idle.

I would agree if this will result in using a great deal of petroleum resources, for evample, or steel resources, I think to the extent you have that situation you have a problem. But I would think you could design conservation programs that would not do that.

Mr. ZARB. Mr. Chairman, not being a Congressman, I cannot fully respond, but I would like to answer at least in part.

We will, in 1975, commit budget outlays of something over $3 billion to the waste treatment plant program.

Senator PROXMIRE. How does that compare with last year?

Mr. ZARB. The outlays will be up, what? A billion dollars?

Mr. TRAIN. In fiscal years, 1973 and 1974 we obligated a total of $3 billion. It would be about $3½ billion of obligations this year by end

of the fiscal year, which at a 75 percent–25 percent matching rate would fund about $4½ billion of total construction. Now, there is a good deal of lag time obviously in getting that kind of construction actually underway.

We in EPA want to get all the waste treatment construction going that we can within the dollars we have, and to help use this construction to the extent possible to combat unemployment problems. One of the problems we have discovered and have been trying to address is the great lag out in the field between the time that a project is approved by EPA, the funds are obligated by EPA and the contracts have gone to bid and actually let, and the time that the projects actually go to construction.

Senator PROXMIRE. I could not agree with you more, and there is a lag and Government can do something about that lag.

We have in our State 200 or closer to 400 communities waiting on actions on sewer projects. I am sure that is true in Pennsylvania and in most of our States, perhaps in all of our States with heavy unemployment, good work, not a matter of trying to find some make-work, but work most useful in building our economy and helping our economic situation in the future and improving our public health.

Mr. TRAIN. I agree.

Funds that the Federal Government has made available in many cases take about 18 months to get into construction.

Senator PROXMIRE. Haven't some of these projects recently been held up? Hasn't some of the money been impounded or the availability been limited?

Mr. TRAIN. Of the $18 billion authorized by the Congress for waste treatment construction and for the 1973, 1974, 1975 fiscal years, the President did put $9 billion in reserve and made $9 billion available for obligation during that period.

As I have indicated, EPA through that 3-year period is not going to be able to actually obligate $9 billion. We will have obligated around $6½ billion.

Senator PROXMIRE. Why not?

Mr. TRAIN. Senator, that is going to require a fairly lengthy answer. The major problem was the complexity of the new law that came on the books at the end of 1972. The transition from the prior law to the new law, the need for whole new sets of regulatory requirements that were included in the statute, whole new sets of criteria and eligibilities had a very unfortunate impact on the flow of funds.

The pipeline practically dried up during that initial period. We have been making massive efforts to turn this thing around which have been quite successful.

Senator PROXMIRE. Is there any way that can be amended to reduce the time and move ahead promptly now that we have the kind of crisis situation we have and the crisis we have with unemployment?

Mr. TRAIN. We have, over the past year, been able to cut the time for processing a grant application from 6 months to 3.

Senator PROXMIRE. Is there legislation to cut it further?

Mr. TRAIN. Many of those projects go much faster than that. We are putting continued pressure on making those funds move faster. We have gone up to an obligation level of around $3½ billion this year.

It is my expectation that with the availability of funds, it would be possible to obligate somewhere between $5 billion and $6 billion in the next fiscal year, and still maintain the kind of quality control that is very important.

Now, the point I started to make is that much of the time delays and the lag in going to construction on these projects has nothing to do with the Federal Government.

After we have made the grant, and the local government has actually gotten all of its designs and specifications, has put the project out for bid and has let the contract, at that point I think you would agree that there isn't much more the Federal Government has to do with it except perhaps to audit the project. These projects are often running 18 months between the letting of the contracts and actual construction.

We have had a meeting recently in my office of State water administrators, our own regional administrators, because they are strongly decentralized, the representatives of all the national contractor associations, the consulting engineers of the Nation and the national labor construction building trade representatives to see how we can move these projects into construction faster. Now, we are moving this dialog out across the country.

Each of our regional offices is calling similar meetings of State and regional representatives and trying to see where they can break these construction logjams. We are trying to do whatever we can to get the construction union, labor unions, and engineers working to break this logjam so we can get the projects underway.

Senator PROXMIRE. My time is up.

Congressman Moorhead.

Representative MOORHEAD. Thank you, Mr. Chairman.

For obvious reasons, Mr. Train, I have had communications with representatives of steel industry who were concerned about the effect of environmental controls on their ability to increase their capacity of producing steel. They claim that they have to raise the price of steel to not only increase their capacity but also for noncapacity projects such as environmental controls. You said you had a study going on in the steel industry. Is it far enough along for you to give me any comments at this time?

Mr. TRAIN. I think it would be premature. In fact, I don't have any of the preliminary results of this work. It will be several months before we have any final data on the Youngstown situation.

One of the difficulties is—and I am not saying this in any critical sense—is getting accurate data from the industry, itself. We do not have it. They have it. Much of this information is proprietary. It is a highly competitive industry and the data is hard to come by. I have addressed letters to the presidents of each of the companies setting out what we needed. We have been having discussions with the companies themselves directly, man to man, to move this along faster. We now, I think, have a deadline of December 31, or thereabouts, for the data from the industry and then we will be able to move ahead much faster.

There is no question that the steel industry is heavily impacted by environmental control, in both air and water areas, particularly.

Much of the steel-producing capacity in the country is represented by fairly old plants and equipment. Much of it is probably located where the industry might not locate today, given changes in economic conditions.

I think that we have to be sensitive to these problems. This is the reason why we are making a special study of the Youngstown steel problem.

Similar problems, of course, exist in Johnstown, Pa. But we have problems with the industry almost wherever they are located—around Pittsburgh, and Gary, and other areas where we have fairly old installations in the steel industry. They are difficult to control. The coke ovens, in particular, represent a very nasty problem, as well as a very severe source of air pollution.

I could give you some rough figures. These are largely industry figures, but from our own correspondence we estimate the additional investment needed to meet air pollution requirements by the steel industry in the period 1971 to 1979 is $2 billion. We would estimate an annual cost in 1979 of about $688 million.

In terms of the water requirements, assuming that the Mahoning Valley plants are kept at the same level as the rest of the industry, we are looking at investments of $145 million for the primary operations in order to meet the 1977 best practicable treatment requirements or an annual increase of about $40 million in operating costs which could be translated into about a 0.2 percent price increase.

I think it is fair to say that beyond 1977 going to best available treatment as required by law, those levels of expenditure could be expected to be substantially higher than the ones I have just given you. But I do not have an estimate as to what they might be.

I have some industry figures, themselves, here, if you would like, I could put those in for the record.

Senator PROXMIRE. We would appreciate that, Mr. Train.

[The information referred to follows:]

The following figures are estimates of the capital expenditures in the U.S. for air and water pollution controls for the industrial category "blast furnace, steel works." The estimates were derived by the Bureau of Economic Analysis of the U.S. Department of Commerce from a survey of U.S. business firms. The survey results are published in the July 1974 *Survey of Current Business*, p. 58.

[In millions of dollars]

	1973 estimates	1974 planned
Air	163	304
Water	67	78
Total	230	381

Representative MOORHEAD. One other situation, Mr. Train, involves the controversy between the EPA and the American Electric Power Co. I don't think that you have the money to buy a double-page spread in the newspapers. I think we might even be critical of you if you did.

Would you want to take this opportunity to make any comments on that controversy?

Mr. TRAIN. I would rather not. Though I do think it is time we got down to resolving the issues.

We, in EPA, do believe quite strongly that we must move toward the reduction of total loading of sulfur in the atmosphere by constant control of technology and not simply by diffusion as exemplified by smokestacks. They have their place in given areas for considerable lengths of time. There are a number of plants in the country in which we would quite readily agree that scrubbers are not necessary and, hopefully, will never be necessary. But having said that, we are convinced that there are a number of plants in urban areas where there is a substantial public impact and where we should reduce the levels of sulfur. This can only be done at the present time by the use of scrubbers and low-sulfur fuel. There are several different kinds of technology. There are a number of vendors. Some are what we call throwaway systems, in other words, they produce a sludge. Some produce reusable, resalable products such as sulfur or sulfuric acid. The costs tend to vary.

I think one good point to keep in mind is that our present estimates in EPA of the need to install scrubber technology or low-sulfur fuel extends to about 90,000 megawatts of capacity. Already about 37,000 megawatts of that capacity are committed to scrubbers, either in place, installed, under contract, or otherwise committed. Thus, we are almost halfway there.

This is not a question as to whether we are ever going to have scrubbers or not. We do have a great many scrubbers in place around the country. Most recently in Philadelphia the power and electric company committed itself to three magnesium-oxide scrubber units. To show how reasonable EPA is in these matters, we said, "Please proceed with one unit and if for some reason in the operation of that one unit you can show us that it is not an appropriate, feasible, practicable technology, we will take another look at the thing." We then criticized because we said publicly that they had committed themselves to three units when they had really, in fact, committed themselves to one. Well, you have to interpret the data as you will.

The fact is we are moving ahead in a very satisfactory way with the installation of this kind of technology.

I think the argument today is really not on its reliability. We recognize there are continuing problems in the area which will take a lot of work. We certainly also assume that as time goes on the technology will improve.

I believe that by and large the industry today does not argue substantially with EPA over the general question of the reliability of the technology. The argument tends to be directed toward the costs involved. The units are very costly. I think our estimates run as high as $50 to $70 per kilowatt for the capital costs. These have to be reflected in increased electricity rates, which is not something that anybody is very happy about.

One of the problems confronted by the industry is the difficulty in getting permission from the rate commissions to pass on these investment costs. They find it much easier to include the cost of their fuel—in fact, there are automatic passthrough provisions in many areas. So

if they can get low-sulfur coal from Appalachia or the West, to many of them this is an easier route than the scrubber route.

The actual cost per kilowatt of the scrubber as compared to Western low-sulfur coal transported to the Middle West or the East by mail car is very close.

I think I have talked enough about it, sorry.

Representative MOORHEAD. My time has expired but I want to say to you I have known you for a long time and no one can question your dedication to the protection of the environment. Most of us would say you have been a reasonable person and you have a difficult job balancing these. I would say you have done a swell job.

Mr. TRAIN. I appreciate that.

I have to point out, at a colloquium at the L.B.J. Ranch there was a group of us talking about the environment, and a representative of industry said what you said and then added, "Russel Train is an exceedingly reasonable man as long as you do it his way." I would like to think that we are very openminded in EPA. We do want the best solution. We feel very strongly a shared sense of responsibility for meeting this Nation's very serious energy and economic problems. We have a statutory duty to do in the environmental area, but I want this committee to fully appreciate our strong sense of responsibility in helping meet the energy and economy needs of the Nation. I think we can do all of these together, and it is going to be a hard job but that is why we are here.

Senator PROXMIRE. Mr. Busterud, I think you make the case most convincingly, the case on which these hearings were called with respect to the impact of environmental legislation and environmental policy on inflation. You say in your prepared statement, and I quote, "All of these analyses arrived at essentially the same conclusion—that pollution abatement expenditures are not having and will not have a significant impact on the rate of inflation."

I think there is another estimate of one-half of 1 percent of the 20 percent wholesale price inflation that we have had in the last year.

So we do have that support for this conclusion. You support your conclusion with citation from four highly respected agencies in each case. They are competent certainly to make this kind of analyses, and although we have had testimony yesterday from industries affected who have a contrary view to some extent, nobody challenged this general conclusion.

Now, my question is, can we accept this statement as the latest and most definitive word on the question of environmental regulations and their consequences, and if so, does this mean further pronouncement from top administration officials on the need to relax environmental standards will not be forthcoming or will not be well founded if they are forthcoming?

Mr. BUSTERUD. Mr. Chairman, you have asked me to answer a very difficult question in view of the fact that any bureaucracy, including ours, is made up of a number of points of view.

Senator PROXMIRE. That is why I made my last point. We might get that argument made, of course, but if we do can we dismiss it?

Mr. BUSTERUD. In the opinion of the CEQ, the fact that we have just made this kind of a study, which is in accordance with the results of three other studies that have been made, I think removes a good

deal of the controversy over the validity of these figures. As you say, other testimony has not really challenged the figures to any great extent. It seems to me the effect might be even lower than we have concluded.

I do feel we are likely to see a tapering off in comments of the kind that you have referred to. I think we really should accept this kind of a figure as the best we can do in Government or economics and move on to other causes of inflation that confront our country.

Senator PROXMIRE. Yesterday the president of the Du Pont Chemical Co. made the argument that although undoubtedly there are some jobs created by pollution abatement activity, by pollution abatement plants that have to be produced and so forth in investment, nevertheless, the effect on his company and the effect on other companies is to retard employment because the requirements are that you have to produce these abatement facilities before you can engage in the kind of activity that the expansion of their plant would require.

For example, with a papermaking company, Consolidated Paper in Wisconsin, they have a $14 million pollution abatement project they are working on now. It will take a couple of years to complete it. It obviously will require a lot of people to complete that, but until they do complete it, they are unable to proceed with the expansion of their production.

I am not saying they should be allowed to, by any means. In fact, I would vigorously oppose it. But I would like to know what the economic consequences are. It would seem to me they do have some argument on that side. That is to the extent that until you put in place your environmental facilities, wouldn't this tend to have a slowing effect on employment and has that been taken into account?

Mr. BUSTERUD. Well, we certainly have tried generally to take these things into account, although we have not, for example, been able to take into account the estimates of the factor of plant closings because it is difficult for us to know which companies will elect to close plants and which will not and what consequences will flow from that.

Senator PROXMIRE. It would seem to be even harder to take into account the prospects for employment when a new plant is completed.

Mr. BUSTERUD. That is right.

In many of these conversions there are process changes combined with them for other than environmental reasons or including environmental reasons which in the long run will provide more employment, rather than less, although one can argue whether an efficient plant might require less employment.

But we feel in general that the overall effect when seen from the macroeconomic point of view is not a large one. The pollution control equipment itself is manufactured by other plants and they have had a greatly expanded work force recently; and as you have indicated, this is one area where public service work could be provided as well.

Senator PROXMIRE. But in these bottleneck areas with chemicals and steel and other areas where we need—petroleum, where we need expansion, to the extent they are retarded from being able to expand their plant it would seem to me it would have both an inflationary effect and reduce employment, at least the production workers, to what it otherwise would be. You say you have taken that into consideration?

Mr. BUSTERUD. We have taken it into consideration generally, but in specific situations it is somewhat more difficult.

As I indicated earlier, we are continuing to study particular industries, such as the one that you have mentioned, and our continuing review of this will lead us to some conclusions and perhaps we can find some ways to ameliorate such difficulties.

Mr. TRAIN. Senator, might I add just a point here to make sure we understand one another.

We certainly do not in any regulatory sense inhibit the addition of new capacity pending the addition of improved pollution abatement facilities. The problem, I think, is that a particular industry or company may be in a capital limited situation because of its own earning situation or because of the state of capital markets and can only raise so much capital when that company is required to abide by regulations to meet higher pollution control standards it may have to put capital that would otherwise go into capacity into pollution abatement.

Senator PROXMIRE. You have a double effect. There is no question if they are going to meet the standards, and they cannot meet the standards without creating the pollution abatement facilities before they proceed to expand their production. If they do they will be in violation of the standards. That is No. 1. And No. 2, as you cited. was that they have limits on the amount of capital they can raise. Almost all businesses do, their cash flow, the sorry state of the equity market, the fact that interest rates are so high and borrowed capital so unavailable means that they have to ration very carefully the capital they have and if they have to put a substantial amount into pollution, antipollution equipment, then they have that much less for expanding their actual capacity to produce.

Mr. TRAIN. No question about that, and the paper and pulp industry is one which may be in the situation you describe.

Senator PROXMIRE. Let me ask Mr. Busterud what are the increases in unemployment, the results that you project?

Mr. BUSTERUD. I wonder if you would repeat that?

Senator PROXMIRE. In the first place, your econometric projections arrive at a decline in fixed investment in producers' equipment to abate pollution after 1977; is that right?

Mr. BUSTERUD. Yes, sir.

Senator PROXMIRE. What extent are the declines projected for real gross national product for increases in unemployment resulting from this investment slump?

Mr. BUSTERUD. We feel there will be very little decline.

Senator PROXMIRE. Well, there was an estimate that unemployment would increase somewhat because of this lack of activity.

Mr. BUSTERUD. Yes, in the later period.

Senator PROXMIRE. How realistic is this?

Mr. BUSTERUD. Quite realistic. We see a slight decline in overall unemployment in the early period followed by a minor increase in unemployment in the later period.

Senator PROXMIRE. And the net effect a washout?

Mr. BUSTERUD. Yes.

Senator PROXMIRE. Wouldn't mandating pollution control necessarily boost total investment during all of the period even if they do displace some of the other investments, and won't pollution invest-

ments leave a larger backlog of other investments when they are finished?

Mr. BUSTERUD. Our studies do not show that will necessarily be the case. In fact, our studies indicated that new plants would not necessarily be constructed even if pollution controls were reduced. Pollution control is a very small factor.

Senator PROXMIRE. Mr. Zarb, Mr. Sawhill, the present FEA Administrator, has come out quite strongly for the necessity of mandatory energy conservation measures. In light of the fact that substantial energy conservation would help greatly in alleviating not only our oil import bill but also environmental pollution, would you basically agree with Mr. Sawhill's position?

Mr. ZARB. Thank you, Mr. Chairman.

Senator PROXMIRE. I thought you would be glad to answer that question.

Mr. ZARB. Mr. Chairman, I think energy conservation is essential. I have heard very little argument from any reasonable source that would suggest that conservation is not vital.

The methods and strategies for achieving it—the options are many and the work done by the Energy Administration on Project Independence gives us the beginnings of some information which would lead us to make an ultimate decision.

When we talk about mandatory conservation, I think one of the major questions that we need to ask is: If we take this particular step what else does it do out there in the economy? I am still very clear in my mind, since I worked so closely with this problem during the course of the embargo, about what happened in our economy when we experienced abrupt shortages of energy. I very clearly recall a man who told me that his job, which was somehow connected with the tourist business, was as important to him and his family as if he had a job in industry. That is a long way around of saying we are looking at all the options and weighing the economic impact and other impacts but start off with the conclusion that we need to have a——.

Senator PROXMIRE. Are you ready to strongly support the Project Independence Blueprint conclusion that a cut in energy demand is mandatory and that if it were cut to a 2- or 3-percent yearly growth rate that this would not hinder healthy economic growth?

Mr. ZARB. I would endorse that in saying this was their conclusion and would ask permission to add one caveat. The strategy by which we achieve those savings is crucial and it must be carefully plotted and implemented in a way to minimize its negative effects on the economy.

I do think conservation in fuel——

Senator PROXMIRE. It would be cut in half roughly, the growth rate. It would still be a small percentage?

Mr. ZARB. I certainly would not quarrel with that general ball park figure.

Senator PROXMIRE. On Tuesday, we asked John Sawhill some questions on recent administration decisions concerning oil imports in the future, but he had to answer that he did not know very much about the basis for the decisions and that he was definitely not consulted. Perhaps you could shed some light in this area.

First, Secretary Kissinger said that the United States is prepared to cut oil imports 85 percent, from 7 million to 1 million barrels, in the next decade.

What analysis did he base this statement on, what assumptions were necessary and how exactly is this going to be achieved?

Mr. ZARB. I guess I would have to say in all honesty I am not familiar with the staff work that went into that presentation, although I am sure there was some.

The Secretary is a member of the Energy Resources Council and, as such, his staff works with the Council and the staff of a number of agencies. He has access to whatever documentation they have concerning those particular objectives. But I certainly do not have first-hand information of that type.

Senator PROXMIRE. I am hopeful there is some. We are having a great deal of trouble finding out what he based it on. He is an extraordinarily able and responsive man, but this is such a dramatic commitment, 85 percent cut-back from 7 million to 1 million barrels, it would be helpful to know on what he based that, whether this was poit of view, conservation plus the development of additional re- what could be done and how he is going to do it.

Mr. ZARB. Mr. Chairman, I would just like to make a general observation about targets, objectives, and where we are headed.

It seems pretty clear to all who have been involved in the energy business over the last year that it is really not a question of should we considerably reduce our dependence on foreign sources. I think it is more a statement that we had better. After you arrive at that conclusion, you get to the question of how.

If you are of my point of view, which says that this is America, we do things, we get them done, and this is one that is doable, we are going to cut out a lot of quarreling about strategy, about how you conserve or how much you conserve within a unit of time. From a personal point of view conservation plus the development of additional resources are strategies which are not an open question. It is a question of how we accomplish what needs to be done.

I am less concerned with specific numbers as we get into detailed debate than I am with the job of turning the blueprint into national energy policy which will give us a step-by-step program as to exactly how to achieve independence.

Senator PROXMIRE. That is exactly what we should start off with, I think everybody agrees with that. We have to have a plan to achieve it and it will take this body that is the Congress cooperating with the President to get it done.

Both of us have to give up what we would prefer to do and work out something that will actually work. We have to get this started. The President has made an emphatic rejection of a big increase in the gasoline tax. I support him in that. I think he is right. But we must come up with some other kind of an effective system if we are just going to progress. We are not going to do it unless Congress and the President act.

Mr. ZARB. It may be just useful to take a minute, Mr. Chairman, to describe the process that is now underway to turn the Project Independence blueprint into an energy policy. It was, in essence, a staff

document that said, here are the various opportunities to reduce importation if we do certain things. There are some parts of that analysis still missing, with particular reference to economic impacts.

The Energy Resources Council, of which I am Executive Director, has underway a program that is doing the following: The staff work in Project Independence is being analyzed and we are collecting comments on it. When you put together that kind of endeavor you are logically going to have areas where mistakes are made. But we have an open period within the Federal Government and the public where we hope to work them out.

Simultaneously, the staff is viewing major options that need to be addressed. How much should we be less dependent in what point of time? What are the options for research and development?

Staff will, in addition to studying these options, be holding public hearings so that each segment of the economy, the consumer, the environmentalist, the small fuel oil dealer in New England, will have an opportunity to visit here in Washington and comment on that document and the options presented. Within a very short period of time that document will result in a national program.

Senator PROXMIRE. That is very helpful.

See, our problem is that we have been told by Mr. Sawhill that he thought the Council of Economic Advisers had done some work on the 1 million barrels cut back.

Well, I understand the Council of Economic Advisers has requested some work, but has nothing to show for it. That is not 1985 or a decade from now. That is next year. If we are going to make that kind of progress, it would seem to me it takes more than a speech. It takes action that ought to begin right now. The sooner we begin it, the easier it will be. The more we postpone it, the more difficult or impossible it will be.

Mr. ZARB. Mr. Chairman, the Council of Economic Advisers, with Secretary Morton as Chairman of the Energy Council, is doing some additional work on various strategies. But I think it is fair to say their first cut, which has been taken, indicates an abrupt tightening simulating the embargo conditions of late last year and early this year would have a meaningful impact on the economy. So their early conclusions, pending further work was that conservation exercises should occur, but should be orchestrated in such a way that they do not have an abrupt effect, on a mandatory basis, on supply.

Senator PROXMIRE. You mentioned that "the Administration is firmly committed to a continuation of policies to limit environmental degradation." Yet there have been calls within the Administration in the past year that, for economic or energy supply reasons, some environmental standards may have to be relaxed.

Who within the Administration were the prime supporters of this position and are there still some who feel the costs of environmental regulations are still too high?

Mr. ZARB. Mr. Chairman, the statement that, for energy and economic reasons, environmental standards might be relaxed, seems to me to express views of a general nature shared even by my colleagues here at the table.

We have already, I think, addressed several issues, particularly in the energy area, where the Energy Council has asked the Administra-

tor of EPA, as chairman of a subcommittee, to quickly look at some of the environmental regulations, and their effects.

In the case of auto emission controls, the Administrator had already come forward and said that, although he would not use these terms because the term "relaxed" is not a term in general use, he would agree that there needs to be an adjustment to facilitate temporary energy requirements. I do not think there was anything to imply that we were totally abandoning our enviromental protection efforts. We need to revisit them and determine whether they should be adjusted or relaxed, if you will, or stretched out as some say to faciltate current economic needs or current energy needs.

Senator PROXMIRE. Does that mean if you should become FEA Administrator that you may push for relaxing or easing of standards that may impede——

Mr. ZARB. The Administrator has told me he has not submitted those questions to the chairman.

Mr. TRAIN. I am very interested in the response, however.

Mr. ZARB. Mr. Chairman, the Administrator and I have worked together now for some period of time in my current role as Associate Director of OMB where we have come to grips with the same question that you just raised, and perhaps he can answer this question better than I can.

Senator PROXMIRE. I do not think he is going to be the FEA Administrator.

Mr. ZARB. As he and I have faced these issues, because of public comment, because Members of Congress have raised serious issues of environmental strategy or because of disputes within the Government which frequently have occurred, we have followed the principle of getting the facts which all too often have been missing in the initial iteration of either the charge or the response. Once we have gotten them and we have a fairly good arrangement whereby staff is instructed to produce answers to necessary questions, we jointly visit together and ask the question: Is there some substance to this charge that the environmental standards are unreasonably affecting another goal or unreasonably visiting a hardship on society?

In virtually every one of those cases that I can recall, we have been able to come to an agreement based upon the facts that we have and the objectives as we both see them. That is perhaps not a pinpoint answer to your question, but I think it does indicate the method by which I have been able to work in this particular area and achieve a result that is, in our estimation, in the best interest of the total public.

Senator PROXMIRE. It is so important that we have as much agreement as possible within the Congress and the administration that we are going to pursue our environmental standards.

I have been around the country a great deal in the last couple of weeks and I have been very, very impressed about how widespread this determination is, in the West and the East, all over the country. This is something that is universal, just an overwhelming feeling of support for environmental standards and the determination that there is no real excuse for weakening our drive to reduce water pollution, air pollution, solid waste, and so forth.

Mr. ZARB. I certainly would have to concur with that and I will be waiting for Administrator Train to say something as well on this sub-

ject. I think we have oftentimes, he and I, approached these questions with firm differences of opinion, either because of the way we perceived the initial fact or because we were exposed to the initial fact at different points in time.

But I think we have the capability to reach reasonable conclusions without major confrontation or wholesale abandonment of any of our national objectives.

Senator PROXMIRE. Before you speak, let me say one thing, Mr. Train, because I want you to have the last word.

The hearings that we have had so far and the witnesses we have had so far, it would seem to me have all come down on the side of the conclusion that we can wage a vigorous and in fact an increasingly vigorous attack on environmental pollution without an inflationary effect, without an adverse effect on employment; in fact, it may be favorable, and without a significant effect on the availability of energy resources.

Furthermore, to the extent that there is a problem of the environment and energy resources that we can far better meet that by conservation.

We are such a wasteful country, we consume so much more than other developed countries do, five times as much as Japan per capita, for example. We have all kinds of fat here that we are able to reduce. So that overall I certainly think that these hearings, if they show nothing else, have indicated that pursuing those environmental objectives should not be weakened or enfeebled in anyway.

We can proceed more vigorously than before without any real sacrifice in these areas.

Mr. Train, go ahead.

Mr. TRAIN. You raised the question of the continuing national interest, and I simply want to concur with your statement.

I have been around the country quite a bit recently and I am absolutely convinced that the level of interest remains very high. Indeed, the need for environmental protection has sort of an institutionalized priority in our society, is firmly established.

Beyond that, I do not know what Mr. Zarb's future may be as a nominee after this hearing, but I would like to add that I have worked with Frank on many very complex issues, and I can assure you that I have never found any antienvironmental bias whatsoever in the way he has looked at the problems. He has always been openminded and fair. We do not always agree.

These are highly complex issues. I do not think it is a matter of relaxing environmental controls in order to achieve energy objectives or even vice versa. I think it is a matter of increasingly approaching highly complex issues in our society, taking full account comprehensively of all the factors involved. We have been very poor in this. We have very poor institutional mechanisms in our own Federal Government for doing this.

Each agency has its own particular perspective.

But I think the need here involving both environment and energy and the economy is to deal with them as an integrated set of problems, highly interrelated, highly complex, in which almost anything you do in one area tends to have some kind of trade-off insofar as the other areas are concerned.

I think we simply have to get at the problem systematically, intelligently, with all the facts before us, and achieve results which are fully protective of the overall public interest.

Now, that is one of those great rhetoric that simply does not answer anything. There is not going to be any backing away of programs.

As I indicated to you, I think we are going to a much more relaxed job of analysis, of impacts, economic impacts in our environmental standard setting and regulatory activities, and this is something that should be done no matter what the economic situation.

I would say Frank is a very reasonable man and I would hope he would remain that way.

Senator PROXMIRE. As you said earlier, as long as his reasoning conforms with the Train reasoning.

Mr. TRAIN. Thank you, sir. That is exactly right.

Senator PROXMIRE. Well, I must say the testimony by all you gentlemen has been very, very helpful to us. I think you have made a most helpful record.

We would like to submit written questions to you which you can answer in writing when you correct your remarks.

I understand the committee will reconvene on Monday with Congressman Reuss chairing the committee.

The witness will be Secretary of the Treasury Simon on the Kissinger-Simon proposal for setting up a proposal for petrodollars.

On the 27th, Arthur Burns.

[Whereupon, at 12:25 p.m., the committee recessed, to reconvene at 10 a.m., Monday, November 25, 1974.]

[The following questions and answers were subsequently supplied for the record:]

RESPONSE OF HON. JOHN A. BUSTERUD TO ADDITIONAL WRITTEN QUESTIONS POSED BY SENATOR PROXMIRE

Question 1. In the first part of your prepared statement you say in regard to pollution control expenditures, "investments are expected to increase steadily up to a peak in 1976. Annual costs are expected to increase at a rapid rate through 1977, after which they will level off." Based on testimony on November 21 by representatives of the electrical utility, petroleum and chemical industries, these major industries dispute this type of claim and say their pollution control expenditures will be increasing for a considerable time. For example, the oil industry representative said "The upward trend in amount of environmental expenditures, both in absolute dollars and as a percentage of total capital, is expected to continue into the early 1980's."

How do you explain the difference between your figures and what these industry witnesses claimed?

Answer 1. Our cost estimates assume that all the required pollution abatement equipment will be installed early enough to satisfy the goals established by the Clean Air Act and the Federal Water Pollution Control Act. Both Acts have set major deadlines in 1977, and the investment streams assumed in our cost calculation reflect these deadlines. The 1972 Amendments to the Federal Water Pollution Control Act set additional goals for 1983 and 1985. The costs of meeting these goals are unknown for many industries at this time. Many industrialists, however, seem to be focusing their concern on these future dates apparently fearing that they will require substantial amounts of investment. EPA is attempting to clarify these requirements as rapidly as it can in the effluent guidelines. For several industries for which EPA has already defined the 1983 requirements, they are the same as the 1977 requirements. This suggests that the concern about these additional future investments may be based on a substantial over estimate of their magnitude.

Question 2. Could you please go into more detail concerning the substantial amount of expenditures which, as you say in your statement, are "what the Nation would have spent for the same purposes in the absence of this legislation." Do these primarily refer to expenditures which would have been required under State and local regulations?

Answer 2. Some of these expenditures would have been made because our society could not operate without making them. An example is expenditures on collecting and disposing of solid wastes. We estimate that the total costs for handling solid wastes will be $44.9 billion over the 1973–1982 decade, only $5.2 billion of which results from Federal environmental legislation.

Other expenditures would have been made because people at the local level would have demanded and were demanding action prior to Federal legislation. An example is in the installation of sewers and the construction and operation of sewage treatment plants. We estimate that $64.1 billion would have been spent for such purposes by localities in the absence of Federal environmental legislation.

We also assume that some expenditures would have been made by the private sector on pollution abatement because of public pressures. Thus we estimate that $9.1 billion would have been spent on air pollution abatement and $17.3 billion on water pollution abatement.

In all cases we base our estimates on expenditures that were being made prior to 1965, and do not presume any change in state or local legislation subsequent to 1965.

Question 3. It was somewhat surprising to see that over the next decade, the majority of pollution control expenditures will go for operating maintenance rather than capital equipment. What is the reason for this shift in trend away from greater capital expenditures? Also, why are operating and maintenance costs going to loom so large? What components make up the category, and isn't there any chance it could be reduced as the various technologies are better perfected?

Answer 3. The magnitude of the O&M costs was first pointed out in our 1973 annual report. O&M costs become more important when costs are viewed over a longer time period. Many of the early cost estimates focused on the pre-1977 period when most of the investment was being made, and of course, the investments costs were a major consideration during this period. Once the investment is in place, however, the O&M costs become more significant. We would expect that each future CEQ estimate would show an increasing proportion of O&M costs because each will include an additional year of high O&M and low investment costs.

The components of O&M are labor, materials and energy. The costs are usually estimated as a percentage of capital in place.

We have strong expectations that total pollution abatement costs will decrease with improved technologies. However, it is not clear what impact these improvements will have on the level of O&M costs or the proportion that these costs are of total costs. For instance, we anticipate that there will be significant amounts of abatement accomplished through process changes rather than end-of-the-pipe-treatment. Process changes, however, may involve very little capital investment but the firm's increased O&M costs may be just as great with the process change as they would be with end-of-the-pipe treatment. For instance, burning low sulfur oil rather than installing a stack gas scrubber reduces investments, but still imposes relatively high operating costs. (for the higher priced fuel).

Question 4. You stated that private pollution control investments in 1974 amounted to 6 percent of business investment in plant and equipment and that some industries will be impacted much more severely than this average.

Do you feel that any public policies should be established in order to provide some form of relief or assistance, or should all industries be subject to the full social costs of producing their products and let the market mechanism work from that base?

Answer 4. The Council believes strongly in the "polluter pays" principle and does not believe that pollution should be subsidized. On the other hand, the rapid response required by the environmental legislation may impose some inequities both between industries and between small and large firms, that could be avoided without rewarding polluters. Many of these problems can be avoided by the sensitive and efficient implementation of environmental regulations so as to avoid undue social costs. EPA is attempting to accomplish such implementation. If any

additional assistance is required to avoid substantial pockets of unemployment, or substantial economic impact on particular firms, we believe that these situations can be best dealt with on a case-by-case basis and assistance provided existing Federal programs.

Question 5. How do your econometric projections arrive at a decline in fixed investment in producers' equipment after 1977?

To what extent are the declines projected for real GNP and increases in unemployment results of this investment slump? How realistic is this? Won't mandated investments on pollution control necessarily boost total investment during all of this period even if they do displace some other investments? And won't pollution investments leave a larger backlog of other investments to be undertaken when they are finished?

Answer 5. The decline in fixed investment after 1977 results from (a) the projected decline in pollution abatement investment and, to a lesser extent, (b) the effect of slightly higher equipment prices resulting from the increased demand prior to 1977.

There is a high correlation between the projected fall off in investment and the relative decline in GNP, although each contributes to the other. One's view of the realism of these projections depends upon one's view of the realism of the macro-economic model which produced them and of the assumptions that were made on inputs to the model. As stated in our answer to question 1, we assume that most of the investment will be in place by 1977 in conformance with Federally legislated deadlines. There is, however, some uncertainty about how much investment will be stimulated in the energy sector during this period, and a heavy investment demand here could more than compensate for the decline in pollution abatement investment.

As a general comment on these projections, we assume that the Chase model basically incorporates the best current thought in the imperfect art of economic forecasting, and we supply Chase with our best estimates of what the pollution abatement costs will be. While recognizing that there are inevitably inadequacies in both the model and the estimates, we believe that the results given represent the best projections that can be made with the available data and resources.

RESPONSE OF HON. RUSSELL E. TRAIN TO ADDITIONAL WRITTEN QUESTIONS POSED BY SENATOR PROXMIRE

Question 1. I read a statement to Mr. Wagner yesterday which is in regard to EPA's proposed regulations under SS 304, 306 and 316(a) of the Federal Water Pollution Control Act Amendments of 1972. It said:

"By conservative estimates, the costs of EPA's proposals would be 3 to 50 times greater than any social benefits that might result from their imposition. More realistic estimates suggest costs which are a 100 to 1,000 times the benefits. In many cases it appears that no social benefits whatsoever would result from the economic burdens imposed by EPA's proposals."

The statement in which this appeared was signed by a vast majority of the electric utilities in this country. Are your cost-benefit ratios really that horrendous, or just how do the utilities come up with such startling figures?

Answer 1. The Utility Water Act Group (UWAG) cost-benefit analysis was based on the use of a mathematical model to quantify ecological benefits due to waste heat reductions, which did not live up to the claims of developers of the model. This fact was recognized in the public hearings, which EPA held after the public comment period, by several of the technical personnel who were on the UWAG panel.

In particular, the UWAG assumed that Congress in passing P.L. 92-500 desired to provide direct economic benefits. Although financial benefits may be an outgrowth of the legislation, EPA believes that it was the primary intent of Congress to improve water quality by increasing species diversity, which is limited in the presence of waste heat releases. The UWAG model did not take these environmental benefits into account because its simplistic designs and assumptions foreclosed the assessment of these benefits. In particular, important food chain biological issues of effects on juveniles, age distribution, and extinction were ignored. EPA concludes that the UWAG analysis misstates any biological and economic benefit.

In order to assess the costs and benefits in terms of the legislation, it is necessary to relate the cost of controls to a meaningful parameter of water quality. EPA evaluated a variety of possible measures to achieve this objective, deciding finally to employ a measure of the change in risk of environmental damage associated with varying levels of control. This approach was selected because it permitted a sensible comparison of economic costs and environmental benefits. Mathematical models verified by field investigations were employed to assess the tradeoffs between costs and benefits. A careful comparison of these was made which resulted in the standard we promulgated in October which exempts all plants in operation prior to January 1, 1974 except very large new plants which came into service since January 1, 1970. This standard will control thermal problems where there is a significant water quality problem attributable to heat, and not over-control where there isn't a problem. Secondly, if imposition of the standard is not needed because there is no significant damage to fish, shellfish and wildlife, the utilities are afforded relief from control under Section 316 of the Water Act.

Question 2. The oil industry representative in the November 21 hearing claimed that if there is no postponement in the date for compliance with the ambient air quality standards "much of the burden will fall on the general public, who will be asked to curtail private vehicle use severely."

Do you foresee this postponement occurring and if not, will there be this severe curtailment of driving such that, as one witness cited yesterday, meeting the standards in Los Angeles by 1977 "would virtually require banning automobiles altogether"?

Answer 2. The issue here is the question of how stringent the transportation control plans will be which are imposed in cities unable to meet the primary ambient air quality standards for automotive pollutants by 1977. The Clean Air Act requires that transportation control measures be used to achieve these standards in areas where the automotive emissions standards will not reduce emissions enough to allow the air quality standards to be met.

In some areas limited measures such as inspection and maintenance systems, more buses, and increased use of car pools can lead to attainment of the primary air quality standards without unreasonable cost or disruption. Unfortunately, a few cities have air quality problems that cannot be solved by 1977 with limited measures. For these cities to meet the air quality standards by 1977, very stringent means of reducing vehicle miles travel (VMT) would have to be used, such as gasoline rationing or parking surcharges. Los Angeles has the most severe problem in this respect, requiring a VMT reduction of 100 percent to meet primary standards by 1977.

When EPA issued transportation control plans for this latter group of cities as required by a court order, the Agency said that it felt that some of the measures included would cause far more cost and disruption than would be warranted by the air quality improvement expected. EPA feels that it would be preferable to require all reasonable transportation control measures as quickly as possible, but to allow additional time in the areas with the most severe problems for attainment of standards through reasonable measures. With additional time these cities can develop transportation systems which offer citizens practical alternatives to single passenger automobile use.

Consequently, EPA requested last year that Congress amend the Clean Air Act to allow extensions of the 1977 primary standard attainment date for up to five years on a case-by-case basis. These extensions would only be granted where the ambient standard could not be met by 1977 with reasonable measures, and they would be contingent upon imposition of all reasonable measures as rapidly as possible. Although the Congress has expressed its disappoval of stringent measures such as gasoline rationing or parking surcharge for purposes of attaining ambient air quality standards, it has not acted upon EPA's request for an amendment to the Clean Air Act.

Question 3. After citing the failure of EPA economic studies to give adequate consideration to cost-effectiveness is technological assessment, the oil industry statement went on in its criticism of EPA studies:

"As a result, the most expensive alternatives frequently are chosen, even though their pollution control performance, compared to that of some more cost-effective method, may be only negligibly better. Moreover, in assessing the cost of environmental regulation to industry, there has been a tendency to consider each regula-

tion in isolation, rather than to consider the aggregate effect of all environmental regulations on industry economics."

Is it true that EPA frequently chooses the most expensive alternatives and has had a tendency to consider each regulation in isolation?

Answer 3. It is difficult to respond to this general criticism without more specific examples of what regulations the industry spokesman was referring to. As indicated in the prepared statement for the Committee, EPA tries to assess the costs and economic and environmental impacts of alternative regulations before selecting the regulation to be promulgated. A public comment period allows industry and other interested parties the opportunity to express additional views on these impacts.

Ultimately, the Agency must promulgate regulations which meet criteria embodied in the legislation. The definitions of best practicable technology (BPT) and best available technology (BAT) in the Federal Water Pollution Control Act (FWPCA) and of new source performance standards (NSPS) in the Clean Air Act (CAA) prescribe the extent to which economic/environmental tradeoffs can be made. In some cases, such as regulation of toxic pollutants under the FWPCA or establishment of primary air quality standards under the CAA, consideration of economic factors is not called for by the legislation.

The prepared statement for the Committee lists a number of actions the Agency has taken where economic considerations have led to selection of alternative regulations (or proposals for legislative changes) which would lead to less expensive compliance. The actions discussed in that statement include:

Modifications of effluent guideline limitations (particularly the thermal guidelines for electric utilities and the review of impacts on the Mahoning Valley steel plants).

The proposed Clean Air Act amendment easing the 1978 Statutory NO_x auto emissions standard.

The EPA "Clean Fuels Policy."

The nondegradation regulations.

Low-lead gasoline regulations for small refiners.

The claim that EPA considers each regulation in isolation in its economic studies is generally incorrect, although it has been true in certain instances. The economic analysis for each regulation focuses on the impacts of the particular regulation being set, but each typically assumes a level of costs required by other regulations on the industry. In some cases, this is impossible where regulations under other legislation have not been issued.

As described in the prepared testimony, EPA is now conducting a program of studies of six major industries including petroleum refining, which will focus on the combined impact of all EPA regulations. These studies should resolve some of the uneven treatment of past studies. In addition, the *Cost of Clean Air* and *Economics of Clean Water* will be combined this year into one report to show the combined cost to each industry of air and water regulations.

Question 4. After discussing the difficulty of assessing the marginal benefits of individual standards on page 3 of your statement, you say "we must use qualitative judgments in making these marginal trade-offs."

How exactly is this done?

Answer 4. Typically, most costs and some benefits can be quantified in dollar terms, but a significant portion of the benefits can only be expressed qualitatively or can be quantified in physical but not in dollar terms. In such cases, the comparison of dollar costs and benefits for a particular standard or for an incremental change in a proposed standard may not be adequate. If economic benefits exceed economic costs and unquantified benefits exist as well, then the standard or incremental change in the standard is justified. On the other hand, if the costs exceed the economic benefits, it is still necessary to make a judgment as to whether the benefits not measurable in dollar terms (perhaps measured in deaths or illnesses averted or in improved visibility) are worth as much as the excess of costs over dollar benefits. This judgment is ultimately a question of societal values, and no formula for making such judgments can be defined.

It should be recognized by the Committee that EPA's ability to follow this procedure is constrained both by the significant shortcomings of the state-of-the-art of benefits assessment and by the statutory criteria for standard-setting embodied in the legislation. In many instances, benefits assessments can only be accomplished on an aggregate level which is not useful for setting individual industry standards. Furthermore, the governing legislation frequently limits economic

considerations to concerns with costs and economic impacts rather than a cost-benefit comparison.

Question 5. In regard to the use of emission charges, you mention on page 4 that "it would be a mistake to substitute an economic approach at this time" and that "economic incentives can be an effective supplement to our regulatory program."

(*a*) Do you foresee a time when the U.S. may use emission charges (sometimes called effluent taxes) on a massive scale, largely replacing the regulatory approach. This is, as you know, what most environmental economists advocate as the most efficient method.

(*b*) You mention your support for the sulfur tax proposal. Why just that one specific effluent charge and what other examples of effluent taxes can you give which you would be likely to support?

Answer 5. It is hard to foresee the U.S. using emission charges on a massive scale instead of regulations in the near term, for two reasons. First, as mentioned in the testimony to substitute emissions charges for regulations at this point would subvert the very significant progress we are making in dealing with our urgent environmental problems. It would be quite disruptive to make such a change until the initial objectives of the new environmental legislation of this decade are achieved.

A second reason for utilizing the regulatory approach or combining it with the emissions tax approach is that the state of the art of cost and benefit assessment does not now permit the full achievement of the objectives of environmental economists who would replace regulations with effluent charges. To set these charges optimally, it is necessary to have accurate descriptions of marginal cost curves for all polluters and of marginal damage functions for each pollutant. We have neither of these now; and the marginal damage functions, which correspond to marginal benefits curves, will probably take many years to derive. Without marginal damage functions, it would still be possible to set emissions charges at levels which would achieve current desired levels of control if we could accurately describe the marginal cost curves. Unfortunately, we cannot describe these curves with precision now.

Consequently, any attempt to use effluent taxes as the sole mechanism for achieving environmental goals would run the risk of using a trial-and-error approach, which is intolerable in view of the large capital investments and planning horizons required to install pollution control equipment. The data problems are accentuated when the problem of setting different charges on each air shed or water basin is considered. This would be necessary because charges appropriate for an area would vary with pollutant loadings and types of polluters.

Consequently, EPA favors the use of emissions charges in support of the regulatory program rather than instead of it, at least until the initial air and water quality standards are met and the methodological problems mentioned above are resolved. Thus far, the sulfur tax proposal is the only specific proposal which would not be disruptive of current progress and which would not suffer unduly from the problems with cost and damage assessment. Other areas such as control of automotive emissions might be appropriate applications of emissions charges in the future, although no reasonable specific proposal has been formulated to date.

Although this discussion has emphasized the problems with emissions charges, EPA does support the goals of efficiency and effectiveness desired by proponents of charges. EPA feels, however, that the advocates of these proposals must consider the realities of the current programs and the data problems that exist in formulating their proposals. EPA has done significant research in this area and will continue to do so.

Question 6. You raise a point similar to one in the CEQ statement, namely, that pollution control can act as an anti-recessionary factor. You cited the construction sector as one of the depressed sectors which is bolstered by environmental controls, but you also hinted that there are others in saying "*some* depressed sectors."

What are some of these other sectors which are bolstered by environmental controls?

Relatedly, you cited a 1972 study which conclude that 75,000 jobs will be created as a result of the Federal legislation of this decade.

Is this a "net" figure, meaning that none of these workers were simply bid away from other jobs? Also, by what date will these jobs have been created?

Finally, is there a study currently underway to ascertain the same type of employment creating impact, since the environmental field has changed so much since this study was completed?

Answer 6. The portions of the economy which are helped directly by pollution control expenditures are those which design, manufacture, construct, install, operate, and maintain pollution control equipment, as well as those who use pollution control wastes or make profitable process changes induced by pollution control. The main sectors affected directly are the construction industry and the pollution abatement equipment industry, as discussed in some detail in the prepared testimony and answers to the questions originally posed by the Committee. These sectors should not be too narrowly defined. Involved in construction are engineering firms and suppliers of steel, concrete, electrical equipment, and many other materials, as well as construction firms. Pollution abatement equipment manufacturers require supplies and fabrication of materials and equipment from many other sources.

Besides these direct effects, there are indirect effects on income and employment in other sectors resulting from expenditures by firms and employees in the sectors which are directly bolstered. As discussed in the prepared testimony, the Chase Econometrics study shows a net positive effect on employment in the next several years due to pollution control requirements.

The 75,000 jobs described in the 1972 Arthur D. Little study are net jobs in the sense that they did not exist before. If current statutory compliance dates are met, most of these jobs will be created by 1976. Many of the workers in these jobs will probably come from other jobs which will in turn be filled by other employed and unemployed persons. Some, but by no means all, of the investment in pollution control will result in less investment in other areas, resulting in some reduced employment. The best estimate of the overall net effect is provided by the Chase study.

A new study to update the 1972 study is being designed now, although it has not yet been initiated. In the interim period until an update can be done, the Chase Econometrics study will provide some useful data on overall employment effects.

Question 7. In a statement given earlier this month, you said that "as a result of the Clean Air Act and the Water Pollution Control Act, the price of electricity in 1983 will be approximately 7 percent higher than it otherwise would." This seems like a pretty low figure in light of the tremendous amount of expenditures anticipated for pollution control by electric utilities in the coming years. At the November 21 hearing, Aubrey Wagner, the Chairman of TVA said that by 1979, the increase in price to TVA's residential consumers would be 12.9 percent due to meeting pollution control requirements.

Is your 7 percent increase by 1983 based on the recent available data and standards to be in effect till that date? If so, then why so low an increase, particularly compared to Mr. Wagner's stated increase which occurs four years earlier?

Answer 7. The most recent EPA studies indicate that the annual cost in 1983 of complying with the Clean Air Act (CAA) and the Federal Water Pollution Control Act (FWPCA) will be about 5.3 billion dollars (1974 dollars). Approximately 75% of this amount is for air pollution control equipment, while the remainder is for water pollution control equipment, since the total annual costs (and revenues) of the electric utility industry in 1983 is projected to be approximately 75 billion dollars in the absence of environmental regulations, it can be concluded that environmental regulations will cause the price of electricity in 1983 to be about 7 percent higher than it otherwise would be. While EPA is currently in the process of updating these estimates, the new estimates are not anticipated to be significantly different from the above projections.

Since EPA has not received a copy of TVA's analysis of the impact of environmental regulations, it is not possible to accurately reconcile the difference between EPA's and TVA's analysis. However, the three most likely reasons for the differences are as follows:

1. TVA's analysis probably assumes that the exisitng State emissions limitations for sulfur dioxide (SIP's) will not be changed. EPA's analysis assumes that these standards will be revised where they are more stringent than needed to attain and maintain primary (health-related) ambient air quality standards.

2. TVA's analysis most likely includes the cost of closed cycle cooling systems at all plants which are coming on line after January 1, 1974. EPA's analysis assumes that 50% of the closed cycle cooling systems that the utility industry is currently planning to install were planned because of economic reasons and therefore should not be included in the cost of the FWPCA, since they would be added even without any EPA regulations.

3. TVAs projected costs in the absence of environmental regulations are below the national average because of TVAs greater reliance on hydro-electric capacity. Therefore, the impact of EPAs regulations on TVA will probably be higher on a percentage basis than the projected national impact of environmental regulations. However, the impact of this factor could not possibly account for all of the difference between EPA's and TVA's analyses.

Question 8. In that same statement earlier this month, you said:

"We should develop tax and other incentives to encourage recycling and the conversion of wastes to energy. We should re-examine and revise those existing incentives in the tax system, freight rate structure, or otherwise, which encourage and subsidize use of virgin materials rather than recycling."

Can you please be specific as to your priorities in these two areas? What should be developed and what should be revised?

Answer 8. In 1973, the Administration proposed the Hazardous Waste Management Act, which specifically provided for adjustment of discriminatory freight rates and Federal procurement favoring products containing recycled materials. In addition, EPA has intervened in Federal Maritime Commission proceedings which explored discriminatory freight rates for recycled paper. Under authority of the Resource Recovery Act we have been carrying out investigations of subsidies and other incentives (tax credits, investment tax credits, cash subsidies, etc.). In testimony before the House Ways and Means Committee in March 1974 EPA noted that it is exploring the matter of depreciation allowances for minerals and capital gains treatment for timber. At that time the various steps that could be taken to maximize the use of recycled and recyclable materials were reviewed in some detail, including the description of various kinds of incentives. A copy of the statement presented in March to the Ways and Means Committee is attached.

Question 9. Has EPA undertaken a comprehensive study of the energy penalties associated with compliance to its standards and is this an on-going practice when new regulations are being considered? One example cited by Mr. Wagner in the November 21 hearing was that there was an energy penalty of 5–10 percent due to the installation of limestone scrubbers to control SO_2. Does this figure sound about right to you and is this generally the energy penalty associated with scrubbers?

Answer 9. The results of EPA's review of energy impacts of its program were provided to the Committee before the hearings in a report entitled "The Economic Impact of the Federal Environmental Program," which was compiled for the Subcommittee on Agriculture, Environmental and Consumer Protection of the House Committee on Appropriations. Page I–13 of that report provides a useful summary table which is duplicated below. This table assumes a 5% energy penalty for stack gas scrubbers, a figure which represents the mid-point of the reasonable range of such penalties (3–7%).

Summary of energy impacts of EPA's program in 1980

	(Thousands of bbls per day)
Air Programs:	
Electric powerplants	145
All other	125
Stationary sources (subtotal)	270
Auto emission controls	160
Lead free regulations	60
Low lead regulations	35
Transportation controls	(135)
Mobile sources (subtotal)	120

Summary of energy impacts of EPA's program in 1980—Continued

	(*Thousands of bbls per day*)
Water Programs:	
Municipal wastewater	45
Electric powerplant	50
All other	40
Industrial effluent guidelines (subtotal)	90
Solid Waste Programs: [1]	
Combustion of solid waste	(65)
Recycling of materials	(35)
Total all EPA programs	525

( ) represents positive impacts.

[1] Energy benefits from solid waste programs have not been included in the total above because they primarily result indirectly from EPA's research and educational programs rather than from direct regulations. If included, this potential energy savings of 100 MBD would result in a net energy penalty of 425 MBD.

Question 10. The area most emphasized in Mr. Wagner's testimony was the use of the intermittent control method vs. the scrubber method for dealing with sulfur dioxide emissions. He not only said that the costs for the two methods advocated by TVA and EPA respectively were vastly different, $18 million vs. $170 million, but that each expenditure would "achieve the same measure of protection of public health."

Do you agree with these two points, Mr. Train?

Will EPA continue to press for constant emission limitations and do you feel that enough is known about the health hazards from sulfates to justify this type of control?

Answer 10. While Mr. Wagner's cost estimates for compliance through permanent controls (i.e., low sulfur coal and scrubbers) and intermittent controls coincide with estimates given in the recent EPA/TVA task force report, EPA does not agree with his statement that the protection of public health would be the same under the two strategies. Recent EPA studies indicate that certain sulfates can cause adverse health effects of significant concern. Because of intermittent controls systems (ICS) will reduce the total emissions of sulfur doxide only by very small amounts. ICS would only be marginally successful in reducing health damages from sulfates. Therefore, it can be concluded that it is unlikely that permanent controls and ICS will achieve the same measure of protection of public health.

Based on analysis prepared by EPA in consultation with other interested Federal agencies, the Energy Resource Council recently agreed to the following policies regarding compliance with constant emission limitations:

1. Power plants in areas with multiple sources of pollution must achieve air quality standards through use of permanent controls as soon as possible.
2. All new sources must meet new source performance standards.
3. Sources of sulfur oxides that account for all or a substantial portion of the emissions resulting in primary air quality standards being exceeded would be permitted to use intermittent control systems up to 1985, if such measures are reliable and enforceable. To demonstrate this, the utility must have the ability to monitor meteorological and air quality conditions and have on hand a sufficient supply of low sulfur fuel to achieve attainment of primary standards during adverse meteorological conditions.

Full implementation of the policy may well require legislative changes. EPA plans to brief the appropriate congressional committees on this policy agreement and to solicit their views on the most appropriate way to deal with this policy change in terms of legislative authority. The Administration's pending proposal to allow enforcement orders to be issued beyond current statutory deadlines may be sufficient, although more explicit language probably is desirable.

APPENDIX

STATEMENT OF HON. GUNN MCKAY, A U.S. REPRESENTATIVE IN CONGRESS FROM THE FIRST CONRGESSIONAL DISTRICT OF THE STATE OF UTAH

Mr. Chairman, I appreciate the opportunity to present some facts for your consideration in connection with the economic impact of environmental regulation.

Kennecott Copper Corporation, a major industry in Utah, has made serious efforts to comply with air quality regulations imposed by the Federal government. I believe a look at the economic aspects of their clean air program is instructive.

Soon after EPA established ambient air quality standards for particulate and sulfur oxides, Kennecott embarked on a program aimed at developing a pollution control system which would enable their Utah smelter to comply with the standards. In early 1974, after extensive feasibility studies, Kennecott committed $175 million to such a program. This expenditure can be measured against annual expenditures made by Kennecott in Utah, as follows:

Annual expenditures by Kennecott in Utah

1. State and local taxes (annually)	$31,000,000
2. Supplies and purchases (value)	120,000,000
3. Paid to Utah vendors (over 1,200 of them)	72,000,000
4. Capital expenditures (annual average)	80,000,000
5. Payroll (1974)	110,000,000
6. Fringe benefits to employees (1974)	26,000,000
7. Total annual expenditures	439,000,000

Kennecott employs 7800 people. The total number of employees and their family members supported directly by Kennecott payrolls in Utah is approximately 30,000. Approximately 78,000 jobs are indirectly created by Kennecott, in Utah, with 105,000 being the total number of employees and family members dependent, indirectly, on Kennecott for support. As a total, about 135,000 employees and family members depend on jobs created directly or indirectly by Kennecott.

It is apparent that the health of this industry is extremely important to the economic well-being of the State of Utah. It is also obvious that the investment in clean air is sizeable when compared with the total Kennecott operation in Utah.

In October, 1974, the Environmental Protection Agency proposed rules governing the Utah smelter. Kennecott finds these rules to be inconsistent with the control strategy which they have well on the way toward completion, and Kennecott views EPA's standards as unrealistic from an economic and technological viewpoint. Kennecott objects to what they consider late and ill-advised intervention, at a point when a sizeable economic commitment has been made toward one particular approach to pollution control.

Mr. Chairman, clean air is a goal this country has set out to achieve and we should not falter in our efforts. However, in a time of high inflation, high unemployment, and recession, it is of critical importance that we get the top return on our environment dollar. As we trim budgets, as unemployment rises, as our resources are spread thin, we want to know that the resources we can spare to the cause of cleaning up the environment are well spent. And we want to know that compliance with environmental requirements is being ac-

complished with the least possible disturbance to the economic health of our economy. Ultimately, as we all know, money spent on environmental clean-up is going to come from the pocket of the consumer—and he has little enough to spare these days.

I would suggest that two requirements are fundamental in achieving a peaceful coexistence between environmental and economic concerns. First, we need reasoned environmental planning, taking into consideration the economic and employment impact of environmental alternatives. The Committee recognizes this need. Second, I would suggest that the federal government must act responsibly toward industries attempting to comply with environmental requirements. The federal government must not make arbitrary revisions in regulations or tack on new and different requirements after industry efforts are underway. Nor should the Federal government impose standards which, while desirable, are unreasonable within the present technological and economic framework.

Good faith industry efforts must be met with reasoned planning, and good faith efforts from the federal government. When they are not, it is the public that loses.

INTERIM MEMORANDUM OF THE EDISON ELECTRIC INSTITUTE

OVERVIEW OF THE ECONOMIC IMPACT OF ENVIRONMENTAL REGULATIONS

Environmental regulations are imposed on electric utilities by all levels of government—Federal, state, and local. They take a variety of forms, and range from esthetics to health, safety, and welfare. Local regulations were the first to come, and although the bulk of environmental regulations continue to be local in nature, Federal regulations have been given considerably more attention in recent years. Federal regulations generally are designed to be uniform across the nation and often are created in the face of what may appear to be very different conditions.

We estimate that present environmental expenditures by investor-owned electric utility companies are running well over $3 billion a year. We know, too, that the electric utility industry is currently committed to the expenditure of over $2 billion for the construction and testing of a single approach to just one of the environmental problems facing them—the development of flue gas desulfurization systems for coal-burning steam electric power plants. The potential significance of environmental expenditures can be illustrated by two specific cases: (1) The Southern California Edison Company estimates that on one of its plants, which cost $250 million, installation of a flue gas desulfurization system will cost an additional $200 million; (2) The Southern Company system estimates that Clean Air Act requirements for control of sulfur oxides are increasing its costs by one third. This year the increase amounts to roughly $400 million. The Southern Company estimates the increase due to environmental expenditures amounts to $177 per household annually for the 2¼ million households it serves, a 75 percent increase in the average household bill. A portion of this increase would be paid directly by the householder in his electric bill, and the balance would result indirectly through the increased costs of goods and services provided by industrial and commercial consumers of electricity.

It is argued by some that electric utilities should not be overly concerned about environmental regulations which require the expenditure of large amounts of money. After all, this argument goes, utilities merely pass the cost on to their customers. If we assume that industries eventually include all their costs in the prices they charge, this is true. However, regulatory lag in receiving rate relief, debt and equity capital market conditions, inflation, material shortages, fuel price and availability, and other factors make this theory one which is largely inapplicable to the electric utility industry.

Electric utilities are very concerned with the welfare of the communities they serve. Their task is to furnish reliable electric service to all customers at reasonable rates; to give consideration to the long term as well as the short; to earn a reasonable return on investment so that service can be continued; and to act as a positive force to improve the economy and well-being of their service areas. The recent onset of environmental expenditures, the benefits of which are unclear and

whose need is often based on relatively sparse, scientific documentation has caused real distress.

At the end of 1971 the electric utility industry reported a total capital investment for environmental quality of about $5.6 billion, with another $1.5 billion of work in progress. It is likely that no other industry could have sustained such a high level of environmental expenses at that time, and there are a few industries which have approached the environmental expenditures of electric utilities in the intervening years. By 1972, the investor-owned electric utility industry was spending an estimated $2.1 billion each year on environmental controls. Full implementation of the Clean Air Act and Federal Water Pollution Control Act, all agree, will significantly increase utility environmental expenditures.

Environmental expenditures may be easily identified in some industries. However, in the electric utility industry the definitional problems are frequently complex. For instance, is protection of public safety, like protection of public health and welfare to be considered an environmental expenditure? If so, the environmental investments at nuclear power plants may reach 25 percent of the total capital required. Frequently, this level of expenditure is compared with environmental expenditures at a coal burning electric plant, which today may reach about 10 percent of the total investment in the plant. This comparison, however, ignores expenditures for safety at the coal-burning plant which for years have been taken as a matter of course. Similarly, construction of a cooling tower may be required in one instance to minimize the effect of thermal discharges and in another to make the best use of scarce water supply. In the first instance, the environmental consideration is clear, in the second, it is not so obvious.

It is also difficult to determine how much of the environmental expenditures being made can be characterized properly as inflationary. In the sense that such expenditures add nothing to the efficiency of production and frequently detract from it. The bulk of the industry's environmental costs could be seen as inflationary. On the other hand, society has indicated, through the legislative process, that a greater degree of environmental control is desirable, that controls should be undertaken and that the cost of these controls should be internalized by industry insofar as possible. Meaningful cost-benefit analyses that can serve as a guide to policymakers should be undertaken so that general agreement can be reached as to the necessity and desirability of each environmental expenditure. Estimating the cost of environmental controls is a complex process which involves estimating the continuing application of emerging technologies and standards which are not clearly defined and require implementation over extended time scales. Therefore, these costs are often difficult to arrive at until after the fact and there is serious question as to the reliability of utilizing data from the little experience of past years to forecast the magnitude of future expenditures. Benefits have been even more difficult to quantify. Hopefully, the attention being given by the Joint Economic Committee to these complex matters will help the level of understanding.

CLEAN AIR COMPLIANCE COSTS

It is probably impossible at this stage, to estimate with any precision the true cost impact of the Clean Air Act of 1970, in all its ramifications, on the electric utility industry and its customers. The variables (including differences in standards, options for meeting standards, the pollutants to be regulated, the affect of inflation on costs, the effect of improved technology on costs, and other factors) are great, and the unknowns (future standards which may be set, discretionary actions by the EPA administrator, differing interpretations of regulations among the EPA regions, pending litigation, and other factors) are at least as numerous. Moreover, it is difficult to differentiate between environmental expenditures which a company may have been making over a period of years and the same or similar expenditures mandated under the Clean Air Act. Finally, there are problems stemming from accounting procedures which frequently make it difficult to identify specific items of expenditure which may be the result of air quality regulations. Recognizing all of this, it remains desirable to attempt to estimate these costs, at least on an order-of-magnitude basis.

Over a considerable period, Edison Electric Institute has made a number of efforts in this direction. Chief among them have been:

1. An industry survey asking for historical, current, and near future environmental expenditures by such general categories as air quality, water quality and land use, with subheadings for capital costs, operating costs, and research costs. It became evident quickly that (a) the historical data was sketchy and of little value, (b) the current data was helpful, but reflected definitional problems, and (c) beyond the following budget year, forecast data was of little meaning. This survey has been continued for several years, and the current totals are of the same general order of magnitude as the similar surveys made by McGraw-Hill's Economics Department and the U.S. Department of Commerce. None of these surveys have fit particularly well with the data issued by the FPC, based on its Form 67. Hopefully, the new procedures for reporting environmental expenditures being instituted by the FPC will provide a better basis for current data and the development of a meaningful historical series starting in 1974 or 1975 and going forward.

2. An in-depth analysis of environmental expenditures of about a dozen electric utilities, varying in size, location, and primary fuel. The main objective here was to try to establish a cost per kilowatt relationship, both for overall environmental expenditures and by major category (air, water, noise, land use, etc.). A project team visited each of the participating companies in order to reduce definitional differences to a minimum. A large body of data was gathered, analyzed, and found to be of little value for forecasting purposes. Rapidly escalating costs, inability to assign meaningful costs to areas of emerging technology such as flue gas desulfurization. and new regulatory requirements all were contributors to the problem. The techniques used in developing rationale will be of value in some future, more stable period; and an attempt made, with the assistance of a consultant, to relate costs to benefits represented an early serious exploration in this direction.

3. A review of purchases of major items of environmental control by the industry (i.e., electrostatic precipitators), based on manufacturers' shipments. This survey produces meaningful, if limited, data.

4. A review of EPA economic and environmental analyses. Here, procedural assumptions made by EPA were followed but assumptions concerning equipment and operating costs, consistently underestimated by EPA, were adjusted to be more realistic. The advantage of this technique lies in the fact that it focuses attention on the significance of unit costs when applied to an industry of the size of the electric utility industry.

Currently in progress is a detailed, plant by plant analysis of all steam electric generating units in operation, under construction and committed in the United States which will provide detailed information beginning with the year 1970. The type and quality of fuel, relationship to local air quality requirements, and plans for meeting their requirements are included in the analysis It is of interest that of the fossil fuel burning plants analyzed thus far, about 80 percent currently meet ambient and secondary standards. The analysis draws on experience gained from previous studies and, by early 1975, should make it possible to estimate clean air costs for electric power supply systems in this country with considerable confidence. It has been undertaken in cooperation with EPA, and with the advice of FPC and FEA, using data gathered by FPC, FEA and EEI in the hope that a sound data base will be useful to all these parties.

Against this background, a tentative estimate can be made to indicate the order of magnitude of expenditures being required by the electric utility industry under the Clean Air Act. The major elements of this estimate, calling on several of the approaches described above, are as follows:

1. There are presently some 26,000 mw of scrubber capacity, in test operation, under construction, or committed by electric utilities in this country. The total capital investment represented by these units is about $2 billion.

2. EPA estimates that about 62,700 mw of capacity will require scrubbers in 1975 to meet ambient standards, and that by 1980 an additional 37,300 mw will be required. On this basis, the capital investment required for scrubbers by 1980 will be about $7.5 billion dollars.

3. To this amount should be added capital expenditure for electro-static precipitators, used to control particulate emissions. Currently, shipments of precipitators to the electric utility industry are running out of $65 million a year (1972—$49.71 million, 1973, $71.85 million). By 1980 the total capital required for precipitators would be about $325 million.

4. Monitoring equipment represents a third major capital item, EPA has proposed regulations which would require an immediate capital investment of $140 million a year by the electric utility industry, with an approximate $6 million additional required annually in the future. The total requirement for monitoring equipment under these proposed regulations through 1980 would be about $170 million.

5. Thus, electric utility industry capital requirements to control sulfur oxides and particulates, and to monitor the activity, appear to be on the order of $8–10 billion through 1980. It should be noted that a number of significant cost elements are not included in this estimate. For example, premiums paid for low sulfur fuels burned to meet air quality requirements and the cost of control of NO_x are not included. Just as important, the estimate does not reflect operating costs, which will be substantial but which are even more risky to estimate at this stage of scrubber development than are capital costs. A recent EPA–TVA estimate suggests scrubber operating costs in the range of 2.20–3.31 mills per killowatt-hour. If this estimate is accepted, then the operating cost for the 100,000 mw of capacity requiring scrubbers in 1980, as suggested by EPA, would be $1.5 billion for that year. The operation of this environmental equipment includes an efficiency penalty which decreases the affected plants output capabiilty and increases its fuel requirements. EPA estimates that 4–7% of a plants output will be required to operate scrubbers. An additional penalty may be required to operate electrostatic precipitaors. This lost capacity must be replaced at a cost estimated by EBASCO to range from $550/kw (1979 Coal) to $750/kw (1982 Nuclear).

These estimates are intended to provide a suggestion of the order of magnitude of expenditures being required by the electric utility industry, rather than definitive forecast. They are at an early stage of development, and will be evaluated against the detialed plant-by-plant study now underway. For purposes of comparison, the total construction expenditures estimated for the electric utility industry for the 1974–1980 period are $170 billion.

FEDERAL WATER POLLUTION CONTROL ACT COMPLIANCE COSTS

The same conditions which make it difficult to estimate with confidence the cost impact of the Clean Air Act also make difficult the determination of the cost impact of the Federal Water Pollution Control Act. The Federal Water Pollution Control Act, like the Clean Air Act, is a technology based statute which requires the application of general standards over an extended time frame. The full impact of this Act will not be realized until the 1983 "Best Available Technology Economically Achievable" standards are fully implemented. Further even more substantial expenditures will be required if the 1985 goal of "No Discharge of Pollutants" becomes a reality.

The true economic impact that the environmental requirements of the Federal Water Pollution Control Act will have on the electric utility industry is not measureable at this time. In addition to the factors refered to above, this situation prevails because neither the standards nor a precise definition of the group to which they will apply has been established in finality. (The Rules and Regulations published by EPA on October 2, 1974, are now under appeal in the Fourth Circuit Control of Appeals.)

The October 2, 1974 Promulgation (39 F.R. 36175 et. seq.; October 8, 1974) did not represent all of the environmental regulations which will be imposed on the electric utility industry. Some regulations, such as the Oil Spill Pollution Prevention and Control Requirements of § 311 of the Act, existed prior to the October 2, 1974 Promulgation. Other environmental requirements are presently under development by EPA. They include (1) the § 316(a) Technical Guidance Manual for Thermal Discharges; (2) The Technical Development Document and Economic Analysis of § 304 and § 306 Effluent Guidelines and Standards; (3) Rules and Regulations and Technical Development and Economic Analysis Documents under § 316(b); (4) Toxic Pollutant Effluent Standards under § 307; (5) Hazardous Substance Regulations under § 311; and others. In addition to these and other requirements of the Federal Water Pollution Control Act, additional environmental compliance costs will be ultimately required by other existing statutes, such as the Noise Control Act, Coastal Zone Management Act, and proposed legislation, such as The Solid Waste Utilization Act. The economic im-

pact of these environmental regulations are even more difficult to estimate; therefore, for the purposes of this Interim Memorandum further discussions of Water Quality Costs will be limited to the implementation of the October 2, 1974 Rules and Regulations and Federal-State Water Quality Standards.

In order to competently evaluate the cost of compliance with the Federal Water Pollution Control Act all of the standards and their applicability must be known. And EPA agrees that the various sections of the Act which affect the electric utility industry must be examined as a package because of their close interrelationship.

When EPA Regulations under the Federal Water Pollution Control Act were proposed the electric utility industry responded with over 1600 pages of comments on the regulations which included critiques of the standards and their support documents. In addition the comments included alternative proposals which would accomplish the required level of environmental control at a much reduced economic impact. (A copy of these "comments" was submitted to committee staff.) The October 2 Regulations do not represent the "whole package" and complete analysis therefore must await promulgation of remaining standards. Additionally, pending litigation could either increase or decrease the economic impact of this package. Further complicating this determination is the study now under way by the National Committee on Water Quality, established by § 315 of the Act, to evaluate the technical, economic, social, and environmental effects of achieving or not achieving these proposed standards. The Commission is charged to report to Congress by October 18, 1975 and recommend legislation as required by its findings. This "mid course correction" could obviously either increase or decrease the economic impact of the Act.

As to the October 2, 1974 Promulgation, notwithstanding its pending appeal, EPA has not yet completed its Economic Analysis or Technical Development Documents. Thus, it is impossible for the electric industry to evaluate the full and true impact of the regulations at this time. We have, however, drafted a memorandum dated October 26, 1974, entitled "Current Analysis of Aggregate Capital Requirements" which very roughly estimates the "cost" of the October 2 promulgation. (A copy of this memorandum was submitted to committee staff.)

It should be noted that at no time has EPA ever attempted to Cost-Benefit these regulations. The results of industry attempts to perform such an analysis are reflected on page 2 of the summary of the "Comments". Our analysis of the March 4, 1974 Proposed Regulations indicated that costs far exceeded benefits. The proposed regulations were estimated by industry to require by 1983 a capital investment of $48.1 billion while EPA's "best" estimate was $23.2 billion. The proposed regulations were estimated by industry to cost, by 1983, approximately $250 per household.

The October 2 Regulations are estimated by industry to require capital expenditures through 1983 (current dollars) of $14.4–17.8 billion. EPA's estimate for this same period is $10.6 billion. The difference in these estimates is due primarily to (1) the present uncertainty as to the applicability of Thermal Exemptions (§ 316 (a)) and Federal-State Water Quality Standards (§ 301(b)(1)(c)) and (2) different assumptions as to unit costs and the annual demand growth rate. The difference does not result from assumptions as to the standards or the group to which they are applicable. It should be noted that the industry proposal as to the Thermal Regulations would reduce the cost of that aspect of control by one-half. (See Table A, page 2, "Current Analysis of Aggregate Capital Requirements", Sept. 26, 1974.)

The industry estimate represents a 4.4–5.4% increase in capital requirements, which will increase operating revenue requirements $3.9–5.0 billion (current dollars) and consumer charges 1.1–1.5 mill/kwh, a 2.4–3.4% increase in consumer charges. The regulations per household cost is estimated, by industry, to be $49–63 per year by 1983.

Comments by the National Canners Association

INTRODUCTION

The costs to canners for technology to meet national environmental standards implementing Congressional mandates ultimately are passed on to consumers in the form of higher prices. Most spending for environmental controls is nonproduc-

tive in the sense that it does not contribute to expanded production capacity or increased efficiency. These costs have a serious impact on the food processing industry, which is characterized by a large number of small businesses operating on a low profit margin.

The canning industry has not yet quantified the price impact of environmental standards on its products, for several reasons:

First, water pollution regulations (effluent limitations guidelines) affecting most commodities processed by our industry will not be promulgated until March or April of 1975. Since our industry does not know what standards it will be required to meet, it cannot predict what their cost will be.

Second, no thorough study has been conducted of the total impact of environmental controls on the price of processed foods. Most environmental studies have examined the impact of a single proposed regulation on the affected industry or the environment. None have examined the cumulative impact of regulations which affect fertilizer and pesticide manufacture and use, planting and harvesting operations, and processing and distribution of the end product. Based on present knowledge, we believe that the cumulative impact is significant, and will increase. A study should be initiated to measure the inflationary impact of all environmental regulatory actions. The study should encompass not only the Federal Water Pollution Control Act, currently being studied by the National Commission on Water Quality, but also National Environmental Policy Act and Federal Environmental Pesticide Control Act as well.

Third, diversity in the food processing industry creates severe difficulties in assessing the impact of environmental standards. Companies located on water quality-limited sections of our nation's waterways must install more costly wastewater treatment systems than those located on technology or effluent guideline-limited waterways; others with suitable low-cost land for disposal of wastes will have lower treatment costs than those required to use newly constructed municipal systems. Processors require particular pesticides for special uses, depending upon where they are located. Should environmental standards prevent the use or limit the availability of these pesticides, yields of many crops may be greatly reduced due to the use of less effective pesticides that may also be more expensive. Many food canning operations are relatively small, family-owned enterprises. Many of these firms are literally overwhelmed by the barrage of Federal regulations they must meet.

With this background we would like to examine in more detail two environmental standards, effluent limitations guidelines and pesticide use control standards, and then discuss our assessment of the need for enactment of a "Consumer Cost Evaluation Act."

EFFLUENT GUIDELINES

EPA has promulgated effluent limitations guidelines for the crab, shrimp, tuna, apple, citrus, and potato (not canned) segments of the food processing industry. However, guidelines for most commodities processed by our industry—including canned tomato products, corn, snap beans, peas and peaches—will not be promulgated before March or April, 1975. As to the latter, we can provide information only on the anticipated impact.

Attached for review by the Committee is a copy of a booklet prepared by the technical staff of NCA titled, *Impact of Environmental Controls on the Fruit and Vegetable Processing Industry*. This report is based upon an industry survey conducted by our Association. It provides our best estimate of the economic impact of meeting EPA effluent limitations guideline requirements. The report states that up to 400 canning plants could be closed, with resulting layoffs of between 27,000 and 59,000 persons, primarily in small towns where canning plants are major sources of employment.

Also enclosed for the Committee's reference is a copy of comments prepared by Mr. Roger Huibregtse of The Larsen Company, Green Bay, Wisconsin, and NCA staff. Mr. Huibregtse's thoughtful paper discusses our industry's concerns regarding EPA's implementation of this Act.

Reports on the economic impact of recommended or proposed effluent limitations guidelines on the seafood, fruit, and vegetable processing industries are now being prepared by Development Planning and Research Associates, a private contractor, for both EPA and the National Commission on Water Quality (NCWQ). Drafts of the contractor's reports being prepared for EPA should be

available by mid-February, 1975, and the draft report to the Commission should be available by June. The EPA reports will specifically assess the economic impact on the affected industry segments. However, the report being prepared for the NCWQ, while not covering seafoods, will assess the accumulated impact of proposed and final effluent limitations guidelines on the price and supply of the following interrelated consumer products: fertilizers, grain, canned and preserved fruits and vegetables, meat and dairy products, and leather tanning.

The economic impact of effluent guidelines on certain segments of the canning industry are contained in the following documents which the Committee may wish to obtain from EPA's Economic Analysis Division (Tel. 755–2790). While not dealing with impacts on price or cumulative impacts, they do provide useful information.

1. *Economy Impact Analysis of Proposed Effluent Guidelines on the Fruit and Vegetable Processing Industry* (apple products, citrus products, and non-canned potato products only), prepared for EPA by Development Planning and Research Associates, under Contract Number 68–01–1533.

2. *Economic Analysis of Proposed Effluent Guidelines for the Seafoods Processing Industry* (catfish, crab, shrimp, and tuna only). Prepared for EPA by Development Planning and Research Associates of Manhattan, Kansas under Contract Number WA–73X–425.

PESTICIDES STANDARDS

To our knowledge no studies have been undertaken by EPA or state or local governments to assess the impact of standards developed under authority of the Federal Environmental Pesticide Control Act of 1972 on consumer prices of fresh or processed foods. We urge that such a study be made before these regulations take effect.

CONSUMER COST EVALUATION ACT

As the foregoing comments indicate, many government regulations and standards may have an obvious but unquantified affect on the food processing industry and the ultimate cost of food to consumers. At the Chicago Agriculture and Food Economic Conference, September 12 and 13, 1974, the National Canners Association called for a consumer cost assessment to be made of all new controls proposed by any Federal Agency. Draft legislation has been prepared which would require cost assessments to be made by agencies proposing new regulations or legislation using guidelines that would be promulgated to provide for uniformity in assessments. The bill also would grant authority for review of existing laws and regulations and their ongoing cost implications.

Recent action taken by President Ford, (Federal Register, November 29, 1974) in requiring "Inflation Impact Statements" (IIS) for all *major* proposals for legislation and for promulgation of regulations or rules by the executive branch of the government, and by the House of Representatives (Resolution 988, October 8, 1974) where similar IIS's are required on reported House bills, are steps in the same direction. Your own efforts at enacting "fiscal note" legislation also speak very well to this issue. This type of cost assessment will help identify government actions that could cause an increase in the price of consumer goods and will allow elected representatives and civil servants to assess the economic impact of their proposed actions, prior to their implementation. We strongly support the requirement that an "Inflation Impact Statement" be prepared on all major legislative and regulatory proposals and further urge that Congress pass the "Consumer Cost Evaluation Act" when it is introduced in the 94th Congress.

COMMENTS OF THE NATIONAL CANNERS ASSOCIATION, BY ROBER HUIBREGTSE, DIRECTOR OF OPERATIONS, THE LARSEN CO., GREEN BAY, WIS.

I. *Introduction*

The canning industry supports the application of the "best practical control technology currently available" (BPCTCA) to the treatment of canning industry wastes. Unproven transfer technology based on experience in the treatment of lower strength domestic sewage or in other industries should not be declared BPCTCA for treatment of fruit and vegetable processing wastes. Under some conditions where land availability, size of plant, economic factors, and location permit, application of BPCTCA may achieve reductions in BOD and SS greater

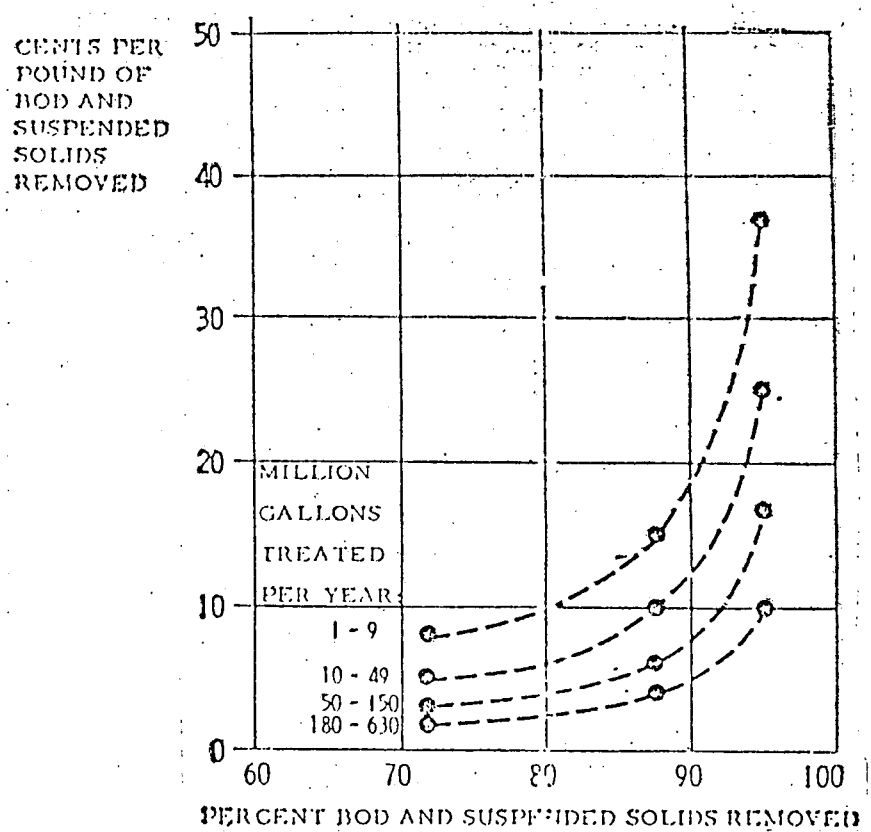
than 95%. Such efficiency in treatment of food processing wastes can not be achieved, however, under all operating conditions when the many practical and economic factors affecting BPCTCA are adequately considered.

II. *Economics of Treating Wastewaters from Fruit and Vegetable Processing Operations.*

For each of the members of the Committee a copy of MCA's publication, *Impact of Environmental Controls on the Fruit and Vegetable Processing Industry*, is provided. The chart that appears on page 11 is reproduced on the following page.

It is apparent from the chart that when percent removals above 85 to 90% are required, the costs of treatment increase substantially. In fact, it costs more to treat from 85 to 95 percent removal, than it does to remove the first 85 percent. Reference will be made to this chart later in our testimony.

FIGURE 1.—Costs of treatment by percent of purification and size of treatment system.



Taken from "Impact of Environmental Controls on the Fruit and Vegetable Processing Industry." Published by NCA Berkeley Laboratory, 1974.

III. *Impact of Pollution Control Costs on Small Fruit and Vegetable Processing Plants*

Reference is made to page 12 of the "Impact" document concerning plant closings. The information presented was summarized from an industry survey conducted by NCA in 1973. It indicates the level of pollution control costs (in addition to current expenditures) that will cause a plant to go out of business. In operating their own treatment systems, average plants processing 1000 tons of

raw product per year can afford to remove about 60% of the BOD and suspended solids and remain in business. Average five thousand ton operations can afford about 80% removal, and 10,000 ton average plants about 90%. Larger average plants could afford higher removals if they were situated where building a treatment system was practicable. The feasible expenditures are highly variable among plants. About one out of six of even the largest plants could remove only 75% of the BOD and suspended solids without prohibitive costs. Irrigation disposal costs are estimated to be uneconomic for average plants processing from 5,000 to 10,000 tons per year or less and for plants of any size that are not near land suitable for this method of liquid waste disposal.

Currently city disposal costs are economically feasible for average plants of almost any size. However, small plants below average in their ability to pay pollutant costs and any plants remote from city treatment works will find such costs prohibitive. Furthermore, where municipal facilities are built new, expanded, or upgraded to meet federal requirements, sewer charges will increase drastically due to cost recovery requirements.

The following projections have been estimated from the industry study: About 160 of the industry's 550 plants that treat their own wastewater will be forced out of business if required to reduce their BOD and suspended solids discharges by 90%, about 230 of these plants will close if the requirement is 95% reduction. Almost 50 plants of the approximately 600 that use irrigation disposal will be unable to meet future costs and more than 200 plants of the 1100 that use city treatment systems will close because of increased charges.

The plants estimated to close because of pollution control costs are nearly all small plants. Together, they employ 27,000 full time workers and an additional 31,000 part time; they pay out $140 million per year in wages and salaries and buy raw products from 14,000 growers, for about $160 million per year. Collectively they generate between $600 and $900 million per year in economic activity in their local communities. About half the towns in or near where these plants operate have populations below 2,500 and three-quarters of the localities have populations of 5,000 or less, thereby accentuating the impact of potential plant closings.

It is recognized that all of the plants included in this NCA survey cannot be prevented from closing. However, by applying reasonable cost/benefit ratios and requiring only that level of treatment necessary to protect water quality, it may be possible for at least 50 percent of the small plants to stay in operation and continue to support the economy of the communities in which they are located. Promulgations by the EPA on treatment requirements must be tempered by qualifications and realistic compromises where the environment will not be in danger so as to permit survival of small businesses.

IV. *Secondary Treatment Versus Best Practical Treatment*

Technically and otherwise, there is no difference between pollution characteristics from food processing operations involving fruits and vegetables whether processed in the home or in the food processing plant. Effluent from all industry categories such as iron and steel and electroplating, however, cannot be related to domestic sewage. Therefore, when the Act was developed, there was a need to define treatment for wastes other than those similar to domestic waste, which for 1977 has been called best practical for all industrial waste. We believe that secondary treatment (85 to 90 percent BOD and TSS removal) of wastewaters from fruit and vegetable processing plants should be defined as BPCTCA because these wastewaters are the same as domestic sewage, except for strength.

We believe some insight of the intent of Congress can be obtained in the House Committee Report on page 101. "It has been argued before the Committee that privately-owned point sources should not be held to a stricter standard than publicly-owned treatment works which are required to meet secondary treatment or the equivalent. This argument was rejected by the Committee. Secondary treatment as considered in the context of a publicly-owned treatment works is generally concerned with suspended solids and biologically degradable, oxygen demanding materials (BOD). Such a standard in the minds of some, if applied to effluents containing material other than suspended solids and BOD, would be an empty standard. Best practicable control technology currently available might mean 'secondary treatment' for some effluents but it is not a synonym for secondary treatment." This statement clearly indicates that the intent is the equivalent of secondary treatment when BOD and suspended solids are the only major parameters of consideration which is the case for food

processing wastes. The only reason this standard cannot be applied to other wastes is that many other industrial wastes do not have BOD and suspended solids as major criteria and therefore would be an "empty standard." Since the major concern for food processing wastes is BOD and suspended solids, then the required treatment for 1977 until 1983 should be the equivalent of secondary treatment.

It is difficult to rationalize that a pound of BOD in the home or a commercial establishment such as a restaurant, should be considered different for the same food commodities as a pound of BOD in a food processing plant. If there is a desire to penalize the food processing industry as against the general public, then a better definition is required to provide guidance as to how severe this discriminatory penalty should be.

As an example, treatment of domestic sewage containing 10,000 pounds of BOD results in 1,500 pounds (85 percent removal) of BOD discharged to the receiving stream, as long as the receiving stream will not be adversely affected by the effluent. Effluent limitations guidelines have been promulgated requiring a frozen potato processor to discharge as little as 100 pounds of BOD to the receiving stream when starting with the same raw waste load of 10,000 pounds of BOD. This is an inequitable requirement, especially for the small food processor, and in particular the seasonal operator for whom this creates difficult if not impossible economic constraints.

The plight of the food processor is due to the fact that he has already practiced water conservation and reuse, which is not done in the home or in the commercial food establishment such as restaurants. In doing this, he has increased the concentration of his waste up to ten times that of domestic sewage and, for achieving this desirable goal, he is penalized by the final effluent limitation regulations.

Even if Congress intended to discriminate and demand more of a food processing plant than of the local community, we cannot conceive that the intent should have been carried out to a ratio of 15 to 1 on the final effluent. If a domestic system is allowed 1,500 pounds discharge from 10,000 pounds BOD, then a much fairer relationship such as perhaps, 1,000 pounds in place of the 1,500 for domestic would provide a more realistic goal that will permit greater economic equity.

That food waste be considered relatively the same, whether originating in a domestic system or a food processing plant, is extremely important in combined municipal treatment including domestic waste with many food processing plants or even a single food processing plant. In a city like Chicago or Philadelphia, it is completely impractical for these communities to consider that the pounds of BOD originating in a food processing plant would have to be treated to 99% BOD reduction, whereas the rest of the domestic sewage only has to be treated to 85% BOD reduction. Since this cannot be factored out in such a complex system, it is wholly inequitable in small communities to design a system such as the previous analysis of 10,00 pounds of BOD of domestic waste versus 10,000 pounds BOD of food processing waste, wherein the one in a combined system can be treated to a residual of 1,500 pounds of BOD and the other can only have a residual of 100 pounds of BOD. In the case of a combined system, present regulations (See Section V. for details) would dictate treating this 20,000 pounds of BOD to 1,600 pounds and charging all cost for additional treatment back to the food processor. This has two serious effects: It places the food processor in a small community at a competitive disadvantage with a food processor in a large city, and the cost to treat his waste this way in a small community will be considerably larger than if he were in a position to treat his waste himself and discharge directly to a receiving stream.

Industry treatment of fruit and vegetable processing wastewaters to 98 or 99% removal of BOD and TSS will result in little improvement in water quality when municipalities continue to discharge at the 85 to 90% reduction level. Since it is improvement in water quality that is the objective of treatment, it is apparent that the costs incurred in industry treatment of fruit and vegetable processing wastewaters to 98% or 99% removal will be much greater than the benefits in improved water quality obtained.

For all the above reasons, it is apparent that there is a need to consider the treatment of fruit and vegetable processing wastewater commensurate with domestic sewage. If they cannot be considered on an equal basis, the degree of variation in treatment requirement should not be the extreme presently encountered in the EPA regulations.

V. *EPA Requirement that Municipalities Treat Fruit and Vegetable Processing Wastewaters to the Same Percent Removal as Required by Guidelines*

EPA regulation 133.103(b) (*Federal Register*, August 17, 1973, p. 22299) requires municipalities to treat compatible industrial wastewaters to 30 mg/l BOD and TSS or to higher values if guidelines higher than this value have been established for major participating industries. This means that municipalities must treat the compatible wastes from fruit and vegetable operations who are major contributors to the same percent removal as required by guidelines for direct discharge or to 30 mg/l BOD and SS, whichever number is greater. In the case of a "typical" frozen potato processor for whom guidelines have already been promulgated, a municipality must treat to 94% BOD and to 93% TSS removal. Many frozen potato processing plants, however, will not be "typical" and the municipality will have to treat wastewaters from these plants to even higher treatment removals. As previously stated, when treatment above 90% removal is required, the cost increases dramatically and in most cases the extra treatment will not result in a significant improvement in the quality of the receiving water. For these reasons, we believe that municipalities should not be required to treat compatible wastewaters from fruit and vegetable operations to achieve percentage reductions in BOD and TSS much greater than required for treatment of domestic sewage. In most cases this would be 85% to 90% reduction. Treatment to this level would be cost effective and hence would encourage industry's participation in joint treatment facilities.

We strongly reiterate our statement that requiring municipalities to treat compatible industrial wastes to 98% or 99% removal would create excessive costs which are not justified. Furthermore, it would create many technical problems which could not be resolved at this time with available technology.

VI. *Issuance of NPDES Permits that Require Effluent Treatment More Stringent Than That Required for Implementation by 1983*

Several states and regions, when issuing NPDES permits under Section 402(a) of the Act in order to protect receiving stream water quality, are establishing requirements more stringent than the effluent limitations based on the 1983 best available technology standards. The Wisconsin Department of Natural Resources (DNR) for instance, has determined that virutally all streams in the state are water quality limited. Permits are being issued without compliance with the requirement of Section 302(b) that effluent limitations more stringent than the 1983 standards may not be imposed in order to attain a specified water quality, without first holding public hearings to consider the relationship between the economic and social costs of complying with such limitations and the social and economic benefits to be obtained. In many cases, these public hearings have not been held.

Since the Larsen Company has not yet received a finalized permit, we can only cite the proposed permits which we have received for three of our plants. These proposed permits are subject to revision, and we do expect substantial changes in the final draft. The final permits will apparently be based on water quality considerations rather than effluent guidelines for all of our plants. Using our Hortonville plant proposed permit as an example, we would be allowed a daily maximum BOD discharge of 60 mg/l and SS discharge of 70 mg/l. With these restrictions, we would still be required to obtain written aproval from the Wisconsin DNR who will determine the time and rate of discharge. In effect, we would not have a permit. The Larsen Company has been working closely with the DNR and we feel that our problems are being listened to, but this is an indication of the position of all industry in Wisconsin.

When water quality standards are used for issuance of permits as in Wisconsin another problem develops. Each stream will be analyzed and its maximum wastewater assimilative capacity will be established. This assimilative capacity in Wisconsin is to be based on the 10 year low stream flow. With this method of determining assimilative stream capacity, most streams would not be able to receive BOD and TSS loads other than those from municipal treatment plants. Since municipal plants are required to have only secondary treatment by 1977 the BOD load emanating from these plants will use all or most of the streams assimilative capacity. The question arises as to what will be expected from industries located on these streams. Since most fruit and vegetable processing plants in Wisconsin are located on or near small streams, this problem will have to be faced by most canners in the State.

VII. *Federal Funding of Municipal Treatment Facilities*

The corporate policy of The Larsen Company has been to work with the communities in which our plants are located and encourage construction of joint municipal treatment plants to provide final treatment for our process wastewater. Two of these communities, Hortonville and Cedar Grove, are under Pollution Abatement Orders from the Wisconsin DNR to improve their effluent quality. The City of Brillion must also build a new plant to treat wastes from planned population increases, but they are not under a formal order.

The village of Cedar Grove, began to seriously consider construction of a new treatment plant in 1968, when they hired a consulting firm. The Larsen Company indicated their interest in a joint treatment plant at that time. A proposed plan was submitted to the DNR for approval shortly thereafter. The DNR would not give approval, however, and the next three years were spent working out a plan which the DNR could approve. They were prepared to start construction in 1971, but they were unable to secure Federal funding. The entire program is still waiting for financial aid grants. There are currently 515 municipal treatment plant projects in Wisconsin waiting for funding. The 515 proposed projects are numbered on a priority basis. Uncommitted funds through 1975 will take care of only the first 37 projects. Two things have restricted further project construction:

1. If the Federal aid to projects in Wisconsin were based on population, we would receive approximately 2.1% of the total aid rather than the 1.33% we are receiving for 1975.

2. President Nixon has impounded one-half of the $18 billion appropriated by Congress in Public Law 92–500.

Since Cedar Grove is number 53 on the priority list, it will be at least 1976 before Federal grant money is available. If construction takes two years, it will be 1978 before the plant is operational.

Hortonville was issued a Pollution Abatement Order in July of 1971 to expand their plant. They hired a consultant shortly thereafter to proceed with the plans. They are now ready to proceed with the project, but with a priority number of 231 it will be at least 1978 before Federal aid is available.

Brillion has experienced a rapid industrial and residential growth rate and consequently must expand their treatment facility. With a priority rating of 275, funding for their project will not be available before 1979.

Both the municipal leaders and the industries are faced with decisions that affect the future of these communities. Should the community accept a 25% State grant, which does not include sewer rehabilitation, and bond the remaining 75%. Or should the community wait until 1976–1979 when the Federal grant is expected? If they go with only State aid now, the bond repayment will continue for many years. This would be a very unpopular program if 75% Federal funding would have been available only a few years later. If they wait until the Federal grant is available, they may find that the Federal assistance program is no longer funded and that they must proceed on their own with much higher construction costs. Of course, the real loser will be the receiving stream which will continue to receive effluent from these overloaded, outdated treatment plants.

Industries are required to meet their Best Practical Treatment by July 1, 1977. It now appears that the Cedar Grove facility will not be available before 1978, Hortonville before 1980 and Brillion before 1981. If The Larsen Company and other industries in these communities wait for these programs, we will be in violation of our NPDES permits. Industry is thus faced with the question: Can we wait for completion of these joint treatment plants and still maintain our production schedule, or must we build and operate our own treatment plants to satisfy our NPDES permits?

Competing with these small communities for the available money are several very large regional treatment systems which are planned for construction at great expense to the taxpayer and industry. Because existing local facilities are performing adequately, the effluent from the new regional treatment plants will be but slightly improved over the effluent now being discharged.

There are many municipalities in the U.S. today which are discharging raw sewage direct to the receiving waters. It would be more equitable and appropriate in achieving national water quality improvement objectives for the money to be spent where the need for water quality improvement is greatest. With this idea in mind, it would be preferable to upgrade existing primary systems to secondary and to build new regional secondary treatment plants where no treatment is now given before spending large amounts of money to build large regional facilities to replace already adequate local systems.

VIII. *Industrial Cost Recovery Programs for Municipal Treatment Plants*

Current EPA cost recovery regulations are dramatically increasing the cost of treatment of food processing wastewaters by municipalities in different cities across the country. We believe that the basic intent of PL 92-500 was to develop a sewer rate charge in each community that would be relatively the same throughout the country.

Some municipalities already have completely adequate secondary treatment facilities which include expansion for the future. Sewage rate charges at many of these existing facilities are only 10% of treatment rate charges likely to be imposed under the new super-regional schemes being developed under the new legislation.

Companies fortunate enough to have been able to join municipal treatment systems prior to the establishment of the new cost recovery requirement have modest wastewater treatment costs, while those who join new systems will have quite high costs. Obvious competitive advantages and disadvantages will result to the detriment of industries in many communities both small and large.

A few examples of inequities developing under the new method of industrial cost recovery are as follows:

Our Green Bay, Wisconsin plant, one of the largest canning and freeing plants in the State, discharges its liquid effluent to the City system after screening. Our costs per year until this year were included with our property tax bill and were about $5,000.00 per year. A new $65,000,000 metropolitan treatment plant is currently being constructed, and was funded prior to March 21 1973, and therefore 80% Federal and State funding was obtained. We, as a significant contributor to the waste treatment system, will be charged approximately $200,000 per year for waste treatment starting in 1975.

If this treatment plant were to be funded today under the new industry payback rules, our annual costs would be almost $300,000, an increase of 50%.

The same situation exists at our Fort Atkinson plant except at this plant we will be pretreating our wastes prior to final treatment in a new $4,000,000 municipal plant. At this plant our costs for pre-treating our wastes to the 90% reduction level of BOD and TSS will be less per year than our payment to the city to treat the additional 5%. This plant also was funded prior to the March 21, 1973 date.

Our Cedar Grove plant will pre-treat their wastes to a level of 95% before discharge to the yet to be funded municipal system. We anticipate our annual charges from the municipality will exceed our annual treatment costs even though we will treat nineteen times the BOD load that the municipality will treat.

While we have established a policy of joining with municipalities in joint treatment facilities where possible, we are now questioning the wisdom of this decision.

What will happen in the future to these joint treatment systems when the municipal plants become overloaded or are required to provide a higher degree of treatment? Will we as a contributing industry be required to pay a share of additional capital costs even though we may not have increased our waste load?

Some of our plants are located in cities where no land is available for construction of our own treatment facilities. These plants may be forced to close or move if treatment costs continue to increase as anticipated.

IX. *Limited Variance from Average Parameter Values of the Effluent Limitations*

The effluent limitations guidelines issued to date for sub-categories of the apple, citrus, and potato processing industry have contained an allowable daily maximum discharge rate that is twice that of the 30 day maximum average for both BOD and SS. If EPA establishes its guidelines for other commodities the same as it did for these, we expect the effluent limitations for some of the commodities which we pack, such as beets and peas to require an average treatment of raw effluent of up to 99% removal of BOD and greater than 98% removal of TSS. Using the 2x variable factor, the maximum daily allowable discharge rate would still require 98% BOD removal and greater than 96% SS removal.

We do not believe that it is realistic to expect this efficiency on a daily basis from any treatment system. The operation of a treatment plant for a cannery presents problems not found in municipal systems or most other industrial operations:

1. We are basically a seasonal industry with most plants operating less than six months each year.

2. Our effluent flow may reach an annual maximum one day followed by perhaps a week of no effluent discharge. This is due to the fact that we are processing raw agricultural commodities that must be packed when they are available in their peak state of maturity, otherwise they will deteriorate in quality or spoil.

We would almost certainly experience start-up problems of a treatment plant each year. This could account for several days above the maximum allowable discharge rate for both BOD and SS. With such a wide variance in effluent flow, nutrient balances and other parameters necessary for optimum efficiency would certainly be upset.

Another problem becomes apparent as the required efficiency begins to approach 100%—that is, that even a minor upset will make it impossible to achieve the required efficiency. It will be similar to a man making a two mile trip trying to average 60 mph and having to drive the first mile at 30 mph.

X. *The Need for Flexibility at the Local Level*

The Larsen Company does not believe that it is fair for the EPA to cite the records of the best treatment plants for each sub-category or to project results from treatment systems of unrelated industries which are unproven in a subcategory, and expect all plants to meet these standards. Our experience at The Larsen Company has shown that projection of results from one plant to predict results in a virtually identical situation can be very misleading. An example of this can be shown by comparing the results from the treatment facilities of our Hortonville and Cedar Grove plants. The raw effluent from both plants has similar BOD, TSS and pH characteristics. The volume of effluent from the Hortonville plant is about twice that of the Cedar Grove plant. Both plants discharge the effluent onto a saturated irrigation field and run-off is collected in the first of a three stage lagoon system. The water depth in each of the three lagoons is similar. With all of these similarities and no significant differences apparent to us, 175 h.p. of aeration are needed at Cedar Grove to produce an effluent comparable in quality to that of the Hortonville system with no aeration.

Another example is the use of land irrigation. One of our plants employs an irrigation system to successfully dispose of all its liquid wastes from a pea and corn operation. This same system was employed at another of our plants located only 15 miles away with absolutely no success. Soil characteristics resulted in abandonment of the irrigation system in favor of mechanically aerated ponds at this plant.

From these examples, the dangers of attempting to transfer the technology from one plant with anticipation of obtaining similar results from the other plants are obvious. Even more dangerous is the attempt to transfer concepts from one industry to another, without even a pilot plant study, in anticipation of achieving similar results.

The matrix method proposed by the Effluent Standards and Water Quality Information Advisory Committee has been endorsed by the members of our industry as being an acceptable method for establishing guidelines that will provide the desired and needed flexibility. This method, or one similar to it, if adopted by EPA, would take into consideration as required by Section 304(b)(B) of the Act such factors as ". . . the total cost of application of technology in relation to the effluent reduction benefits to be achieved. . . ., the process employed, the engineering aspects. . . ., process changes, non-water quality environmental impact. . . .," and other factors such as age and size of plant, age and type of process equipment, climate, geographic location, and economic equity. It is our belief that National guidelines should provide for improvement in water quality on a National scale, but with provisions for improving these guidelines, where the cost could be justified by the benefit to be derived.

XI. *Concluding Comments*

Concluding comments will contain information about the industry's commitment towards the solution of practical problems in the treatment and disposal of wastes to meet National objectives in water quality improvement while maintaining the economic viability of the canning industry. This challenge could prove to be overwhelming and impossible if unpractical and uneconomical requirements are imposed on food processors. Additional concerns of our industry members may be included in testimony presented at the hearings.

AMERICAN PAPER INSTITUTE,
New York, N.Y., November 27, 1974.

Hon. WILLIAM PROXMIRE,
Chairman, Joint Economic Committee,
Congress of the United States, Washington, D.C.

DEAR MR. CHAIRMAN: The American Paper Institute is grateful for this opportunity to present our views as part of the record of your important hearings on the "Economic Impact of Environmental Standards." We commend the Joint Economic Committee's efforts to understand the complex interplay of environment, energy, and economics in determining our quality of life.

The American Paper Institute is the national trade association of the pulp, paper and paperboard industry. Our 200 member companies produce over 90% of the pulp, paper and paperboard manufactured in the United States. Operating in almost every state, the paper industry produced almost 62 million tons of paper and paperboard in 1973. The industry employed 281,000 people and, based on the U.S. Department of Commerce figures, paid some $3 billion in wages, salaries and benefits in 1973.

Our industry, through its member companies, has actively cooperated with Federal and State agencies to reduce environmental pollution for many years. We worked closely with the Congress and with EPA to supply information before the passage of the two major pieces of environmental legislation which affect our industry: the Clean Air Act Amendments of 1970 and the Federal Water Pollution Control Act Amendments of 1972. Both of these bills had our active support and were passed at a time of heightened environmental concern. We hoped they would give rise to reasonable regulatory programs combining the important national goal of clean air and water with the equally important national goal of a viable industry and economy. We continue to support the nation's commitment to a clean environment.

Now there is a growing awareness that, while we must achieve purer air and cleaner water, environmental quality has a large price tag. Today inflation has been identified as our nation's number one problem, and our national leaders have declared that all other problems must be viewed with consideration for their economic implications. Moreover, we are beginning to find that among the related environmental cost impacts are such things as the energy crisis, problems of industrial sitings, an increasingly unfavorable balance of trade, and the need for industry to justify new capacity in the light of projected return on investment.

Newspaper headlines tell us about the growing problems of inflation. The paper industry has seen the effects of inflation: for example, the same pulp and paper mill that cost $100 million to build in 1969 will cost approximately twice as much today—and material and labor costs continue to inflate.

There is no question that as far as the paper industry in the United States is concerned environmental costs are a major inflationary factor. Through the end of 1973, we estimate that the total capital cost for environmental improvement facilities in the primary sector of the paper industry reached nearly $2 billion. Projected expenditures for the same purpose for 1974 and 1975 amount to over $1 billion.

How does this relate to the industry's total capital expenditures? For 1972 the industry spent *38%* of its total capital investment in primary mills for pollution control facilities. These capital dollars, of course, are nonproductive in that they neither provide new capacity nor improve the efficiency of existing plant. A survey completed recently by the National Council for Air and Stream Improvement indicates that, in both 1973 and 1974, between 30 to 35% of the capital dollars for primary mills are going for environmental control. In brief, for the past three years our industry has expended approximately one third of its total capital dollars on non-productive pollution control facilities, contributing to the very tight paper markets of 1973 and early 1974. (The National Council survey is attached.)

Moreover, this capital demand problem is not yet behind us. Looking ahead to 1983, we estimate that—if the present requirements of EPA are not modified significantly—it will cost our industry another *$7* billion in addition to the $3 billion mentioned above . . . a total of $10 billion for pollution control. To put this into perspective: at present, the total assets of the primary and converting

operations of our industry are valued at $10 billion. Thus we are looking at a total industry investment in environmental control facilities by 1983 equal to our present entire asset base!

EPA's implementation of the Clean Water Act, as reflected by its promulgated guidelines, would force our industry to advance 1983 technology to 1977. Such an acceleration of the Clean Water Act's timetable—plus EPA's approach of "treatment for treatment's sake" as reflected in its color removal requirements—has caused API to take the unprecedented step of filing suit in the federal courts to have EPA's published guidelines set aside.

Specifically, there are five major points of difference which the paper industry finds with the promulgated guidelines to FWPCA:

(1). EPA's choice of a single number for each pollution limitation, rather than a range of performance, overlooks the intent of the Congress.

The EPA should provide flexibility in the permit program by recognizing the varying effects on performance of such factors as: size and age of plant, geographic and climatic conditions, processes employed, and cost/benefit relationships.

(2) EPA ignored much of the available data on the performance of existing mills and based its single standard on the overall performance of one or two mills in each category. Moreover, these mills were atypical in that they use nonstandard advanced control measures and internal process measures. This action, in effect, accelerates the timetable established by the Congress and would require the majority of mills to make major internal plant changes by 1977—in effect, achieve 1983 technology by 1977.

(3) Having established a single unduly stringent effluent limitation for 1977, the Agency used that value as the base for deriving the limitations for 1983. The Agency's 1983 numbers—particularly those relating to color removal—for the Phase I segments of the industry, would require most mills to achieve a degree of performance efficiency that has not yet been demonstrated by available technologies.

(4) For 1983, EPA required color removal across the board from all facilities within certain categories. Color is an aesthetic pollutant, and, whereas a mill located on a clear mountain stream should be required to effect color removal, a mill located on a muddy river—such as the lower Mississippi—where the color in the mill's effluent could not be seen, should not be required to install such costly treatment just for treatment's sake.

(5) EPA diminished the role of the States in the national permit program envisioned by the Congress. The Agency, by issuing inflexible "guidelines" and by promulgating a single inflexible number rather than a range, reduced the role of the States in the national permit program from the primary one intended by the Congress to a clerical one without discretionary powers.

Since demand for paper and paper products in this country historically has increased 4 to 5% a year, and our new capacity projections indicate that during the next few years new paper production capability will increase by only about 3% a year, it is obvious that environmental costs have an impact on our ability to expand capacity. The extraordinarily heavy future pollution control costs which we envision would contribute significantly to the prospect of future shortages. Moreover, these extensive expenditures would increase the inflationary pressures on our industry—pressures which must inevitably be passed on to the ultimate consumer in higher prices.

Recognizing a need to quantify these expected impacts, API has retained USR Research Company of San Mateo, California, to study the economic effects of meeting the 1983 requirements. This study will examine the various impacts of a shortage of capital dollars on supply and inflation; the additional costs to an average family of four for direct and indirect paper usage; and the international market implications to the industry of absorbing these environmental expenditures.

In addition, API has formed a task force from its member companies to try to establish the total capital requirements of the industry between now and 1983; to determine as accurately as possible what part of that will be for environmental and other non-productive costs; and finally to attempt to judge the capability of the industry to find these dollars.

The results of these studies will be available by March of 1975. It is hoped that they will serve to give our industry and the Congress a sense of the potential impacts of the 1983 environmental requirements.

Again we thank you for this opportunity to share with you our concerns We hope you will let us know if you have any questions or if we may in any other way be helpful.

Sincerely yours,

RICHARD J. WIECHMANN,
Director, Environmental Affairs.

Attachment:

A SURVEY OF PULP AND PAPER INDUSTRY ENVIRONMENTAL PROTECTION EXPENDITURES AND OPERATING COSTS—1973

I. INTRODUCTION

During 1974 the National Council conducted the annual survey of environmental protection expenditures in the pulp and paper industry. This survey, which is part of a continuing program, is the fifth of such surveys conducted. The first was published in 1965 and the last reported expenditures made through 1972 and those planned through 1975. This survey covers the year 1973 with planned environmental protection expenditures for the years 1974 through 1976.

This survey, like the last, requested information at the corporate level on the capital expenditures for environmental protection in the primary manufacturing sector of pulp, paper, and paperboard manufacture in the United States for the three major areas of concern, water quality protection, air quality protection and disposal of solid waste generated at the mill site by manufacturing and waste treatment activities.

The present survey, presented in summary form in this report, identifies the capital expenditures in 1973 and planned from 1974 through 1976 for air and water quality protection and disposal of mill site generated solid waste. Information on amortization, tax relief and tax exempt bond financing for these activities is also included. The fixed costs (depreciation, interest and taxes) for pollution abatement facilities installed during, and prior to 1973 corporate administrative costs for environmental protection not charged to individual mill operations, and the cost of company-conducted or directly-supported environmental protection research are a part of this report. The operating cost information for environmental protection facilities, and administrative cost of environmental protection at the mill level was taken from information obtained *at the mill level* in a similar survey—Pulp and Paper Industry Survey of Environmental Protection Operating Cost and Accomplishment Survey—1972.

II. ORGANIZATION OF SURVEY AND DATA ANALYSIS

Distribution of the survey questionnaire for environmental protection expenditures was directed to corporate management of all paper companies in the United States engaged in the manufacture of pulp, paper, paperboard and construction paper and board. This summary report on capital expenditures and related topics was prepared from information received from companies with 83% of the wood pulp production capacity and 81% of the paper and paperboard manufacturing capacity of the industry. The operating cost information for 1973 was based on information received from 302 mills with 74% of the pulp producing capacity and 67% of the paper and paperboard producing capacity of the industry.

The capital expenditures for the entire industry were projected from the actual expenditures reported by the above portions of the industry. It was assumed that those not replying to the questionnaire made expenditures for 1973 at the same rate as those who did. The different rate of expenditures for integrated and non-integrated mills was taken into account and specialized expenditures for facilities such as sulfite liquor recovery systems considered separately.

The procedure for estimating planned capital expenditures in this survey assumed that a reported "not known" planned capital expenditure in any of the categories for which planned capital expenditures could be reported, was zero.

This may tend to result in a modest underestimate of planned expenditures. Experience has shown, however, that assuming that those replying to the questionnaire and reporting "not known" in one or more of the categories will spend at the rate of those reporting planned expenditures results in a modest overestimate. It was also assumed that those not replying to the questionnaire would spend at a lesser rate in 1974, 1975 and 1976 than those reporting. This adjustment reflects the somewhat reduced capital expenditure rate for environmental protection needs of the bulk of the non-reporting companies compared to those responding to the questionnaire.

TABLE 1.—PULP AND PAPER INDUSTRY ENVIRONMENTAL PROTECTION CAPITAL EXPENDITURES THROUGH 1973 AND PLANNED THROUGH 1976

[In millions of dollars]

	Water	Air	Solid waste disposal from manufacturing	Total
Through 1966	213	129	10	352
1967	44	[1] 31	[1] 1	76
1968	49	[1] 43	[1] 1	93
1969	74	[1] 52	[1] 2	128
1970	120	[1] 65	[1] 2	187
1971	134	66	2.5	203
1972	205	129	5	339
1973	179	162	10	351
Through 1973	1,074	677	33.5	1,785
Planned 1974	237	274	12	523
Planned 1975	232	246	14	492
Planned 1976	169	133	11	313

[1] Estimated distribution.

Note: Estimate based on partial information from companies with approximately 50 percent of capacity.

III. CAPITAL EXPENDITURES FOR ENVIRONMENTAL PROTECTION THROUGH 1973 AND PLANNED FOR 1974 THROUGH 1976

A. Water Quality Protection Expenditures

(1) *Past Expenditures.*—Through 1972 the pulp and paper industry had spent $689 million on facilities for the control, treatment and disposal of liquid effluents. The annual rate of expenditures rose from $74 million in 1969 to $134, and $205 million in 1971 and 1972 respectively. In 1973 this rate was $179 million (*Table 1*). The actual expenditures in 1973 for water quality protection were less than planned expenditures by $46 million. There were three dominant reasons provided by responding companies for this occurrence, (a) failure to obtain a satisfactory discharge permit in adequate time for construction to proceed on schedule; (b) tardy regulatory approval of construction plans and (c) delayed equipment deliveries. This unexpended portion of 1973 planned expenditures in some cases is included in the planned expenditures for 1974 which follow.

The accounting procedures followed in some companies and failure to specifically request the identification of delayed 1973 expenditures in the survey questionnaire explains why 1974 planned expenditures may be low. Based on information from a subsequent request for method of reporting the planned but unexpended 1973 funds, the 1974 planned expenditures for water quality protection are probably low by $25 million.

(2) *Planned Expenditures.*—The planned capital expenditures for this activity are $237, $232 and $169 million for 1974, 1975 and 1976 respectively. A significant number of companies reported that capital expenditures for 1976 were not known. This reflects a fluid regulatory situation, resulting in reported projected expenditures for 1976 by companies with just over 50 percent of the industry's production capacity. The indicated reduced rate of capital expenditures for environmental protection in 1976 in this and other categories as well, probably has only limited significance since it is subject to future changes as environmental protection requirements become better defined.

TABLE 2.—PULP AND PAPER INDUSTRY WATER QUALITY PROTECTION EXPENDITURES THROUGH 1973 AND PLANNED FOR 1974 THROUGH 1976

[In millions of dollars]

	Internal process loss control (including sulfite recovery)	External to process	Total
Prior to 1966			183
1966		30	
1967		44	
1968		49	
1969		74	
Through 1969	57	380	437
1970	32.6	87	
1971	54.8	79	
1972	31	173	
1973	48	131	
Through 1973			1,074
Planned 1974	62	175	237
Planned 1975	79	153	232
Planned 1976	24	145	169

(3) *Internal Process Loss Control Expenditures.*—The capital evpenditures for internal process loss control measures assignable to environmental protection continue to reflect major expenditures for sulfite liquor recovery systems. Internal process loss control expenditures represented 27% of the total capital expenditures for water quality protection in 1973. They represent 26% of the total expenditures planned for water in 1974, 34% in 1975 and 14% in 1976 (*Table 2*).

B. Air Quality Protection Expenditures

(1) *Past expenditures.*—Through 1972 the industry has spent $515 million on air quality protection for (a) facilities designed with the single purpose of emission control from power boilers, pulping operations and papermaking operations or incorporation of environmental protection features in equipment also serving a function in the process; (b) conversion of power and steam generating power boilers to burn fuels with less emissions, or (c) incremental costs for additional kraft recovery furnace capacity permitting minimal reduced sulfur emission rates.

(2) *1973 and planned expenditures.*—In 1973, $162 million was spent for these activities (*Table 1*). For the same reasons cited in A above the actual expenditures for 1973 were $41 million less than the planned expenditures. The planned expenditures for 1974, 1975 and 1976 are $274, $246, and $133 million respectively. The capital expenditures for this activity in 1973 were 25% greater than those of 1972, and double the previous year for the planned expenditures in 1974 and 1975. The planned capital expenditures for air quality protection are greater than those planned for water quality protection in 1974, $274 compared to $237 million and exceed those planned for water in 1975. The increasing rate of expenditures for air quality protection reflects an effort to provide sufficient kraft recovery furnace capacity so that reduced sulfur emissions are minimized and the installation of high efficiency particulate collection equipment on power boilers and process equipment.

C. Expenditures for Disposal of Solid Waste Generated at Site of Manufacture

Capital expenditures for this activity include those for solid waste disposal resulting from waste treatment and on-site manufacturing operations. They include expenditures for trucks, land used for disposal operations, incinerators, etc. The expenditures for this activity are small, being $10 million in 1973, with $12, $14, and $11 million planned for 1974, 1975 and 1976 (*Table 1*).

D. Summary of Environmental Protection Expenditures Through 1973 and Planned for 1974 Through 1976

(1) *1973 Expenditures.*—The capital expenditures for the three categories of environmental protection covered in the 1973 survey, namely (a) water quality protection, (b) air quality protection, and (c) disposal of solid wastes generated at the site of manufacture through 1973 and planned for 1974 through 1976 are summarized in *Table 1*. The total annual expenditures for environmental protection represented 33.7% of the total capital expenditures of $818 million by that group of companies who provided *both* total capital and environmental protection

expenditures in the survey and who are in the primary sector of pulp, paper, paperboard and building paper and board manufacture. Environmental protection expenditures in 1972 were 38% of a lower total capital expenditure.

(2) *Planned Expenditures.*—The planned capital expenditures for environmental protection in 1974 are $523 million, an increase of $172 million or 49%. The bulk of this increase, or $112 million, is for air quality protection.

The planned capital expenditures for environmental protection in 1975 are $492 million. Planned expenditures in 1974 for air quality protection expenditures are greater than those for water. This reflects a change in the pattern of environmental protection expenditures for the industry, being the first year that air quality protection expenditures may exceed those for water.

The planned environmental protection expenditures for 1976 are projected at $313 million, and down from 1975. Whether this reflects a significant trend is not known. A fluid regulatory situation probably accounted for companies having only about 50% of the industry's production capacity providing information on planned environmental protection expenditures for 1976.

IV. SPECIAL AMORTIZATION, TAX RELIEF AND FINANCING OF POLLUTION ABATEMENT EQUIPMENT—1973

A. Use of Rapid Amortization and Investment Tax Credit

Survey participants were asked to designate the portion of 1973 environmental protection capital expenditures on which (a) rapid amortization was taken, or (b) the 7% tax investment credit was taken.

Companies with capital expenditures for environmental protection of $256.7 million reported that rapid amortization with applied for on only $4.1 million. A high percentage reported that the investment tax credit was taken. Of the above referenced $256.7 million investment tax credit was taken on $122.6 million.

B. Value of Sales and Property Tax Relief, Environmental Protection Capital Expenditures

Of the $256.7 million, $160.9 million was eligible for some form of state sales tax or property tax relief. The value of this relief was reported to be $1.3 million or about $1.8 for the total environmental protection capital expenditures of $351 million in 1973.

C. Environmental Protection Capital Expenditures Financed by Tax Exempt Bonds

Tax exempt bonds were used to finance $147.6 million, or 57% of $256.7 million in capital expenditures for environmental protection, for the companies reporting in this category. No use of tax exempt bonds for financing environmental protection facilities at non-integrated mills was reported.

If those integrated companies not replying to the questionnaire used tax exempt bonds for financing at the same rate as those who did they would amount to about $202 million. If allowance is made for non-uniform geographic distribution of mills employing tax exempt bond financing, the total would not have exceeded $180 million.

V. ENVIRONMENTAL PROTECTION COSTS FOR 1973

A. Operating Costs for Environmental Protection—1973

The costs for operating environmental protection portions of facilities serving a dual purpose as well as those for operating single purpose environmental protection facilities and other associated activities were not determined by survey for 1973. In 1972 mills discharging to public treatment systems spent $2.6 million in operating costs for environmental protection features of process loss control facilities, $3.1 million for effluent pretreatment and made payments of $11.4 million to public agencies for effluent treatment for a total of $17.1 million.

During 1972, $58.9 million was spent for operation by those mills not discharging to public treatment systems. About 60% of this was for external treatment and the remainder for environmental protection features of internal process loss control. Operating costs for air quality protection during this period were $21.4 million and solid waste disposal operating costs were $18.6 million.

The total operating costs for 1972 were $116 million. Since capital expenditures for environmental protection in 1973 were 25% of those made through 1972 it is estimated that operating costs increased proportionately or from $116 to $145 million in 1973. (*Table 3*).

B. Fixed Costs on Environmental Protection Facilities—1973

Depreciation of $89.6 million on a related investment of $638.4 million was reported by companies replying to this portion of the questionnaire. This represents an annual depreciation rate of 6.2% which, when applied to the industry environmental protection expenditures through 1973 of $1.785 billion, represents an annual industry cost of $110.7 million.

Interest of $29.4 million on a related investment of $508.4 million was reported by companies replying to this portion of the questionnaire. This represents an interest rate of 5.8% which, when applied to the industry environmental protection expenditures through 1973 of $1.785 billion, represents an annual industry cost of $102.9 million. Real estate and property taxes on environmental protection facilities were $7.6 million (*Table 3*).

C. Administrative Costs for Environmental Protection and Research Expenditures—1973

A significant amount was reported for administrative costs of environmental protection which was not charged to individual mill operating costs. These costs are derived from personnel assigned to some phase of environmental protection management or planning, permit application fees, discharge permit surveillance fees and related activities. Of the $23.1 million reported in this category, $13.1 million was related to corporate level activities and the remainder was incurred at the mill level. (*Table 3*).

TABLE 3.—PULP AND PAPER INDUSTRY ENVIRONMENTAL PROTECTION OPERATING, FIXED ADMINISTRATIVE AND RESEARCH COSTS—1973

	Millions
Operating costs, 1973: Includes direct operating costs of environmental protection facilities, e.g., power, labor, maintenance and, where applicable, payments to public agencies for treatment in municipal systems	$145.0
Fixed costs, 1973:	
Depreciation on environmental protection expenditures	110.7
Interest on environmental protection expenditures	102.9
Taxes on environmental protection expenditures	7.6
	221.2
Administrative costs, 1973: Administrative expenses not charged to mill operating cost	23.1
Research expenditures, 1973: Industry conducted and supported environmental protection research	12.1
Total	401.4

The industry expenses for environmental protection research in 1973 were $12.1 million. Of this, $11.0 million was for company conducted research or research initiated which was conducted and supported by individual companies by an organization outside the company. Continuing pre-funded research programs funded by the industry accounted for the remainder.

D. Summary of Annual Charges for Environmental Protection

The annual charges or average cost for environmental protection per ton of paper and paperboard produced in the industry in 1973 was $6.35 (*Table 4*). This is up from $3.94 reported in 1972. Increases were noted in all activities related to environmental protection.

TABLE 4.—SUMMARY OF ENVIRONMENTAL PROTECTION ANNUAL CHARGES, 1973

	Amount (millions)	Paper and paperboard (cost per ton)
1972		$3.94
1973:		
Operating costs	$145	
Fixed costs	221	
Administrative costs	23	
Research	12	
		6.35

STATEMENT OF SMALL BUSINESS ASSOCIATION

We fully support the general premise of cleaning-up our environment as required by PL 92–500. We honestly believe that if this law is wisely enforced within the intent of Congress, that widespread economic hardships can be avoided. Unfortunately, all economic evidence points to catastrophic consequences for small businesses that require significant quantities of water for their operations.

In reviewing the legislative history of PL 92–500, we believe the intent of Congress was to obtain uniform sewage treatment with uniform sewage costs to avoid economic dislocations. For the small business there is not equity for pollution control costs and the cost among the small business community is completely distorted and disproportionate. If it were possible to have pollution control costs uniform, then that cost could be passed on. As programs are developing it is apparent that the cost for pollution abatement from small business to small business is totally different with spreads in cost creating closing of many operations.

We do not favor subsidies to business. However, when the Congress or Agencies adopt mandatory standards, we do favor low-cost interest loans from the Small Business Administration (under the Emergency Loan Program) for those small businesses, forced to comply or go out of business with the obvious loss of jobs and loss of revenue to Government.

In issuing effluent guidelines, the EPA has had outside contractors develop economic impact reports on each industry. In every single case there is an acnowledgement by the contractor that the small business is being adversely affected and, in many cases, has to go out of business. There are many factors that generate this type of situation and are too numerous to explain in detail in this short statement. Some of the distortions are due purely to size and the fact that the cost of treating waste for the very small business can be 4 to 5 times greater than to treat an operation perhaps 20 to 100 fold larger.

Unfortunately, the small businesses which have to discharge directly to a receiving stream, normally do not have within their organization the expertise to be completely informed on the problem no less to develop systems for treatment. They generally do not have a full awareness of the impact national policy on pollution control will have on their specific operations until the problem is manifested by a visit from a regulatory agency. Even though recent regulations provided for variances and some assistance on loans the resultant distortion on cost in most cases just cannot be overcome, even though a particular effluent may have no measurable impact upon the receiving stream, with some alternative treatment that is less than the effluent guidelines.

Although in some cases a completely knowledgeable small business operator might be able to obtain a variance it is not practical to educate all of them to the point of protecting themselves, and we feel strongly that the regulations should be revised to force this economic consideration as a basis of permit issuance upon the regulatory authorities where there is not a serious detrimental effect upon the environment for some alternative rather than the effluent guidelines, which really have become standards. Some procedure should be developed for processing Natural Pollutant Discharge Elimination Systems permits that give the regional EPA offices the tools and the time to consider the individual economic needs of each operator. In many cases a slight relaxation of standards would have no environmental effect and could mean large decreases in costs.

Such an approach has been suggested by EPA's own advisor, the Effluent Standards and Border Quality Information Advisory Committee. Their proposal is a matrix approach which would allow the local, state, and regional EPA authorities to make decisions locally for alternate considerations rather than having the small businessman attempt to carry the issue all the way back to the Administrator in Washington. We desire that Congress direct EPA to have some system like the matrix approach with considerations for small business operations in order not to force a large proportion of these operations to close because of disproportionate costs of pollution control.

The problem of disproportionate costs for pollution control also carries over into the sector where small businesses discharge to municipal sewage treatment plant systems. The intent of Congress was that municipal sewage charges should become more or less stable and uniform across the country with no subsidizing of industry in any particular area to distort economic conditions. As sewage plants are being constructed under the new regulations it is becoming increas-

ingly apparent that the distortion of sewage cost from one community to the other is increasing in order of magnitude rather than decreasing. This is due to many factors and each area will have its own peculiarity. The basic issue however is that where communities already had completely adequate secondary treatment prior to 1972, with reserve capacity, to run up through 1983 or beyond, they can and do have very low costs. Whereas, communities that are building brand new secondary facilities under today's and tomorrow's higher inflated costs have the full burden of those costs thrust back on the business community. We agree that there should be no subsidy of business. But in order to avoid this the regulations have become so restrictive—with practically no options for negotiating a practical cost allocation program—the overall effect is to go completely contrary to the intent of Congress.

We are hopeful that EPA can be directed to alter their practices to obtain better equity in the cost of pollution control from one small business to the other, and for the small business in relation to the larger business.

Statement of the National Association of Manufacturers

I. Introduction

This statement is filed by the National Association of Manufacturers in connection with the hearings held by the Joint Economic Committee of the Congress on the economic impact of pollution control. The National Association of Maufacturers is an association of enterprises engaged in manufacturing in the United States. Some 80% of these enterprises are classified as small business.

This statement is filed because of the following concerns:

1. Frequent use of the "macro-economic" approach to economic analysis tends to belittle and obscure the very real economic impacts which pollution control laws and regulations have on small business enterprises. Expression of pollution control costs in terms of a percentage of the Gross National Product is irrelevant and, in fact, meaningless.

2. Economic impact analysis of industries characterized by large enterprises may obscure the economic impact of pollution control requirements on industries characterized by small enterprises. For example, in the foundry industry, small foundries have historically been a vital foundation for our economy. Nevertheless, in recent years, a number of foundries have decided to close because of environmental laws and regulations. We are indebted to the Cast Metals Federation and the United Foundrymen of Wisconsin for information along this line.

3. Macro-economic analysis also obscures the fact that plant closures and unemployment resulting from pollution control programs are correlated with the percentage of pollution reduction required under a particular program for a particular industry. We are indebted to the National Canners Association for supporting data on this point.

4. Macro-economic analysis also obscures the fact that the economic impact of pollution control may be correlative with prevailing world market prices of particular products of particular industries. We are indebeted to testimony of The Anaconda Company before the Senate Interior Committee on November 25, 1974 for data on this point.

5. Economic impact analysis based on past data is only part of the whole story because the full economic impacts of both the Clean Air Act and the Federal Water Pollution Control Act are yet to be felt. The real crunch will come in the near-term future—for the Clean Air Act, from mid-1975 to mid-1977, and for the Federal Water Pollution Control Act, from the present to July 1, 1977, with another wave of requirements scheduled for July 1, 1977–July 1, 1983. The National Association of Manufacturers believes in the objectives of both these Acts, but also believes that certain amendments to both Acts are needed.

II. Small Business and Pollution Control

The costs of pollution control can fall heavily on both large and small companies if they are currently in a pollution-intensive manufacturing category. However, because large corporations have greater marketing, technical and legal resources, they are the least likely to find themselves in a position where

pollution control could be a serious threat to their survival. In cases where pollution control standards do threaten severe economic penalties on these corporations, they normally show great competence in presenting the case to regulatory authorities.

For the medium and small manufacturer, however, a different situation exists. Small companies generally do not have a full awareness of the impact national policy will have on their specific operations until the problem is manifested by a visit from a regulatory agency. Small companies cannot maintain close contact with the developing problems at the national level and do not have the resources to maintain a staff dealing exclusively with pollution problems. This places a stringent time limitation on their ability to analyze the effects of the intended action on their company and generally results in an ineffective presentation to regulatory officials. Thus, the companies which are least able to absorb the results of a hasty pollution control program are those which are most likely to be in a position of being forced to construct one.

There are several factors which make the pollution control requirements fall especially hard on the small manufacturer. The first of these factors lies in his inability to assemble the technical and financial resources to properly assess his pollution problems and arrive at the most cost effective solution. The use of consulting firms to characterize wastes and arrive at the most economic engineering solution to the pollution problems of a small firm is very expensive when compared to the annual profits of the company or even to the final cost of the pollution control equipment which will be required. Since the small manufacturer rarely has the staff to perform these studies internally, however, it is often the only choice.

Secondly, many small business enterprises are able to operate profitably only because they are located in older facilities with correspondingly less overhead expenses. These are the facilities which prove most expensive to install pollution control equipment. Many of the cost-reducing alternatives, such as installing counter current rinses, segregating wastes, or otherwise modifying the process to use less water, would be extremely expensive in such plants. Space for installing new pollution control equipment is limited and retrofitting costs can be many times the cost of installing equipment into new facilities.

In addition, there is the normal economy of scale factors in purchasing pollution control equipment. The small manufacturer will be paying a penalty for the small capacity of his equipment. The costs of the equipment will be a significant percentage of the total plant value for many small manufacturers.

Acquiring financing at low interest rates will be a major problem for many small businesses since they have been largely operating with internal capital and are not currently showing a high enough return on investment to be attractive to commercial sources of funds. The availability of Small Business Administration loans will be the only salvation for many manufacturers. These loans are not always easily obtained, however, and require extensive paperwork.

Multiplying all of the above factors is the inability of the small manufacturer to pass on these costs to his customers in relation to his larger competitors. Since the larger manufacturers will have much lower pollution control costs per unit of production, the competitive market price will probably stabilize somewhere near the point where the industry leaders have recovered the bulk of their costs. This will leave the smaller manufacturer with a high percentage of his costs unrecovered.

III. ECONOMIC IMPACT OF POLLUTION CONTROL ON VITALLY IMPORTANT SMALL BUSINESSES IN THE FOUNDRY INDUSTRY

On November 15, 1974, Raymond E. Walk, Business Manager and Marketing Director of Modern Casting, a publication of the American Foundrymen's Society, wrote to Frank T. Schultz, Purchasing Agent, City of Green Bay, Wisconsin, in part as follows:

"Adding to these higher costs foundries must pass along, are the extraordinary high costs incurred by the local and federal Environmental Protection Agencies. The state of Wisconsin is a good example of their impact. During the past five years, Wisconsin has lost 10% of its foundries and I don't pretend that my records are complete, but these closings are verified. A list is enclosed. Also enclosed is correspondence showing two more Wisconsin foundries being forced

out of business. This pattern is consistent throughout the United States. Newer foundries opening in less stringent states neither increase total national capacity for casting production nor replace the serious loss of expertise."

The list referred to by Mr. Walk contains some 375 foundries which have been closed over the past five years. The Wisconsin foundries referred to by Mr. Walk as having closed are 20 in number as follows:

Closed foundries and location:	*Date*
South Water Foundry, Milwaukee, Wis	December 1968
SPO/C–E Cast, Milwaukee, Wis	1969
Zenith Foundry Co., Milwaukee, Wis	October 1969
Allis-Chalmers Mfg. Co., Appleton, Wis	September 1970
Chicago Hardware Foundry, Racine, Wis	1970
Falls Non-Ferrous Foundry, Sheboygan Falls, Wis	November 1970
Rohde Manufacturing Co., Milwaukee, Wis	1970–71
Standard Brass Works, Milwaukee, Wis	1970
Standard Ductile & Gray Iron Foundry, Racine, Wis	June 1970
Giddings & Lewis-Kaukauna Foundry, Kaukauna, Wis	December 1971
Highway Trailer Industries, Inc., Edgerton, Wis	July 1971
Iroquois Foundry Co., Racine, Wis	1970–71
Sivyer Steel Casting Co./Mitchell, Milwaukee, Wis	March 1971
United Foundry Co., Grafton, Wis	1970–71
Acme Foundry Co., Superior, Wis	December 1972
American Skein & Foundry Co., Racine, Wis	1972
International Harvester Co., Milwaukee, Wis	September 1972
Kenosha Brass & Aluminum Foundry, Kenosha, Wis	September 1973
Lakeside Malleable & Gray Iron, Racine, Wis	January 1973
Westphal Co., Hayward, Wis	March 1974

"An Open Letter From Wisconsin Foundrymen," to Senator Muskie from G. P. Antonic, President, United Foundrymen of Wisconsin, printed in the Gray and Ductile Iron News, October, 1974, reads as follows:

"DEAR SENATOR MUSKIE: Now that Congress has started to reevaluate the restrictive provisions of the Clean Air Act, I thought you should know why the foundry industry has suffered under its severe impact.

"Prior to the time that any clean air legislation existed, it was publicly acknowledged that our industry produced less than 1% of total particulate emissions in the United States. In highly concentrated industrial areas the foundry contribution of particulates rose to 1½% of the total.

"In 1966 federally sponsored interstate studies recommended a national clean air goal of 75 micro grams of particulate matter per cubic meter of air. According to the studies industry was to reduce its emissions by an average of 71.3%. Our Wisconsin state law, at .45 pounds per 1000 pounds of gas, is far stricter than this suggested goal and demands an actual reduction of 82%. What does this mean? The normal processing of one ton of iron within a cupola with no pollution controls produces an average of 18–20 pounds of particulate. The recommended 71.3% reduction would have removed 8.56 pounds of this particulate leaving 3.44 pounds to be emitted. Legislation, as passed, required an 82% reduction removing 9.84 pounds as opposed to 8.56 pounds; a difference of 1.28 pounds, but, at what cost?

"Comparing the costs to remove this extra 1¼ pounds of particulate, we find the required investment for the equipment for a 71.3% reduction would have been approximately $50,000 for a ten ton per hour cupola as opposed to a $300,000 installation for 82% abatement. This is a lot of money for a small foundry, and one should know that the majority of foundries employ less than 100 people and are privately owned.

"It would require fifty horsepower to run the 71.3% efficiency operation as opposed to 300 horsepower for the 82% operation. The annual electric bill to operate the 82% unit on a single shift operation is in excess of $10,000. An electric utility, in order to supply power to run this added 250 horsepower, must burn an additional 750,000 pounds of coal per year. And in so doing emits as much pollution to the atmosphere as was reduced by going from 71.3% to 82%, giving us a net gain of zero. Can we honestly say to ourselves that this additional amount of captured dust is worth the price?

"Natural gas is also used to fuel afterburners in many foundry pollution control systems. This raises several questions:

"1. Will enough energy become available to permit year around operations of the high energy system in the future?

"2. If the answer to this question is no, then would it not be sensible to think in terms of low energy, low cost pollution control equipment producing a year round average of 3.4 pounds per ton?

"The answers to these questions should come into sharp focus when one looks at the example provided by the recently forced shutdown of the pollution control system of one Wisconsin foundry due to a shortage of natural gas. The fuel saved was sufficient to supply 200 homes with heat for an entire year, and the power saved is enough to supply 24 homes with enough electricity for an entire year. This illustration is for just one of the 200 foundries in Wisconsin.

"During 1974 and the years that follow, the foundry industry will continue to face up to the reality of the need for a clean environment to preserve and improve our quality of life. All we ask is that as you deliberate on such matters as the environmental impact of our industry that you also gain. Only in this way will we achieve a sound social and economic balance in developing environmental legislation. This can only be done if you will call on qualified people for assistance. We have these qualified people in our industry, and we want to give you that assistance. Between us we can develop means to keep air contamination within realistic limits, so we can end the massive waste of resources demanded by present standards.

"Very truly yours,

"UNITED FOUNDRYMEN OF WISCONSIN,
"G. P. ANTONIC, *President.*"

Following are excerpts from a statement filed by the American Foundrymen's Society and the Cast Metals Federation with the Permanent Subcommittee on Investigations of the Senate Committee on Government Operations:

"Castings represent the very beginning of all manufacturing processes. The sudden loss of a relatively small number of foundries producing strategic castings could result in the total shutdown of the U.S. manufacturing complex, driving unemployment to unbelievable proportions. This could happen while government statistics show the industry shipping record tonnages. Eighty percent of all casting production finds direct use in manufacturing, one hundred percent some indirect use. Solutions to many of the current national problems are directly related to the health and stability of the foundry industry * * *.

"The chief alloy imports into the U.S. have been chrome based, ferrosilicon, ferromanganese and silicon manganese products. Imports were sold in the U.S. market at such a reduced, non-competitive price that domestic producers could not afford capital investment for increased production. Two successive dollar devaluations, price controls and general increase in world production have reduced these imports to serious levels. These two factors have resulted in very low production capacity on the domestic scene. In addition, each domestic producer is forced to make changes to comply with EPA and OSHA standards. As furnances are equipped to meet codes, effective capacity is curtailed by approximately 15%. As new installations are constructed, many modified existing units will be closed, leaving us with basically the same capacity. Ferrosilicon is particularly in short supply * * *.

"Refractories are another area being affected by OSHA. There is a worldwide shortage of raw magnesite used in refractories in steel foundries and arc furnaces. In the U.S. this material is produced synthetically. Delivery is running approximately two years; energy availability being given as chief cause of the shortage. Other refractory products, such as fire clay and silica brick, are running into problems of lengthening lead time despite availability of raw materials * * *.

"Prime metallurgical coal, a third raw material, used in the coking process has been committed to export. Since 1965 over 500 coking ovens have been closed and dismantled, representing a loss in capacity of 5,150 tons per day in production. A continuing battle with environmental agencies has further restricted production. Current expansion plans see no possible relief for five years * * *.

"Electric melting was initially presented as a major solution to environmental problems in foundries. Current shortfalls of electric power prohibit foundries in

many cases from operating at capacity levels let alone increasing their capacity potential or productivity * * *.

"The founding industry does not challenge the concepts of legislative acts such as EPA and OSHA, but only the manner in which these new laws are being implemented. It has accelerated the loss of what is erroneously termed 'marginal shops' but in reality is the cause that has effected this serious loss of expertise. Such foundries have been pushed to expend capital to meet conflicting and, in many cases immeasurable, standards with unproven control equipment, resulting in their management being involved in continuous litigation. The net results are: A major reduction in working capital, vast increases in non-productive operating costs prohibitive escalation of energy consumption . . . all resulting in a severe restriction of their ability to add productive capacity * * *.

"Economic impact studies conducted by the Environmental Protection Agency grossly underestimate the full cost of compliance to the industry. They rarely, if ever, include the high operating costs and the many exceptional variables which are encountered in installation, engineering, and sometimes relocation.

"Heavy public relations activities by EPA has generated a multiplicity of citizen groups whose emotions have been allowed to adulterate the facts and further harass foundries. The sum spent on this activity exceeds the total the foundry industry musters annually for research and development.

"The secondary effect of EPA regulation is often as great as the effect of the initial regulations. For example, prior to the promulgation of the Air Pollution Control regulations the foundry industry as a whole had no waste water problems. The air cleaning systems brought about voluminous water usage which in turn required installation of water treatment systems of a cost equal to the original air cleaning system.

"The Occupational Safety and Health Act is enforced in an equally unrealistic manner. Foundries are literally forced to spend million of dollars in areas of relatively minor hazards, leaving areas of major injuries unattended or given minor attention.

"The concept of accounting in the U.S is predicated on an accounting convention that assumes a stable monetary unit. This concept works against foundries who, particularly since the Second World War, have been shifting from a labor intensive industry to that of capital intensiveness. Inability to accumulate surplus profits to compensate for depreciation loss, obsolescent technology and modernization forced an increasing reliance on borrowed capital and leasing which escalated liabilities foundries had to carry.

"The short run jobbing foundries whose technology generally lags behind the volume producers are most prone to the impact of recessions. It is in this area that the greatest loss in foundries has occurred. It is also this foundry that is considered a 'marginal producer' but is important to small and specialty manufacturers for his wide variety of expertise in the manufacture of short run specialty castings. The declining trend was already apparent during the early 1960s, but its full impact was not felt until the implementation of EPA and OSHA.

"It is apparent that some immediate action is required to alleviate the destructive trends cutting away at an important segment of the foundry industry . . . the independent jobbing foundries. We must, as an industry, maintain and enhance this expertise and critical capacity. The following remedies are suggested:

"1. A five-year moratorium, with qualification, on EPA, OSHA and similar legislation affecting foundries. This valuable time is needed to:

"a. Establish realistic standards;

"b. Establish whether other more serious problems are created by compliance with these standards;

"c. Develop standards with reproducible results; and

"d. Permit capital to be invested in hardware and processes needed to gain the necessary productivity.

"2. Conduct economic impact studies for the foundry industry by an agency other than those who set standards.

"3. Conduct realistic economic studies as to what level of efficiency is most practical to achieve.

"4. Quick write-off or other subsidy for the extraordinary high costs of environmental control.

"5. Investment allowance and accelerated write-off for capacity expansion."

IV. CORRELATION OF PERCENTAGE OF POLLUTANT REDUCTION WITH ECONOMIC IMPACT OF POLLUTION CONTROL

The food processing industry is characterized by a large number of small businesses, many in small, rural communities where the plant is the principal place of employment. Overall, this industry is highly competitive in the market place, operating on a low profit margin. The before-tax profit on sales for canning and freezing was 1.8% in the 1969–1970 year; and 48% of the industry's companies had no profit according to the latest figures published by the U.S. Internal Revenue Service. These characteristics of the industry are the causes for economic vulnerability to suddenly-imposed, excessively restrictive controls which require significant capital outlays and operating and maintenance costs.

Although technology is available to reduce the discharge of industrial pollutants to any arbitrarily low level, the cost for implementing the required technology must be balanced against the benefits to be derived from such expenditures and the impact which these expenditures will have upon the industry and the national economy.

An industry survey has indicated what level of pollution control cost (in addition to current expenditures) will cause a plant to go out of business. In operating their own treatment systems, plants processing 1,000 tons of raw products per year can afford to remove about 60% of the BOD and suspended solids on average and remain in business. Five thousand ton operations can afford about 80% removal on average; 10,000 ton plants about 90%. Larger plants could afford higher removals if they were situated where building a treatment system was practicable. The feasible expenditures are highly variable among plants. About one out of six of even the largest plants could remove only 75% of the BOD and suspended solids without prohibitive costs. Irrigation disposal costs are estimated to be uneconomic on average for plants processing from 5,000 to 10,000 tons per year or less and for plants of any size that are not near land suitable for this method of liquid waste disposal.

Current city disposal costs are economically feasible for plants of almost any size on average. However, small plants below average in their ability to pay pollutant costs and any plants remote from city treatment works will find such costs prohibitive. Furthermore, where municipal facilities are built new, expanded, or upgraded to meet federal requirements, sewer charges can be expected to increase drastically.

The following projections have been estimated from the industry study: About 160 of the industry's 550 plants that treat their own wastewater will be forced out of business if required to reduce their BOD and suspended solids discharges by 90%; about 230 of these plants will close if the requirement is 95% reduction. Almost 50 plants of the approximately 600 that use irrigation disposal will be unable to meet future costs and more than 200 plants of the 1,100 that use city treatment systems will close because of increased charges.

The plants estimated to close because of pollution control costs are nearly all small plants. They employ 27,000 workers on average, and an additional 31,000 part-time; pay out $140 million per year in wages and salaries; buy raw products from 14.000 growers, for about $160 million per year, and generate between $600 and $900 million per year in total economic activity in their local communities. About half the towns in or near where these plants operate have populations below 2,500 and three quarters of the localities have populations of 5,000 or less, thereby accentuating the impact of potential plant closings.

In summary, the implementation of new environmental control regulation should be designed to attain desirable cost/benefit results, to minimize adverse economic dislocations, and to permit fair competition in the domestic and foreign market place.

V. CORRELATION OF WORLD PRICES WITH ECONOMIC IMPACT OF POLLUTION CONTROL

The following is excerpted from testimony presented to the Subcommittee on Minerals, Materials and Fuels of the Senate Interior Committee by The Anaconda Company on November 25, 1974:

"As to the 'high, stable price of copper,' the London Metal Exchange price went from 48¢ on January 2, 1973, to a high of $1.52 and back to 58¢ in a period of 21 months. The Anaconda price was limited to 60¢ under price controls until

December 8, 1973 when it was permitted to increase to 68¢ per pound. With the termination of price controls on May 1, 1973, the price moved to 80¢, and then to 85¢ on June 1, back to 79¢ on September 17th, and to the present price of 75¢ on October 16, 1974. . . .

"The funds available to any large corporation are limited and the demands are heavy. As you know, much of our capital has been committed to environmental control programs in Montana. As of this date, our Company has spent more than $29.4 million for emission controls at the Anaconda smelter, and we will spend an additional $18.5 million to complete the program. In Butte, we have expanded more than $9.5 million for water quality control and reclamation of mined lands. These two activities carry an ongoing price tag of approximately $2 million per year."

Clearly, the economic impact of pollution control cannot be assessed without reference to prevailing domestic and world market prices for the particular products of particular industries. The impact could be particularly severe if price controls are imposed upon domestic manufacturers.

VI. FUTURE ECONOMIC IMPACT OF POLLUTION CONTROL UNDER EXISTING LEGISLATION

Under the terms of the Clean Air Amendments of 1970 and the Federal Water Pollution Control Act Amendments of 1972, the real "crunch" of pollution control legislation will be felt over the 1975–1977 period.

Emission limitations under State air implementation plans will be enforced pursuant to compliance schedules in an effort to achieve ambient air quality goals within this period. Effluent limitations will be enforced under the terms of permits issued under the National Pollutant Discharge Eliminations System and designed to achieve certain goals by July 1, 1977. Even higher goals are set for July 1, 1983. The degree of stringency with which these limitations are set will govern the degree of economic impact.

NAM President E. Douglas Kenna wrote to Russell E. Train, Administrator of the U.S. Environmental Protection Agency, on November 16, 1973, urging that EPA adopt a "matrix approach" to the formulation of effluent limitations guidelines.

The "matrix approach" would be more flexible than the "single number" approach, and would provide a realistic range of values which would take into account the special circumstances of small business enterprises.

Ultimately, there will be thousands of business decisions as to whether particular plants should continue to operate subject to specific pollution control requirements. Therefore, there is no clear picture as to future economic impact of pollution control under existing legislation. However, there is no doubt the impact will be substantial.

VII. THE ECONOMIC IMPACT OF POLLUTION CONTROL IS OBSCURED BY MACROECONOMICS

In the August, 1974 issue of "Survey of Current Business," the U.S. Commerce Department states "Gross National Product comprises the purchases of goods *and services* by consumers and government, gross private domestic investment (including the change in business inventories), and net exports (exports less imports)." (Emphasis added.)

Table 1.22 of this publication lists as some components of GNP in addition to maufacturing: "Government and Government enterprises," $167.9 billion; "Services," $148.6 billion: "Finance, insurance, and real estate," $177.8 billion; and "Wholesale and retail trade," $218.9 billion.

We believe the inclusion of non-manufacturing elements in the GNP makes it invalid to express pollution control costs as a percentage of Gross National Product. This macroeconomic approach also fails to take into account pass-throughs and mark-ups from the maufacturing level through the wholesale and retail levels as the costs of pollution control are passed along to the extent that markets and the government permit.

In the long run, analysis on a plant-by-plant basis is necessary to define economic impact of pollution control. It is at that level where pollution control requirements will determine whether a plant may expand in terms of production and employment, or remain static, or be forced to curtail or shut down. We believe that this point has been brought out by the previous sections of this statement discussing the foundry and food processing industries.

VIII. CONCLUSION

We are hopeful that this statement has illuminated some aspects of the economic impact of pollution control which might otherwise be obscured by a macroeconomic approach.

We appreciate the opportunity to have this statement included in the printed record of the hearing.

FEDERAL ENERGY ADMINISTRATION
Washington, D.C., May 16, 1975.

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

DEAR SENATOR PROXMIRE: On November 19, 1974, John Sawhill testified before the Joint Economic Committee on the economic impact of environmental regulations. At that time, you indicated that an FEA analysis, assessing the impact of pollution control expenditures on such economic indicators as GNP, price of commodities, and employment would be most beneficial to the committee. By letter on February 2, 1975, I indicated that we were analyzing the macroeconomic data developed for EPA by Chase Econometrics, and that our assessment would be subsequently forwarded to the committee.

We have completed our analysis, and the results are enclosed for the committee's review. If there are any questions concerning this review, I would be happy to meet with you to discuss this matter further.

Sincerely,

ROGER W. SANT,
Assistant Administrator,
Energy Conservation & Environment.

Enclosure.

FEA ASSESSMENT OF THE MACROECONOMIC DATA DEVELOPED FOR EPA BY CHASE ECONOMETRICS

This paper will present and critique the findings of the Chase Econometrics study as they relate to current economic conditions and selected industries.

One of the major concerns being expressed by industry officials about environmental regulations is the substantial investments that firms will be required to make during the next 10 years. These expenditures will displace investments that otherwise could be made to expand or modernize production capacity. Such a substitution, it is argued, if it were to occur widely, could have an adverse impact on the rate of growth in productivity, because firms would be operating with older, less productive equipment. Reduced productivity growth would result in a lower rate of growth for the Nation.

CONCLUSIONS OF CHASE ECONOMETRICS STUDY

The Chase Econometrics study indicates that pollution control effects are likely to be minimal. The maximum projected investment for environmental purposes by U.S. industries is unlikely to exceed 6 percent of total plant and equipment expenditures in any one year and is projected to average approximately 3 percent of these expenditures over the ten year estimating period (1973–1982).

For example, cumulative pollution abatement costs in 1973 dollars over the 1973–1982 period are estimated by Chase to be $194.8 billion. Approximately $77 billion of the cumulative costs (mobile sources and solid waste collection costs) will be paid directly by consumers. Another $32 billion will be paid by the electrical utilities, and the remainder by other major industries. These costs will be predominantly passed on to the consumer in the form of higher electricity and product prices.

PERCENTAGE CONTRIBUTION OF POLLUTION ABATEMENT EXPENDITURES TO PROJECTED CHANGES IN PRICE INDICES (CHASE ECONOMETRICS 1974)

	CPI	WPI	GNP deflator
Increase 1975–1976	0.5	2.0	0.9
Cumulative increase to 1976	.8	2.6	1.2
Average increase 1973–76	.3	.9	.4
Increase 1981–82	−.2	−.1	0
Cumulative increase to 1982	.3	2.4	.9
Average increase 1973–82	.03	.2	.1

In relation to the timing of expenditures, investments are expected to increase to a peak in 1976, in order to meet the goals of the Clean Air Act of 1970 and the Federal Water Pollution Control Act. Annual costs are expected to increase at a rapid rate through 1977 after which they are projected to level off.

Thus, the Chase study concludes that pollution control expenditures will place increased demands on the capital market, and will displace some private investment. However, the displacement will be in areas other than plant and equipment expenditures, such as residential construction. This conclusion is at least partially confirmed by the results of the first Bureau of Economic Analysis [1] survey of pollution control expenditures in which only 2 percent of the firms sampled claimed that pollution control expenditures had displaced any of their planned investments for expanding or modernizing production capacity.

While national economic effects appear minimal, certain industries will experience difficulty due to pollution control regulations. This is because expenditures are not spread evenly across all industrial sectors. Some industries pollute more heavily than others, and will therefore have to undertake greater efforts to abate pollution to acceptable levels. Clearly the industries which would appear to be the most significantly affected are: (1) electrical utilities, (2) petroleum refining, (3) iron and steel, (4) pulp and paper, (5) nonferrous and primary metals, (6) stone, clay glass, cement, (7) chemicals and (8) food and kindred products.

These eight industrial groupings accounted for four-fifths of the total estimated private pollution control investments in 1974. The proportion of total plant and equipment investment spent for pollution control purposes in these industries, ranged from 10–20 percent, and is substantially above the national average which is less than six percent.

The expected increase in investment spent for pollution control purposes 1973–1984 will amount to:

	Percent
For electric utilities	17
Petroleum refining	67
For iron and steel	65
For pulp and paper	39
Nonferrous and primary metals	6
Stone, clay, glass and cement	100
For chemicals	20
Food and kindred products [2]	52

[2] Ibid.

ASSESSMENT OF CHASE ECONOMETRICS STUDY

There are a number of issues which dramatically affect the findings of the Chase study and should be considered in reviewing the data:

The Chase study fails to look at the cumulative effects of Federal environmental and energy programs. All of the industries mentioned above are "basic", which means that their supply and price problems ripple through the economy. They are also energy intensive industries, representing nearly 20 percent of the total U.S. energy consumption. In these industries, energy is a significant cost element accounting for nearly 14 cents per dollar of value added, compared to the average of all industries of 4 cents per dollar of value added. Therefore,

[1] U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, Vol. 54, July 1974.

these industries face serious financing problems because of high energy prices in addition to the expenditures required by environmental regulations.

The Chase model is not able to capture those impacts that are not characterized by change in price. For example, in the titanium dioxide industry, economic impacts resulting from pollution control regulations are experienced by cutbacks in production. These changes are lost in the Chase model because of their inclusion in the standard industrial classification category for chemicals.

The nature of the input/output methodology restricts an analysis of interindustry flows and the problems of substitution. An example of this would be changes in the demand for aluminum due to increased costs of production for steel. In the case of aluminum, the final product might be less polluting but is more energy intensive.

The model does not incorporate the concept of marginal cost in pollution control investment analysis. It assumes pollution control can be financed by industry. In fact, the cost of pollution control will vary by firm, by production process, by location, etc. This results in variances among the marginal control costs of equivalent industries producing equivalent products.

The Chase cost estimates do not fully account for the costs associated with meeting the 1983 standards established by the 1972 amendments of the Federal Water Pollution Control Act. Therefore the actual macroeconomic impacts at the end of the decade 1973–1982 may be greater than projected.

It should also be noted that the initial computer runs for this study were made in the fall of 1974 and hence some of the baseline forecasts do not reflect subsequent changes in economic conditions, such as the increased unemployment rates, increased interest rates, the current slump in production (and particularly in the housing industry).

Even though Chase acknowledges that slower economic growth, greater credit stringency, and increased costs of capital will reduce annual investment in plant and equipment, they do not correctly determine interest rates, the rate of unemployment or production levels for the period 1973–1982. For example, the Chase forecast predicted a continuation of the recession throughout 1974 and a rise in the rate of unemployment continuing into 1975. But the model unemployment rate does not coincide with our current levels of unemployment until 1979. This would tend to understate the impact of pollution control expenditures.

The Chase study also assumes that the housing industry will rebound from a low construction level of 1.4 million units this year to 1.9 million units in 1976 and will remain at that level for the rest of the decade. This finding does not correspond with banking forecasts which conclude that for every dollar of pollution control investment made, 40¢ of private domestic investment will be displaced, most of this displacement (adverse impacts) will occur in the residential housing sector as it is particularly sensitive to the higher interest rates and demands on the capital market.

OVERALL CONCLUSIONS BY FEA

The Chase study provides some useful data on macroeconomic impacts and helps to relate private sector pollution control expenditures to inflation, investment, productivity, employment, government finance, income distribution and foreign trade. However, the usefulness of the cost data to FEA and to Congress is limited by both methodological problems, and by changes in recent economic conditions. Such conditions invalidate many of the Chase conclusions relating to employment, income and productivity. Specifically the Chase study does not take into account the issue of tight capital markets which makes it untenable for some industries to retrofit older plants with pollution control equipment. The questionable nature of the assumptions, also precludes policy-makers from determining whether to alter or modify existing pollution control programs; whether or not to extend the deadlines for the enforcement of environmental regulations; whether or not to financially assist the electric utilities; whether to allow intermittent control in lieu of retrofitting due to capital availability and technological constraints.

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