

P U B L I C H E A R I N G

before

SENATE AD HOC COMMISSION ON
ENERGY AND THE ENVIRONMENT

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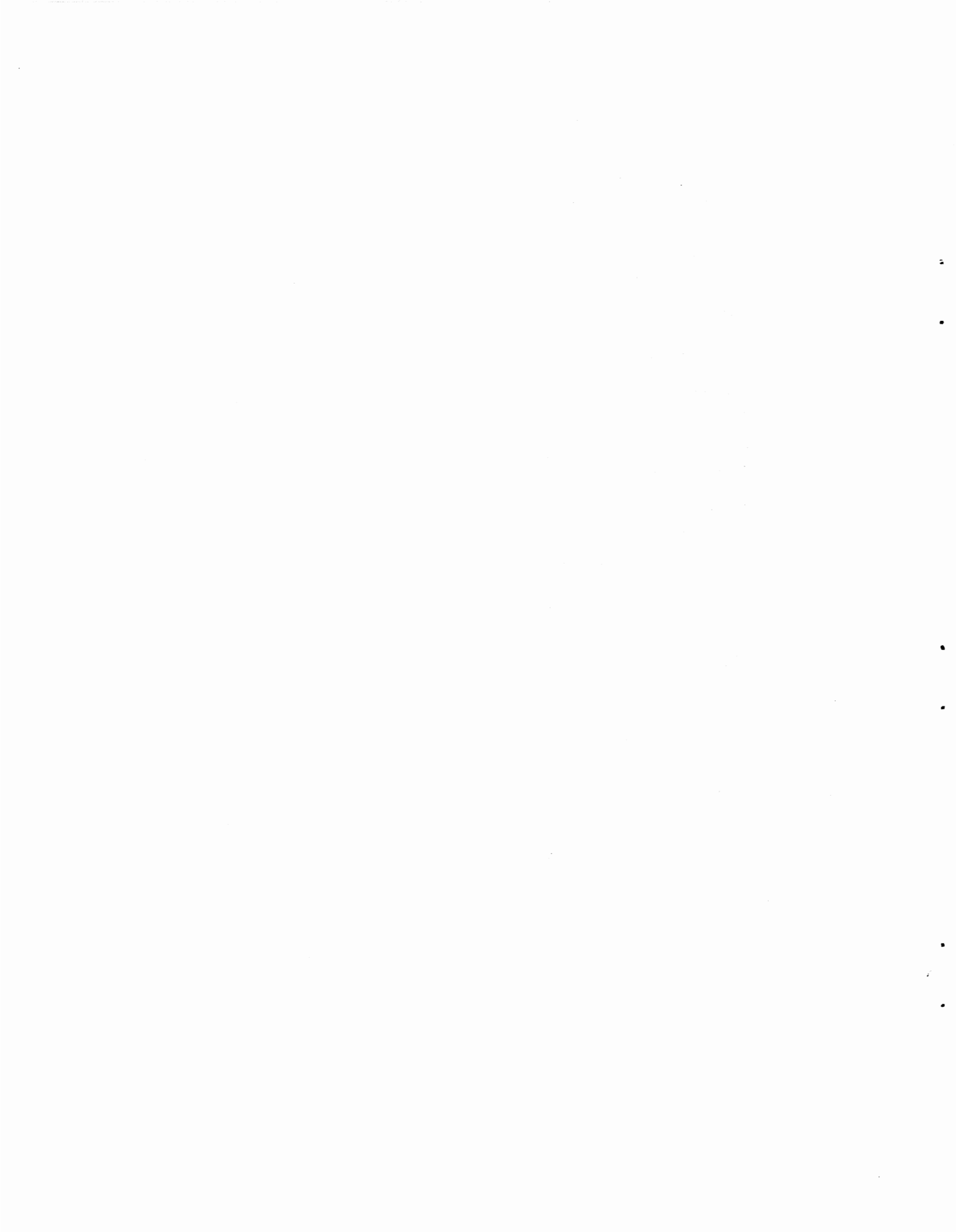
MEMBERS OF COMMISSION PRESENT:

Senator Joseph P. Merlino (Acting Chairman)
Senator William E. Schluter
Senator Frank J. Dodd
Senator Barry T. Parker

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SENATOR JOSEPH P. MERLINO (Acting Chairman):
Good morning. I would like to call the second hearing of the Senate Ad Hoc Commission on Energy and the Environment to order. I was hopeful that there would be more members than just myself here, but I know that Senator Schluter will be here shortly. He is testifying before another Committee down the hall. And Senators Dodd and Parker did state that they would be just a little late. But since we do have a rather full schedule of persons to present testimony, I think we should get on with the hearing.

To those of you who were not here last week or are unaware of the purpose of this Commission, we are here to gather all the information that we can from all parties concerned, those from the various power suppliers and fuel suppliers, ecologists and concerned citizens and industries alike.

My name is Joseph Merlino. I am a Senator from Mercer County. As I say, Senator Schluter, Chairman of this Commission, will be here shortly, as will Senator Dodd and Senator Parker.

We have an agenda but I am going to deviate from the numerical listing for several reasons, one being that the Delaware Valley Council has a slide presentation to make and I think that at least more than one member of the Commission should have the advantage of seeing the pictures. Therefore, I would ask if you would bear with me. I know perhaps some of you may have come here this morning and have seen the agenda but I am hopeful that you have not scheduled the rest of the day based upon the listing here. We will be here until four o'clock. We will break at about 12:30 for one hour for lunch, and hopefully everyone here will have an opportunity to say and do what they came here to say and do.

As you come up to give your testimony, here

at the front desk, if you have a prepared statement I would ask that you please give sufficient copies to the Secretary of the Commission so that he can distribute them to those who wish copies and, of course, he will distribute them to the members of the Commission.

I would like at this time to call on the Atlantic City Electric Company.

J O H N M c D O N A L D: Good morning, Senator. My name is John McDonald and I am Manager of Community Affairs for the Atlantic City Electric Company. I would like to submit to your Commission the testimony of our President, Mr. James P. Hayward. I have copies available and we would like to extend an invitation to your Commission or any member of the Commission to come down and visit our installation.

SENATOR MERLINO: You don't wish to read your statement?

MR. McDONALD: No, I do not wish to. We have tried to pattern this, Senator, on the questions that were given out at your first hearing.

SENATOR MERLINO: The only problem I face - of course, I haven't seen your presentation and at this time I am not prepared to ask you any questions concerning that which you have presented.

MR. McDONALD: We would welcome the opportunity to come back at your convenience, Senator.

SENATOR MERLINO: Does the Atlantic City Electric Company have any other generating plants other than the conventional fossil burning plant?

MR. McDONALD: We are partners in the Salem Generating Station with Public Service, and we will be a partner in the Atlantic Generating Station with Public Service.

If you will refer to Chart 4, it shows the

1971 generating stations, and then we've shown that for 1975 and again in 1980, where the source of power would be, the generating capacity. But the Deepwater Station, the Atlantic, are all in Southern New Jersey.

SENATOR MERLINO: I note on page 3 of your presentation, the growth of electric consumption in South Jersey. Would you be in position to state how this compares with the growth of consumption in North Jersey?

MR. McDONALD: I would not be in position to comment on that, Senator.

SENATOR MERLINO: Well, do you have any information concerning the projected population growth in South Jersey?

MR. McDONALD: Well, our best figures are that our consumption in Southern New Jersey will double again by 1978.

SENATOR MERLINO: Double from the present, in the next five years?

MR. McDONALD: Yes. And then again by '86.

SENATOR MERLINO: The Atlantic City Electric Company, of course, is a main supplier of electric power for the shore communities?

MR. McDONALD: I would like to give you the area involved, Senator. It takes in a part of Ocean, Atlantic, Cape May, Cumberland, Salem, Gloucester and a part of Camden County, the southern part of the State.

SENATOR MERLINO: But that part of Ocean and Atlantic Counties is predominantly the resort area of the shore.

MR. McDONALD: That's right.

SENATOR MERLINO: And how does the Atlantic City Electric Company handle that power which is necessary during the peak summer months?

MR. McDONALD: Maybe I can answer it this way, that our electrical load is about three-fourths year-round and about one-fourth resort oriented. Three-fourths of our business is year-round business, that's the off-shore, in Gloucester County, Cumberland, Salem Counties. One-fourth is what we call our summer load.

SENATOR MERLINO: And what has been your experience in the past several summers concerning sufficient --

MR. McDONALD: We have had summer peaks.

SENATOR MERLINO: And have you been able to --

MR. McDONALD: We have been able to meet our obligation to our customers, yes.

SENATOR MERLINO: Well, thank you, Mr. McDonald. I'm caught just a little short myself.

MR. McDONALD: Well, we would like the opportunity, if you have any questions, Senator, to come back and visit with you again.

SENATOR MERLINO: Well, we would like to have you back but it wasn't our intention - at least those of us who are presently serving - to make this a continuing affair. Hopefully, we will be able to report back to the Senate some time around the middle of March. But you can be assured that, after reading the statement, if we have any questions we will ask them.

MR. McDONALD: Thank you very much.

SENATOR MERLINO: New Jersey Fuel Merchants Association.

D A V I D T. B R E W S T E R: Good morning. My name is David T. Brewster, and I am Executive Director of the Fuel Merchants Association of New Jersey with offices located in Springfield, New Jersey.

The Association represents 750 small independent marketers of oil heat, principally #2 fuel oil, and commonly referred to as home heating oil.

Small businessmen and women, but doing a big, vital job. We deliver approximately 87% of the nearly 2 billion gallons of oil heat to some 1,167,762 households in New Jersey. In addition, we supply oil heat to schools, hospitals, offices, industries, and both public and private institutional facilities.

In earlier testimony before this body, New Jersey's Commissioner of Labor and Industry described graphically how great this responsibility is.

Fully one-third of all manufacturing operations within New Jersey depend on oil as their energy source. It is the leading single energy source for manufacturing in our State.

With regard to heating and ventilation, no less than two-thirds of New Jersey's needs are met through oil!

Our members are at the very end of a complex but efficient system of fuel oil distribution. We depend entirely upon the supplying companies for our fuel oil. Some of our dealers have on-site storage. Most do not. Therefore, a steady and uninterrupted flow of fuel oil is essential to us, to our customers, and to the State of New Jersey.

I will outline and explain the absolute necessity of maintaining an adequate and continuing supply, and what you, as a Legislator, can do to bridge the energy gap. And there is much that you can do!

To that end, we applaud the foresight of President Alfred Beadleston in appointing this Committee, and we congratulate you for holding these hearings.

What you develop here could well be the key to our future.

* * * * *

A continuing supply of oil. That's what we're seeking. But the statement has a ring of generality to it. Therefore, I'll be specific. I'll bring it home. To your home!

If you live in a house with oil heat, you probably have the average size tank, which contains 275 gallons of fuel oil. When the temperature drops around the 20° level, you're consuming just under 20 gallons of oil each day. That means that you have about a two-week supply of fuel in your tank.

There's no magic valve on that tank when it's empty. You must depend on your dealer. And he, as I've indicated, must depend on his supplier.

Thus, when a member of our Association runs out of supply, it's only a matter of hours or days before your home grows cold. Your home...your office...your business...your hospital...your school.

All of a sudden, that general statement of "continuing supply" takes on a specific meaning. A meaning vital to the best interests of New Jersey and New Jerseyans.

How do we get that continuing supply? It won't be easy. There are many actions which must be taken on both a national and statewide level.

First and foremost, we must support efforts to extend the relaxation of import quotas. In January, President Nixon relaxed the restrictions on oil imports until April 30. On the surface, that would appear to solve the oil crisis we have been facing. In reality, however, the step was taken too late, and it accomplishes too little. We need...the nation needs...at least a year's extension of that order, if it is to do any good.

Within the past week, U. S. Senator Harrison A. Williams, Jr., of New Jersey, moved to correct the situation. He co-sponsored legislation removing import quotas for the next 14 months. In doing so, Senator Williams noted this would help alleviate a critical shortage of heating oil in New Jersey, while protecting consumers against a potential high rise in fuel oil costs.

In Senator Williams' own words: "With only a three-month suspension of the quota, overseas dealers are unwilling to supply American buyers except at a very high cost, which is passed on to the consumer. If American buyers could make long-term contracts, the cost would be considerably lower. The only way to keep the price down is to suspend the quota system for a longer period of time."

I urge this body to join in supporting this national legislation with such state-wide implications.

* * *

Our second goal, nationally, should be to encourage the development of domestic sources of oil and gas. We, like all good citizens, are appalled at the prospects of this nation's being perhaps as much as 56% dependent upon foreign sources for petroleum product.

I do not propose to describe everything which could be done to encourage domestic production. But, we must act with all due speed, ever mindful of environmental considerations as we do.

Our nation's security demands that we lessen our dependence on foreign sources of energy supply. We can only lessen that dependence if we expand our domestic sources.

* * *

Our third national goal should be to optimize the means of moving that product from all sources to the market and to the consumer.

Other areas of the country have ultra-efficient, assured sources of supply and distribution. In the East, the very heartland of our nation's population and our industrial nerve-center, our supply system must be improved while at the same time lessening the existing potential for damage to our environment. Great technological advances have been made in recent years involving the transfer and receiving of oil. We should adopt the best, and the safest.

* * *

Fourth, and extremely essential to the needs of our people, is the encouragement of construction of desperately needed refinery facilities along the East Coast. As the Sierra Club's New Jersey Chapter stated in its testimony before you... "New Jersey's requirements for oil are going to increase in the near future. There is a chance that we will soon run out of refining capacity..."

Everyone, environmentalists and industrialists and individuals alike, recognize the need for more refineries. They must be properly sited and meet our State's environmental considerations. But, they must be built!

* * *

Finally, what must be done on a national level (and what you should support through the great influence you exert) is the development of a national energy policy.

Purely and simply, it means the most efficient use of each of our energy sources. It is no longer a matter of one energy source competing against the other. Each source---gas, electricity and oil---has a vital role to play in our future. We must use each source in the most efficient manner possible, if we are to survive.

These are the national programs which must be established and implemented.

Each deserves your support, and mine. But, there is much that can be done here and now, within New Jersey, by you and by me, to bridge the energy gap.

The all-important goal we can achieve is to curtail the wasteful use of #2 fuel oil. Then, in line with the national energy policy, we should establish New Jersey's energy policy, guaranteeing the most efficient use of each of our energy sources, so that New Jersey's families, firms and facilities can best be served.

What do we mean by wasteful use? There are many examples. But, first understand this: The only fuel that can be burned in oil-heated homes is #2 fuel oil. This is the refined oil with an extremely low-sulfur content. It is so ecologically acceptable that there is great competition for this precious resource. The homeowner is competing with utilities and with industry for #2 oil.

But, bear in mind---the oil heat homeowner can use nothing other than #2 fuel oil.

With the imposition of clean-air standards across the nation, and particularly in view of New Jersey's leadership in this area, utilities have been turning more and more to #2 oil as an energy source. Our situation is comparable to New England, where the utilities' consumption of #2 oil has increased tenfold in the past two years alone!

One short-range proposal is that generated in nearby Pennsylvania, where that commonwealth is considering using coal again, rather than oil, for utility needs.

Utilities could and should install the type of advanced anti-pollution devices

now being used with great success in Europe and becoming increasingly available here, which would permit them to use coal or other types of oil, without affecting the environment.

If you would urge a top-priority program in this field now, most utilities could have such devices installed and operative by 1975. This would decrease their dependence on #2 fuel oil and make it more available to the consumer. It would also assist in holding down the price of oil to the average New Jersey resident.

Probably the most flagrant example of inefficient use of natural resources is the generation of electricity using #2 fuel oil to fuel a gas turbine. Until gas came on short supply, this was an efficient "gas turbine". Not so when, in using #2 fuel oil it consumes three gallons of oil in order to generate the same number of BTU's which one gallon of oil would furnish if burned in a conventional home heat burner.

From the Department of the Interior's own figures, "Between May 1 and September 30, 1971, electric utilities bought and burned two billion, eight hundred and eighty-four million gallons of home heating oil---enough to heat 1.9 million average homes. And if we give diesel turbines the benefit of every doubt and an efficiency of 35%, they wasted 1.874 billion gallons, or enough to keep 1.25 million American families comfortable last winter".

Let me conclude.

Robert D. Lynch, Vice President of the National Oil Fuel Institute, said recently, "Heating Oil's annual growth has averaged about 2% for the past 15 years. Our industry has geared itself accordingly. Last year (1972) volume growth for distillate space heating ran around 2.5% while refiners increased

distillate production 5%.

Let me deviate by explaining, the word "distillate" is referred to in this text as number 2 fuel oil.

Technically, therefore, distillate oil supplies should be more than adequate for conventional heating markets. Demand in the last quarter of 1972 hit an unprecedented 15%. Obviously, these staggering volumes are not being consumed by traditional oil heat customers. Electric utilities are overwhelming many markets with their demands, requiring distillate oil as fuel for inefficient gas turbines or to blend with heavy oils to meet environmental sulfur regulations. In 1972 East Coast utilities used 1 3/4 billion gallons of home heating oil for blending purposes, enough to heat 1 1/4 million homes for a year. Parenthetically, that amount of oil would have heated all of the oil heated homes presently in New Jersey.

When natural gas is in short supply - we need more oil.

When electricity is in short supply - we need more oil.

If homes are to be heated and industry is to be supplied its growth energy requirements - we need more oil.

The plain and simple fact is - we need more oil.

That is why the New Jersey Senate, and the potential for action which exists within this State, must be focused on assuring the supply of oil, and guaranteeing its most efficient use. The men, women, and children of New Jersey deserve no less.

Thank you.

SENATOR MERLINO: Senator Dodd, do you have any questions?

SENATOR DODD: Mr. Brewster, how do they

convert the equipment from gas to oil for the generators, for the turbines?

MR. BREWSTER: I have no technical knowledge of the method; all I know is that they were designed to be powered by gas.

SENATOR DODD: And through some modification --

MR. BREWSTER: I suppose through some modification they are able to burn **only** #2 oil, not a heavier grade or anything.

SENATOR DODD: That's all.

SENATOR MERLINO: **Mr. Brewster**, what is the reaction of the Fuel Merchants to the electric companies' efforts to persuade the public to go electric all the way by their advertising?

MR. BREWSTER: What is our objection?

SENATOR MERLINO: No, what is your reaction. I guess your reaction would be your objection too.

MR. BREWSTER: I was jumping the gun.

It's quite true that we've been in competition with electric heating as well as gas heating for years. As we look down the road, we see a need for enough of all of these various forms of energy. Our particular concern is in the wasteful use of #2 in order to generate electricity, where you use three gallons of fuel oil where in a conventional oil burner you would only use one. We're simply saying that it's a waste of natural resource, bearing in mind that the #2 fuel oil that I'm talking about is the only fuel that can be burned in an oil-heated home. We have no alternative fuel.

SENATOR MERLINO: Concerning the importation of foreign oil, just what legitimacy does the fuel merchant attach to the argument against removing the quota regulations?

MR. BREWSTER: We are opposed to raising import quotas - restrictions. I should say, - under

normal circumstances because our Association is just as interested in national security as any other organization. However, we face a terrible shortage of fuel oil. If it doesn't occur this winter - and Lord knows, the Lord has been on our side because it's extraordinarily warm outside --

SENATOR MERLINO: Bad for business.

MR. BREWSTER: Well, in some respects. As one of my jobbers said, "Here I am in the business of selling fuel oil and I hope it's going to stay warm this winter." This is how concerned we are.

We do not want our country to be dependent upon foreign oil because we have had the Suez crisis, or a couple of them, I guess, and it is very unhealthy for our defense. But at the same time, with a protracted cold spell, which we could still have with 44% of our degree days still remaining, we may run out of fuel oil. We don't want to do this. It is bad for everybody, obviously.

We would like to see and in the text of this statement we are pressing for domestic production of fuel oil. That's the answer to import quotas.

SENATOR MERLINO: Concerning the running out of the supply, if we should experience a protracted cold spell, aren't there sufficient reserves built up to take care of the anticipated use for the coming winter and if you don't get to use it what is done with that supply?

MR. BREWSTER: Well, I took the liberty of doing some last-minute checking from Virginia to Maine, and part of the answer to your question, Senator, lies in the fact that - well, if you're familiar with the stock market, and I guess everybody else, the Dow Jones average means something to a person who follows the stock market; in our business we talk in terms of

the Gulf. Well, the Gulf is the Gulf Coast, Louisiana and Mississippi. This is the storage tank, as it were, for New England, the Middle Atlantic States, in fact for the entire United States. They are **desperately** short of #2 fuel oil, and we have 44% of our heating season to go.

Now I have checked with the New England States. They're tight all over in all grades of fuel oil. There has been some relaxation on the heavy grades due to lowering the sulfur content. Ditto in New York. Virginia is asking, I believe today or yesterday, the Office of Emergency Preparedness to make defense stocks available on #1, which is kerosene. Maryland is tight. They will take no new customers. Maine is very bad on #2 fuel oil. And this is why we're worried. It's the backup supplies and the length of time that this distribution line takes to get it to the market that concerns us. If we can have cold weather and then warm weather and then cold weather and then warm weather, it gives us that time. A protracted long period of cold weather and the distribution lines just can't carry it.

SENATOR MERLINO: Well, I appreciate the problem with the distribution lines but the storage in reserve - it would be a fair statement to say that your suppliers, in view of your vesting your demand because of the weather, - that they would divert that which he would supply normally to you to the power generating companies?

MR. BREWSTER: Well, they already have - it's beginning to relax a little bit with the warm weather and they've already reduced, generally speaking, across the board, all suppliers between 20 and 30% of what we would normally use based on last year, which was a very mild year. So they already have indicated a shortness of supply by saying that you can have 70% of

what you took last year.

SENATOR MERLINO: And isn't this a warmer winter than we had last year?

MR. BREWSTER: No, sir. I have the figure here that we are colder by 326 degree days and yet last year was one of the mildest winters, I think, that we've had in modern times. So we're colder this year but we're getting it intermittently, warm and then cold. And they've cut us, as I say, 20 to 30% of what we used last year. So we're just hanging on the brink with cold weather.

SENATOR MERLINO: In your statement, particularly on page 4, the middle of the page, concerning the transfer and receiving of oil, would this be interpreted as an endorsement by the fuel merchants of a deep water port?

MR. BREWSTER: I don't believe that our Association is equipped to say yes to the question but we would like to add that we need more oil, and if this is the way that it can be brought to the market then we would go along with that determination.

SENATOR MERLINO: In other words, you'll take your oil any way you can get it.

MR. BREWSTER: Well, we have to. We have to keep the homes in New Jersey warm.

SENATOR MERLINO: Other than the burning of coal, as has been suggested, - I think you said it was being returned to in Pennsylvania?

MR. BREWSTER: I think it was suggested. I don't know that they've gone to it yet.

SENATOR MERLINO: What other suggestion would the Fuel Merchants have for curtailing the wasteful use of #2 fuel oil?

MR. BREWSTER: Well, coal is a natural resource which would lessen our dependence on foreign sources for energy, and the heavier oils with the higher sulfur

which are presently not burnable because of the Air Pollution Control Code could, and I'm not a technical man but I understand could be burned for, say, power generation where enough of the sulfur could be removed to make it acceptable to the environmental authorities, thus lessening the demands for this other precious material which is #2 fuel oil.

SENATOR MERLINO: Are you aware of the devices you speak of being used in Europe with great success?

MR. BREWSTER: We can answer your question a little bit better by drawing on my technical division. I can't answer that question at the moment. I know it by reference.

SENATOR MERLINO: The shortage of gas that you speak of, would this be the natural gas or the manufactured gas?

MR. BREWSTER: Natural gas, as I understand.

SENATOR MERLINO: And I guess here in New Jersey we use a combination, as I remember, a mixture of natural and manufactured gas?

MR. BREWSTER: I'm not aware of a mixture. I believe that the bulk of it is natural gas. I'm not positive.

SENATOR MERLINO: Would you suggest, at least temporarily, that the restrictions on the sulfur burning oils be lifted until the crisis is met or the shortage is reduced?

MR. BREWSTER: Senator Merlino, I have to be honest in answering this question. At the present time --

SENATOR MERLINO: I presume that you are with all your answers.

MR. BREWSTER: At the present time we, quite frankly, are beginning to wonder now whether we won't get through without a very serious shortage. There-

fore, I would not suggest that it be done because we think we may run out this winter. But what I would like to see, and I'm recommending to this Commission, is that the subject be studied very carefully and that the available supplies of fuel oil be determined almost on a weekly basis so that if it became necessary, in order to keep our factories running and our apartment houses heated and our homes heated, then the Department of Environmental Protection could give us enough lead time to get this higher, undesirable sulfur fuel in to accomplish that.

Now we all read the papers and it's pretty hard to understand everything you read in there, but I say that if there is a sufficient supply of higher sulfur fuel that is available that can be used that would prevent us from going to coal, it should be a very serious consideration by our Department. And I have known Mr. Sullivan for a long time and I am pretty sure that it is. But in studying the energy situation here, it should be very carefully arranged where that could be done in order to keep us going here in New Jersey.

SENATOR MERLINO: Well, we're concerned with the energy situation but we're concerned with all its aspects, how it affects the environment and so on.

I have nothing further.

Senator Dodd, do you?

SENATOR DODD: No.

SENATOR MERLINO: Thank you.

Next is the Delaware Valley Committee for Protection of the Environment.

J O H N K. M U S T A R D: My name is John K. Mustard and I live in Moorestown, New Jersey. I am Executive Director of the Delaware Valley Committee for

Protection of the Environment, an intervener at the Newbold Island construction permit hearings and a member of the New Jersey section of the Environmental Coalition on Nuclear Power.

The one and only way to insure adequate electrical reserves for our state and our nation is to place a national moratorium on all atomic fission generating plants. I repeat, we must have a moratorium on the use of atomic fission in order to gain secure state and national electrical reserves.

We realize this statement flies in the face of the so-called "expert" opinion on the subject so we hope you'll bear with us while we explain the reasons to substantiate our position.

We have heard, among the endless reasons offered, that we must accept fission because other alternatives are either: not developed yet, are inadequate in volume, are too polluting or are not available in our particular area.

Individually, each of these reasons may be true to some degree. Collectively, they represent an attitude that has caused us to choose an energy course, as present symptoms indicate, leading to extreme shortages of electricity.

Basically, our present electrical power dilemma has been caused by our failure to utilize all available methods of energy production with priority on those that are non-polluting. A continuation of this disregard of other methods, except for fission with its production of tremendous amounts of radioactive garbage, will insure not only a continuing power crisis but total degradation of the environment.

You heard Dr. Shepard Bartnoff, President of Jersey Central Power and Light, and Robert Baker, Vice-president of Public Service Electric and Gas, lament delays of up to four years in the construction of atomic power plants. If Salem and Peach Bottom had not been delayed four years would we be faced with the impending electrical shortage projected by Mr. Ozzard in 1974? Obviously not to the degree anticipated, if at all.

For the record we wish to clearly state that these delays occasioned at Salem and Peach Bottom were not caused by activities of environmentalists as no interventions were entered up to the current operating license stage for these plants.

Here is clear evidence that for our particular area the singular choice of reliance on atomic fission plants has been our undoing.

This same situation is occurring across the nation in ever increasing numbers. It boils down to - as the Pennsylvania Dutch might put it - "The further ahead we go with fission, the more behind we get."

Dr. Bartnoff made an interesting and very truthfull statement in a television interview following the Jan. 23rd hearing. He admitted that fission was not the final answer to our energy needs - that we must look to fusion and solar energy as the ultimate sources.

As true as this statement is, how can we expect to switch from fission to, for example, solar energy if it were fully available within twenty years. An estimated \$600 billion dollars will be spent nationally on fission plants and their associated installations by the year 2000. Will these outlays be casually discarded and new funds allocated for a safe, unending, pollution-free energy source?

Total commitment to fission has locked us in to a total commitment to perpetual exposure to radioactive catastrophes through accident of man or Nature and from sabotage, as well as total commitment to the development of the breeder reactor and its awesome product, plutonium. Projections by our utilities indicate that New Jersey will have its full share of breeder reactors by the year 2000. This is perhaps being saved for a "suprise."

These commitments plus the many unknowns associated with producing and allowing radiation into our delicate biosphere are all being made in exchange for a little electricity that several generations of the species Homo sapiens can enjoy.

Only through a moratorium on atomic fission plants now can we hope to bring the realization to light that we can bridge the gap to solar and/or fusion by utilization of non-radioactive sources; coal gasification, oil shale, geothermal, etc. Crash programs on all these methods will be forthcoming only when it is evident a moratorium on fission will cut off the huge flow of uninterrupted research funding

enjoyed by fission for so many years.

The negative attitudes of those in charge who parrot, "We can't deliver the power" and "Other energy sources are impossible" must be spirited back to the old American belief in "can do."

Would we be in our present dilemma if a more broad-based energy policy had been developed at the time fission was first promoted as the answer to all our problems? This overwhelming promotion depressed the coal industry so severely it is still being felt. It discouraged research and development of alternative power sources at a ratio of 83% of the energy research dollar for fission and the balance for all others. (0 for solar, 0 for geothermal and only \$300,000 for magnetohydrodynamics in 1970) We spent less on developing non-radioactive sources of power in 1970 than we spent on two 747 airliners.

It is necessary to recognize how we got to this point in time so that we do not, by overreacting, compound previous errors. The purpose of this committee is, I'm certain, to avoid the necessity of having to reform in another 5 to 10 years to ask the same questions again.

For this very reason we take sharp exception to Mr. Ozzard's suggestion that environmentalists relax their demands for an absolutely "pure" environment. First, we are realistic enough to realize such Utopia as a pure environment is not possible. Second, and most important, the worst time to relax the environmental vigil is when an emergency occurs, for at such times decisions made precipitously may very well commit us to a more destructive course than the one we are trying to avoid.

The question of how much growth can New Jersey accept is paramount in this investigation. All aspects of this question will certainly be dealt with by the Governor's joint legislative planning committee but this committee must recognize there is a limit to our state's ability to expand and contain increases in industry, population and housing which is directly responsible for demands on electricity.

The projections by the utilities are apparently based on a non-restrictive, exponential growth rate. Proper and prudent control of this growth can be instrumental in preventing both power shortages and further degradation of our environment and quality of life.

Intelligent decisions of city and community planning boards

has often prevented the creation of slums. Improper planning decisions at the state level can likewise create a slum state wherein no amount of electricity will be able to reverse the condition.

We cannot accept the head of the animal without also accepting the opposite end. The use of fission entails radioactive releases all along the line up to and including high-level waste storage for hundreds of thousands of years. It also entails accepting the fast breeder reactor which, if successful, will throw our nation into a plutonium based economy.

A method used to justify the acceptance of atomic fission has been the benefit versus risk evaluation.

A close look at the benefits and risks of the most hazardous technology yet developed by man shows the only possible benefits to be achieved are questionably reliable quantities of electricity at a very questionably competitive price. The risks are literally endless, exposing current and future generations to the likelihood of radioactive contamination. In developing a risk-benefit equation a factor of thousands of generations at risk must be included which tips the scale irreversibly. It is not enough to claim acceptance because the benefits in our lifetime seem to outweigh the possible risks in our lifetime. Even this comparison is extremely untenable.

Other immediate risks include the threat of sabotage to plants, spent fuel shipments, fuel reprocessing plants and high-level waste storage sites, the off-shore plant concept being the most vulnerable. The AEC has admitted there is no way to fully protect atomic installations against terrorists such as the hijackers of the Southern Airways jet who threatened to crash the plane into the AEC Oak Ridge plant.

We are also now aware that nuclear materials sufficient to make a bomb have been aboard United States passenger jets hijacked to Cuba. Fortunately, neither Cuban officials nor the hijackers were aware and all planes were returned to the United States.

Since that point, there have been reductions in the allowable amounts of such material that can be shipped, immediately following this expose.

With increased dependency on fission such shipments will increase and the likelihood of a small nation or a band of terrorists gaining instant nuclear status through theft of materials and private bomb construction becomes a stark reality.

These risks must also be totalled and placed in the benefit-risk equation.

An enlightening difference of opinion between Mr. Baker of Public Service Electric and Gas Co. and Mr. Louis Roddis, president of Con Ed was illustrated when Mr. Baker alluded to the increase in reliability of fission plants over fossil fuel plants. According to Mr. Roddis reactor manufacturers led utilities to go nuclear on the basis of an assumed energy deliverability of 80 percent or more for their reactors as compared to 75 percent for conventional oil or coal plants. As of Oct. 1, 1972, according to Mr. Roddis, the average deliverability for the 18 reactors that have been operating in this country was only 60.9 percent and Con Ed's only operating atomic plant, Indian Point #1, operating for 10 years, had a delivery rating of only 47.7 percent.

The problem with nuclear plants, Mr. Roddis said, is that they break down and are too difficult to repair. As an example he cited the failure of a cooling pipe in Indian Point #1 in May of 1970. Total repair time was seven months, cost was \$1 million and 700 men were used in order not to exceed radiation exposure regulations. A similar repair effort, if made in a conventional plant, would have required two weeks and no more than 25 men, Mr. Roddis explained.

Again, "The further ahead we go with fission, the more behind we get."

Mr. Baker represents, we feel, the unburned, optimistic, totally committed utility executive while Mr. Roddis represents the first outspoken, burned, pessimistic utility executive. Con Ed has cancelled orders for two reactors, obviously because of their disenchantment.

What does the future hold for New Jersey? How will this inevitable poor performance affect our electrical reserves? These are questions that must be realistically considered now, as electricity has never been produced by optimism no matter how sincere or how plentiful.

The question on reliability of floating off-shore reactors is also seriously in doubt when you consider the problem of salt water intrusion into the condenser cooling system of the Millstone #1 plant in Conn. It was using salt water drawn from the Niantic Bay in a once-through flow. The cost of repairs and the down time after only two years operation places the use of ocean water for cooling in doubtful acceptability.

Gentlemen, atomic fission is the Edsel of the energy industry and will, if allowed to go "forward" unchallenged, constantly aggravate and worsen our power situation as well as our environment.

We are sitting on top of over 400 years supply of coal. Its use, via clean conversions, could easily solve our immediate problems. It is hoped Pennsylvania through Governor Shapp's efforts will spur this into reality. Our state should lend its encouragement.

Time limitation prevents further discussion of all the actions necessary to protect our future electrical supplies. We ask that the following publications, which have been supplied to the Committee through Steven Frakt, be placed in the record.

Nuclear Energy: Promises, Promises
The Case for a Nuclear Moratorium
Science Magazine articles on Nuclear Safety
Energy Gluttony and Overkill
The Peoples Right to Choose
Nuclear Power and Alternatives
New York Times news item - Nov. 19, 1972 & Ed. Jan. 31, 1973
Courier-Post news item - Jan. 26, 1973

It is hoped everyone will consider seriously the full implications of total acceptance of fission and not overreact to the emergency at hand, be it completely real, part real and partly manufactured or completely manufactured.

In conclusion, we wish to remind everyone that by endorsing fission we are permitting, for the first time in our history, the development of an industry capable of wiping out not only the entire country but the entire world.

Thank you.

SENATOR MERLINO: Senator Dodd?

SENATOR DODD: Mr. Mustard, what is the present form of disposal of atomic wastes by the AEC?

MR. MUSTARD: The high level wastes?

SENATOR DODD: Yes.

MR. MUSTARD: They really have no final solution. Their present project is considering burying them in the salt mines of New Mexico, State of New Mexico, after having given up the idea in the State of Kansas.

SENATOR DODD: What is a half life of --

MR. MUSTARD: One of the longest is plutonium being the most, not only deadly but most toxic, - is 24,400 years half life. That is a good one to base any projections on as far as the need for sequestering from the environment.

SENATOR DODD: We just heard Mr. Brewster from the fuel oil industry tell us that they're only getting 70% of what they used last year. We obviously have an immediate crisis. We mean immediate by this winter. Your projections are long-range and in most cases very good sound thinking. How would you suggest we solve our immediate energy crisis, if in fact we have one?

MR. MUSTARD: Well, again, I would agree with "if in fact we have one". The one item I included is a quotation by S. David Freeman of the Ford Foundation Energy Policy Project, and the period of post coverage on that was so complete I included it. And I think it boiled down, as Mr. Freeman placed it, that there is great doubt as to the real energy crisis as far as fuel oils and gas at the very present moment, that we have adequate amounts in the ground but it has all boiled around price and import limitations, etc. This is what has caused the thing to become a critical situation; it is not the actual lack of gas and oil in the ground, for the immediacy. ~~This is~~ perhaps a national level problem

that must be solved. But we don't feel that we are that short of available reserves in the ground, that this is a man-made situation.

SENATOR DODD: It would seem that our problem lies in lack of storage area in the Northeast Region of the United States.

MR. MUSTARD: That and the incentives to get it out of the ground at the proper price. And, again, that goes at quite a high level above where we are considering action.

SENATOR MERLINO: Mr. Mustard, you began your statement with "The one and only way to insure adequate electrical reserves for our state and our nation is to place a national moratorium on all atomic fission generating plants." How would that insure an adequate reserve?

MR. MUSTARD: Because by placing a moratorium we would immediately force the monies that are now being poured into fission into other methods that will be productive on a much shorter term basis, that are being, as I mentioned, starved of funds and have been starved for the last fifteen years. But until a moratorium is actually enacted, this change won't really be forthcoming. There may be lip service paid to it but it will never happen, as Federal funds are allocated through bureaucratic diversion, until a moratorium is either imminent or on the books. There will be a continuation of more fission which, as I point out in all fairness, is going nowhere. It is primarily the promotional aspects which are holding it up.

SENATOR MERLINO: Therefore, it wouldn't necessarily mean just the moratorium. As I understand you, this would then precipitate the studies into another direction. Do you mean that perhaps we would revert back to the oil and coal burning generating plants?

MR. MUSTARD: Well, for the immediacy it would be basically dependent upon the use of coal, as I pointed out our most abundant source. We have methods of converting coal to clean usable gas. We have some in motion now being properly utilized by many of your large companies, El Paso Gas Company, I believe, in Texas, and some of the other large firms. But the point is, you are not going to generate the enthusiasm to do this on a large scale until it's obvious that fission is going to be negated. But there are more than adequate supplies of coal that can be converted. And we feel, once the incentive is there, the speed with which this will be converted will dazzle us all, because it's not a question of developing the methods. Scientific American, last October I believe it was, had a full, complete article explaining all the methods of conversion of gas from coal that have been in existence for many, many years, just waiting for proper utilization.

SENATOR MERLINO: Well, getting back to using the vast coal reserves that you speak of, how would the environmentalists and ecologists react to the stripping of the base of our land in order to --

MR. MUSTARD: I know what your point is. This has been constantly brought up with the promoters of atomic fission always comparing fission with the use of dirty coal, which is an unfair comparison, as is having to in a sense accept fission because of the threat to the landscape and the environment from strip mining.

Well, obviously, we can mine coal, either deep mine or strip mine, in a proper manner. Again, this is only because we haven't been educated to it or haven't been forced into doing it properly. But to say that we can't do it and we must accept fission, I think is very shortsighted. We know what the hazards are of improper strip mining. We can correct these.

We don't really have, as Senator Dodd pointed out, a solution to what we're going to do with the waste we're creating from fission. So that sort of a problem is much more insurmountable than the small problem of how to properly mine coal. And it wouldn't be for a permanency, it would be certainly for the interim until we can develop properly fusion and/or solar.

SENATOR MERLINO: Would you then suggest that, for the moment, the public be damned with its need for fuel and energy, however the crisis has been created and by whom it was created, until such time as the industry and government is forced into a position to place a moratorium on nuclear --

MR. MUSTARD: I anticipated your question, and the one other inclusion on the bottom of the material I gave you, which says it much better than I can, and I don't have time to go through the whole thing, was entered into the Congressional Record by Senator Mike Gravel explaining the true consequences of a nuclear moratorium. When properly and fully analyzed, discounting some of the, if you will, scare promotional tactics used to force people again to accept fission or the inevitability of shortness of power, this particular explanation points out that this is not in reality a natural and inevitable fact of life, that by utilizing properly what we have and analyzing the contribution of fission to our overall total, it is not as serious a situation as has been put forth by the promoters to justify the constant use of fission, perpetual use.

SENATOR MERLINO: Does Senator Gravel suggest, in his congressional speech, how long it would take to accomplish this end?

MR. MUSTARD: To accomplish full conversion to --

SENATOR MERLINO: The use of other fuels.

MR. MUSTARD: The exact numbers he estimates in here, but the main thing he points out is that the

conversion would not require a critical gap of insufficient amounts. This is the main point. This has been highly promoted by the industry, the threats of blackouts and energy crises are, as he says, perhaps self-fulfilling slogans used by the utilities and their counterparts on the Atomic Energy Commission. And full analysis, as I say, which would take considerable time, this supplies this because it does a very in-depth analysis. It points out the fallacy of this. And, again, we don't fault any promoter when he's anxious to promote what he considers the best for all by giving you the best points and putting somewhere in reserve or behind him the bad points. And this is true from the used car salesman on up to the promoter of atomic fission. But there are many things that are now coming out about fission that weren't known just a few years ago. Well, for instance, the sabotage and highjacking aspects. Ralph Leff in New York Times Sunday Magazine wrote a full-length story on the ultimate blackmail, wherein we are subjecting ourselves to this potential by producing and, of necessity, shipping huge amounts of plutonium fissile materials, around this country; that almost anyone can take it upon themselves to get sufficient amounts to make a homemade bomb. And this is not a very difficult thing to do.

SENATOR MERLINO: Now the shortages that now appear imminent in our particular area, is this also experienced in other parts of our country, do you know?

MR. MUSTARD: The electrical?

SENATOR MERLINO: Yes, electrical and the oil, the fuel.

MR. MUSTARD: As the earlier gentleman pointed out, there is a definite tie-in because gas is short and utilities are calling on #2 fuel oil, so this drains your reserves of your home heating fuel. So they're definitely interlocked.

SENATOR MERLINO: I'm speaking geographically. In most of the matters referred to here at these hearings - of course, we're concerned particularly with New Jersey and we've gotten into Virginia and Pennsylvania and New York and, this morning, we got into Maine. Does the same condition exist elsewhere in the country?

MR. MUSTARD: Well, the electrical, so called, reserve shortages are primarily at a critical stage in the northeast where your heaviest demands have been. But, intertestingly enough, nationally, if you total all your electrical reserves, we have not had what has been projected and predicted as an extreme energy crisis; we have had a very reasonable total electrical energy reserve nationally but we have lacked the capability of directing it to peak demand areas due to our insufficient grid setup, national grid setup. And, again, this would be an essential part of the national energy policy to incorporate distribution through a full national grid, which has been kept out of reality by special vested interests, and so forth, in their own localities. So many of these shortages, particularly electricity, are localized in a sense where at times when they are critical in one area there is ample reserve in another. But, again, this is the large picture and New Jersey falls into part of it because as goes the large picture, so goes New Jersey, in the northeast. So I think by correcting the overall problem and analyzing the full, large picture, we have a chance of automatically improving New Jersey's position.

SENATOR MERLINO: But in particular in New Jersey, do you have an opinion as to just how much the increase in demand for power is attributable to our economic expansion or to our housing and population growth?

MR. MUSTARD: All the numbers that we've seen indicate that ~~the~~ highest percent of increased demand is from our industrial growth and requirements, as opposed to demand from the residential. Their requirements have gone up but they have not caused the major impact. It has been the industrial.

SENATOR MERLINO: Have you seen this morning's Philadelphia Inquirer?

MR. MUSTARD: Yes.

SENATOR MERLINO: I presume that you would like the article which appears on the front page, by Dr. Sternglass, to become part of your testimony.

MR. MUSTARD: Yes. I would be very interested in that.

SENATOR MERLINO: Which is entitled: Nuclear Plant in State is Killing Babies.

MR. MUSTARD: I have, for the record, examined all of Dr. Sternglass's papers up till perhaps this latest one that I haven't had access to. And full examination has been done by some other scientists - I mention Dr. Morris DeGroot who also, after looking into Sternglass's appraisal and also his own work, has come to the same basic conclusion that there is great concern for statistical tie-ins between infant mortalities and ~~other causes of death and diseases,~~ by what was considered to be so-called harmless low-level radio-active emissions from plants.

SENATOR MERLINO: Would you consider perhaps that Pennsylvania's Governor Shapp's suggestion of utilizing the coal in that state for a source of energy might have been spurred because of the depressed conditions which exist in the coal regions of Pennsylvania more or less of a home state rehabilitation project?

MR. MUSTARD: That has been suggested, even suggested in regard to some of Senator Schweiker's comments on the situation. And I suppose it's only

natural to some degree that you would have a form of bias in your own State's resource. But I think the overall picture, according to our information, having had meetings with Governor Shapp's staff, it is not primarily just local state interest in using their coal. They have analyzed the whole situation. I think they would be willing to accept any method that was reasonably safe.

SENATOR MERLINO: Senator Dodd?

SENATOR DODD: Mr. Mustard, does your group or do you yourself have an opinion on the proposed off-shore oil port, as the alternative to, first, a crisis and, secondly, as an alternative to the present system of lightering?

MR. MUSTARD: Well, our opinion is, if we follow proper procedures domestically we would probably not need such tremendous imports as would necessitate such an installation as a deep off-shore port. But, again, this would have to be thoroughly examined by a true evaluation of our reserves and our needs. We certainly feel it is an horrendous risk for our shore. The only risk greater, we feel, than the off-shore oil plant, is the risk of the off-shore atomic plants which overwhelms the possibility of environmental impact through an accident by factors of thousands as compared to the oil. But we feel, and personally I feel we can get through this crisis if we straighten out the price picture that seems to be bothering those who control energy in this country, the large holders of oil, coal, uranium, and so forth. There is obviously, using the word, monopoly in this particular field.

SENATOR DODD: Well as long as we have the American competitive enterprise system and one little factor called human nature, do you think that things will change?

MR. MUSTARD: They will change to some degree as public awareness changes and as legislative awareness changes. But going on unaware, they will certainly get considerably worse. I think awareness is now becoming pretty nationwide on this trumped-up gas and oil shortage. It was certainly grossly aggravated by man's intervention.

SENATOR PARKER: Mr. Mustard, I'm sorry I'm late. I don't know how much I missed but I know your presentation, I'm familiar with it. What statistics do you have to back up your position that there is not in fact a gas shortage or in fact an oil shortage, and that it is in fact man-made? What particular statistics? Do you have any statistics as to oil reserves in this country?

MR. MUSTARD: I don't have my own statistics. I've gone by evaluating the cross-section of what we call objective expert opinion of those that have been researching.

SENATOR PARKER: What, in particular, have you been relying on? In other words, you're talking about coal and it being able to be converted, I take it, into some form of gas and burn more efficiently. And your basic theme has been, as I understand it, one, that there are sufficient other fuels, other than atomic energy. Your thrust is that you are basically opposed to the use of atomic energy, as I have understood it. What items were you using? Department of Labor statistics or what statistics to show that there is plenty of gas?

Now, let me just give you my thoughts. We've all heard that there has been sufficient gas reserves and they're just not taking it out of the wells because depletion reserves, and all the other gimmicks we're financing on a national level, have not made it

attractive to use the gas. We've heard statistics, or at least some accusations that the reason there is a fuel oil shortage is because of the wage-price stabilization it was more economical and more profitable, shall we say, for the gas companies to produce gasoline for automobiles than heating fuels. Now, you know, I want to know what statistics there are available and what you've relied on that we might look at to use as substantiation to your particular claims.

MR. MUSTARD: As I said to Senator Merlino, the one inclusion I put in the material supplied - I didn't attempt to put in every particular comment and statement but I did pick out the one by S. David Freeman from the Ford Foundation Energy Policy Project as printed in the Courier Post of January 26th.

SENATOR PARKER: But most of these are other people's opinions rather than basic facts, statistics.

MR. MUSTARD: Well, the amounts available are not that easily come by. That is, you nor I couldn't go over to the well heads and say how much is here and how much is here. It's the concensus of opinion of men, and certainly Freeman's position, Representative Patman of Texas --

SENATOR PARKER: I've read his statement the other day.

MR. MUSTARD: -- and others. If you follow it and read every concerned opinion, you will come to a total conclusion that the actual underground reserves are there. Many of your news agencies have done pretty in-depth studies on this. It's just a question of immediacy. Now this is not to say that we have adequate gas and coal certainly forever. We're obviously in short supply as far as those futures go. But the business of trying to convince the public that they have to accept fission because there wasn't any possible adequacy of coal, oil and gas, on this emergency type

acceptance, is, I believe we must all recognize now, fraudulent in view of not only the present situation with regard to this actual gas and oil shortage, that is shortage in reserve tanks here in our locality and throughout the country, but also in the actual reserves of coal. People were led to believe that we really had only a matter of 20 or 40 years of usable coal reserves when fission was first promoted. Now those numbers of several hundred years - 400 is not excessive, and these do come from the Department of the Interior, reliable sources.

SENATOR PARKER: But to use the Pennsylvania coal now we would have to change our air pollution laws.

MR. MUSTARD: That's the point I was bringing out, that until we take a sharp change in course we're going to have more fission and less and less of all other alternatives. We must, in any case, use all methods, certainly not one main, basic method. We've never done this in any other respect - the old business of all your eggs in one basket - but until we have this change in course, we will not be utilizing the coal efficiently. But we can clean up coal. As was pointed out, Germany - Europe has much more efficient methods of ~~at-the-plant~~ reductions of emissions. But you can also, as I say, clean it up to clean gas or even clean liquid fuel through these conversions that were very amply brought out in Scientific American for October by Arthur Squires. And these things are in hand. We could actually have these, in my estimation and in the estimation of many others, amply supplying gas much sooner than these highly touted atomic plants which, as was admitted here, are taking at least ten years from the time of ground breaking until completion.

SENATOR PARKER: Well, I'm not familiar with the process. I know that the coal that's available now,

or at least it's my understanding that the coal that's available now from Pennsylvania is high sulfur content and that the cost of doing this is really not economical. That's irrespective of the supply. You know, I don't know that the supply --

MR. MUSTARD: Well there are several hundred years at the rate we could possibly --

SENATOR PARKER: And where are these? in Pennsylvania and West Virginia or out west?

MR. MUSTARD: This is the combination of the out west supply, Pennsylvania and West Virginia, the whole thing.

SENATOR PARKER: You mean out in Idaho and those areas where they're doing the strip mining?

MR. MUSTARD: Some, yes. But the main point is, this so-called dirty coal, high sulfur, can be converted to clean gas.

SENATOR PARKER: By a process of burning the coal?

MR. MUSTARD: This is again the coal gasification processes which are well know. These do not require development.

SENATOR PARKER: Well I've never heard of this.

MR. MUSTARD: One of the reasons why you haven't is because we've been so overpromoted on fission that people have not taken the time to look in these other directions because they thought that fission was going to answer all our problems. Well it's becoming more and more obvious that it isn't.

SENATOR PARKER: The coal industry in Pennsylvania never thought that. A heck of a lot of them - Pottsville went from 40,000 to 20,000, and all those towns --

MR. MUSTARD: Well they were depressed because people would not sign long-term contracts for coal when they were signing long-term contracts for uranium. This was just an economic switchover. It was a bad move

to make so drastically with any industry because it has depressed it now to where it's very difficult, although they claim now that they can supply the coal if they are given full, long-term reliable contracts, which they must have. They can't say, for the next three months will you give us coal; it has to be a long term.

SENATOR PARKER: Well, it certainly seems strange to me, John, that with the coal in the adjacent areas here and with the knowledge and the wherewithal of the coal industry and the people behind them that they weren't able to turn it into some profitable source of fuel.

MR. MUSTARD: It would seem strange.

SENATOR PARKER: Especially with the tremendous cost for the atomic plants as opposed to the fossil plants.

MR. MUSTARD: The answer lies in the fact that for the last 15 years or more 83% of the money allocated for energy research in this country, nationally, has gone to fission. That supersedes development of all forms of fossil fuel usage, cleaning up existing plants, use of magnetohydrodynamics, gasification of coal, solar, and all the others. There isn't enough left after you take 83% of the dollar for fission to do a good job on any of them, much less all of them. And that's the answer. Had we been given a broad-base research policy and had we had a national energy commission rather than an Atomic Energy Commission, the picture would be different. There still is time to correct this situation.

SENATOR PARKER: Well, we're in the process of trying to do what we can here. What the national and federal are doing is a little difficult for us to combat. But the allegation that there are more than sufficient coal reserves in Pennsylvania and that we

can use the coal - I don't think you've really answered. I said, would we have to change our laws at the present time, and you said you didn't think so, that you could change it in some other way. How can we economically - how can Public Service or the others, Jersey Central, efficiently within say a year transfer this over so that we can go on a coal basis that is cheaper and would provide sufficient energy for our people for next year?

MR. MUSTARD: Well I don't think the year factor is realistic.

SENATOR PARKER: The next few years.

MR. MUSTARD: I think, as I pointed out to Senator Merlino, the one inclusion here explaining the consequences of the nuclear moratorium explains much better than I can, or we have the time for, the full impact if you were to stop the use of fission, literally, overnight, and the impact that would have not only on your reserves but on your future methods, your development of your future methods. What I am trying to point out, the scare tactics that if we don't accept fission we are, without question, going to suffer electrical shortages, is again understandable because the promoter of any technology or any manufactured product is always going to try to put himself in this light that if you don't accept my product or my methods you're going to be sorry. But you have to examine all the facts.

SENATOR PARKER: That's standard marketing procedure.

MR. MUSTARD: Exactly. But you've only been listening to the loudest voice which has been the promoter of atomic fission. And we're saying that the other voices which are now becoming heard above the hue and cry of the promoter are telling a different story. Granted, it's hard to get it across.

SENATOR PARKER: We understand that, or at least I think I do. My problem is, how do we get the

coal out of Pennsylvania and down here, efficiently, and what facts and figures did you rely on to make the statement that we can do it?

MR. MUSTARD: Again I would refer you primarily to the condensation in this insert.

SENATOR PARKER: But this is somebody else's interpretation of the statistics.

MR. MUSTARD: Well there are no exact, pure numbers because we're not dealing with numbers that are published; we are dealing with the fact that the coal is there, that if we get after it - there is no exact estimate except the harder we try, the sooner we will have adequate gas and coal, and not trying at all to insure that we will never have it. And that is the point we are adhering to. We know how to gasify coal. There are many of your large corporations now actively engaged in developing these.

SENATOR PARKER: Is there any plant in the United States, like our fossil fuel plants, which is now doing it?

MR. MUSTARD: Gasifying coal?

SENATOR PARKER: Right.

MR. MUSTARD: There are some either on line, small, or there are some with large contracts which will be on line by 1975, producing large amounts.

SENATOR PARKER: Salem will be on line by that time too.

MR. MUSTARD: Possibly. At the rate of delay, I wouldn't want to bet too much on it. Salem is one peg in the whole board. We're talking about the next plant projected here could take ten years from ground-breaking. In other words, Newbold Island, if they started actual construction today, they would be lucky if they were producing electricity by 1983. By that time you could have coal gasification, if we were

diverting our energy, and I feel ample supply to offset the demand for manufacturing that amount of electricity.

SENATOR PARKER: Do you have any statistics or figures from, say, the Pennsylvania coal industry and their association - it's, I would assume, a relatively large lobby and relatively large association - or from the Governor's staff -- they have a regular department over there, as I understand, devoted solely to mining -- that would show that they have adequate reserves and the ability to get the coal out so that it can be used?

MR. MUSTARD: I don't have them at this moment.

SENATOR PARKER: Do they have any that you know of?

MR. MUSTARD: The National Coal Association I would rely on for an overall picture, as well as the Pennsylvania, but I am sure they do but I would have to get them from them. But the estimates that have been given indicate there is no question but that there is adequate.

SENATOR MERLINO: On proposing a moratorium, I would assume you mean a moratorium on any new plants and wouldn't necessarily mean eliminating those already in existence.

MR. MUSTARD: There are varying opinions on this. Actually the only way you would stimulate constructive positive action would be a total moratorium.

SENATOR MERLINO: You mean the shutting down of the plants that are now operating?

MR. MUSTARD: I'm saying there are differences of opinion on this, one of which is for total moratorium.

SENATOR MERLINO: What's your opinion?

MR. MUSTARD: My opinion is, in order to get real diversion, constructive diversion, nationally, as far as legislation goes and allocation of funds, it would actually require total moratorium. But I think the realistic approach is, as has been developed by national

organizations, that you have a moratorium on the construction of all new plants and you would have a de-rating of those in existence, with a phasing out so that they could be replaced by non-fission methods.

SENATOR MERLINO: Well their life expectancy isn't that long anyhow.

MR. MUSTARD: Well, they've given as high as 30 to 40 years, which I question.

SENATOR MERLINO: Which is just a little spot on the calendar of time.

MR. MUSTARD: Right. And I'm not even sure that they'll have that long a life expectancy. They have really no background to go on.

SENATOR MERLINO: But any harsh imposition of a moratorium, of course, would just relate back to the same thing, you know, the public be damned.

MR. MUSTARD: Well, again, the numbers given by Senator Mike Gravel on the total amount of electricity or percent, which is, of course, - we're in the neighborhood of 2% now from nuclear power, in that vicinity. And to cut off that amount, or cut of the projected amount --

SENATOR MERLINO: Well, your projection of 2% is fine but I'm sure that's on a fifty-state basis, but our immediate concern and problem is right here in New Jersey, and I'm sure that it's more than 2%.

MR. MUSTARD: Well, I'm not sure. The utilities could give you a better number on that. But again I go back to our problem and this certainly isn't your Commission's position to take a stand on it but it must be recognized that if we have a national energy reserve, of adequate proportions, and we're short in New Jersey, it is unfortunate that we can't utilize these reserves due to a lack of a national grid and lack of development of long-range transmission facilities. But this is part of the problem, one of

the things that hasn't been developed due to the fact that 83% of our energy research has gone into fission. We've shorted even the long-range transmission techniques which would have helped alleviate most of this problem without the argument of fossil, fission, and so forth.

SENATOR MERLINO: Thank you, Mr. Mustard.

SENATOR DODD: Just one question, Mr. Mustard, before you leave. Why, in your opinion, have all the power companies and the utilities and what-not focused in on developing fission rather than, say, solar, which I would assume as a layman would be the final solution.

MR. MUSTARD: It is.

SENATOR DODD: Why would all this money, time and effort be spent to produce something that obviously is dangerous or has the potential of being dangerous? Why fission?

MR. MUSTARD: Again simply, when you spend this much money, federal funds, to promote the technology, and not only to promote it but to sell it - and it was a good selling job -- and sell it to the exclusion of other methods - the utilities cannot go out and use solar on their own, this must be done federally, federal subsistence or federal grants. And granted, the utilities don't have the researchers. It takes multi-million, perhaps billions of dollars total expenditures. So as long as it's all going into fission, they had no recourse but to accept that which was offered. We just feel that they were offered a very poor choice and a singular choice, and that was a national mistake. We don't fault them for having gone this way because they had no other way. But we would like to get them on a safe course.

SENATOR DODD: Thank you.

SENATOR MERLINO: Thank you, Mr. Mustard.

We'll take a five minute break and we will

resume with the Delaware Valley Council.

(Recess)

SENATOR MERLINO: May we get started again, please. We have the Delaware Valley Council. During their testimony they will show us slides and then we can resume our normal positions and ask questions.

S A M U E L T. H U D S O N: Mr. Chairman, my name is Samuel T. Hudson and I am the President of Delaware Valley Council. We thank you for the opportunity to appear before this Ad Hoc Commission today to protest the ban of off-shore oil ports, which has currently passed as a bill and which is being investigated by this Commission.

I bear your indulgence as I ask for the lights to be turned out and show you some of the slides which have been prepared by my own company, out of pocket, under the aegis of the Delaware Valley Council and its Executive Committee for public information.

We feel here, very strongly, that the super-port is a very necessary adjunct to the tri-state community. We are in a serious crisis and we, at the same time, agree with the ecologists that we do not want our streams and tributaries polluted; we do not want oil on our beaches; we do not want the crisis situation, on the other hand, which is currently facing this East Coast - 13 Colony, if you will, 13 State area - but particularly New Jersey, Delaware and Pennsylvania.

The oil crisis today is in such grave proportions that I find as of yesterday that there was only sufficient domestic fuel for the continuous operation of the utilities for approximately two days within the ports of Philadelphia, Camden and the subsidiary areas. I point out to you the fact that it is necessary to continuously operate the refineries that we have by supplying them with crude, and the crude, necessarily,

comes from the Far East.

Let me then start with this beginning slide, as they are turning out the lights.

This slide comes to you from the Delaware River Port Authority and has pointed out the fact that we are a totally port-dependent community. There are 250,000 jobs, or one out of every three workers is dependent in some regard on the port. We point out to most of the groups, before which we present this talk, that actually almost one in three dollars comes from the port which is currently handled by people within the red outline of this area. We have found, since we have prepared this slide, that it extends further on down into Delaware and Cape May and will continue to spread down as we find ourselves more and more in the eye of the megalopolis.

Next slide. This is currently an installation that is in place at Delanco, New Jersey, for Kaiser Gypsum. This is a very large ship. It's a 700 foot cargo carrier which is off-loading gypsum rock from a self-unloading ship which draws only 35 feet of water. The boom you see there is 230 feet long and can easily swing around. This is offloaded into the Delanco plant where the gypsum rock is refined and used in the manufacturing of various and sundry products. Unfortunately, we cannot get crude carriers of similar size and length up the Delaware estuary simply because there is not enough draft for the supercarrier. The supercarrier is bringing crude into the area but cannot get up the estuary of the Delaware simply because there is only a 40 foot channel. Our crude oil cargo, which has not been developed in the United States - and even if it were, this port we are speaking of would be very necessary - comes from the opposite side of Africa, from the eastern shores of our continent. Due to the closure of the Suez Canal,

it is necessary for the carriers to come around the Cape and up toward our continent from the south. It is imperative, therefore, that the oil be moved in the largest bulk carriers that can be obtained and that it be moved as efficiently as possible for our fuel prices now are higher than we like to see them. This is the most economic way. And currently, there are two 500,000 deadweight ton carriers, probably the biggest two carriers in the world, being developed for carrying crude into our area.

This is a photograph of Bantry Bay, from an aerial view. It shows a supercarrier, and that supercarrier there is approximately 1300 feet long, it's approximately 180 feet across, and it draws, when fully drafted, 86 feet - not 40 feet but 86 feet - of water. It is offloading at a superport, a very simplistic complex at Bantry Bay in Ireland where they were most concerned about the environmental issues, as are we here, and, therefore, wanted a bulk terminal which would be not exposed to tourism and which would be in every way ecologically safe for the offloading of the crude coming from the opposite side of Africa and around the Cape up into Ireland. The ship you see on the opposite side of the port is a ballast ship which takes the ballast water so that water is not dumped into the Bay. And this very simplistic dock which you see is encircled with a pneumatic tube so that if any spills might be had at this port they would completely be encircled by inflating the pneumatic tube which lays on the bottom of the Bay. However, I would point out that up until right now there have been less than five barrels of oil spilled in a total of four years of the operation of this superport, the most simplistic port that I can think of. At the same time, the Irish Government wants to be very careful about its environment. And this is totally computerized,

pipelined on the Bay bottom in shore to the bulk terminal which is not visible from the shore and is almost invisible. This is exactly what it looks like from the tourist road bypassing the terminal, and you can hardly see it. There is such a thing as eye pollution and we're most cognizant of this as a major problem in not only terminals but in bulk refineries and the like. We suggest something similar to this for our own port areas.

This is a supertanker and exactly what it looks like coming in. This supertanker is coming in loaded. It draws, as loaded, 86 feet of water. And again I point out that it's some 200 feet in width and approximately 1300 feet in length. It's large. And, by comparison, you can see this slide which shows this ship here, which is a 236,000 deadweight ton ship, 1135 feet in length and 105 feet in overall depth. The size of the Empire State Building. And there you can see a comparison with the Eiffel Tower. This is a mammoth structure. And it is the type of ship that's being used to bring oil into our Bay right now. And I'm talking about the Delaware Bay.

Many of the environmentalists have felt - and I have talked with many of them and they are, many of them, very much for the proposal or concept the Delaware Valley Council is showing here today, but they feel that if you put a ban on pipelines, you put a ban on oil ports that the whole oil crisis will somehow go away and that we will not any longer bring oil into the Delaware Bay and bring it up into the estuary. In fact, Senators, this is exactly the way oil is currently being handled from supertankers being brought into the Bay now. The supertankers, these large, large, mammoth carriers are coming in and being offloaded into barges. This happens, gentlemen, 30 times a month, approximately one every

day. This statistic was given to me just several weeks ago by the barge operator and it was confirmed by several of the large refineries here in this area. This is a typical crude oil handling operation and it happens every day in the week.

To give you some idea of how quickly this operation takes place, and in fact is over and the next operation starts, you can see in the distance there while this one is still offloading its cargo into barges, which additionally go up the valley, this one is coming into place ready to be offloaded into barges so that the ship and the barges can go up into the valley area.

Currently, with the need of a million and a half barrels of crude oil per day required in the area - this is the need now, this is not tomorrow but right now - by the year 1985 we will need six million barrels per day. And it is estimated both by the Delaware River Port Authority, by the Corps of Engineers, by the Maritime Administration and many others that our needs by the year 2000 will be in excess of 10 million barrels a day. A thousand percent or more increase is something that we have to look forward to insofar as crude oil is concerned into this valley.

The point I am making here is that it is not just the supercarrier being offloaded that will then come into the tributary, it is also the three barges which you see being unloaded which will also be brought up into the Delaware Tributary. In fact, we have a superport. It is just not the kind of superport we should have. This operation obviously has its problem. We have not had a spill in the Delaware Bay to date but that is not to say that we will not. This is why we propose a superport of some concept or another.

This is a supertanker up in the Delaware estuary close by Camden and Philadelphia and this supercarrier has been offloaded in the Bay and you can see how high it drafts and comes in. Obviously the barges have come on there way and up also.

You might get some idea of the magnitude of the size of this ship by seeing a ship there in the distance which is approximately a 35,000 deadweight ton cargo carrier.

I might state too, gentlemen, that I am a Professional Engineer in the State of New Jersey and seven other states, and I'm the third generation of marine consultant and constructor in the Delaware Valley and its estuaries. So that I think I can not only speak for the river but all of the structures. I've worked on all but a very few structures within the entire river complex of 120 odd miles.

Next slide. This will give you some concept of what is happening because we cannot get the supercarriers into port sufficiently fast enough to take care of our needs. One supercarrier of approximately 326,000 deadweight tons with a cargo somewhere in excess of 2 million barrels of oil will replace 750,000 deadweight ton carriers currently in use in our estuary now. If we go to the old T2 tanker, approximately 19 T2 tankers are necessary to carry this same quantity of crude, and I think this can speak not only to economics but the second point that we seriously point out the traffic hazard within the estuary itself. And it is not a traffic that you can suddenly legislate against because of the necessity of having crude coming to all of the major refineries, not only in this area but, of course, finally in the Newark area and the north areas of Jersey.

Next slide. We have studied, my own company has studied and we have spent some \$150,000 out of pocket to

conceive of a location and a type - conceive of one location and one type of operation which we feel is the proper location for a superport, and we locate that some 14 miles inside Cape Henlopen after studying charts, maps, and many, many engineering reports that have been written. We feel that this is the proper location.

One of the reasons why I feel it is the proper location is because - and you will note that I have two possible sites located, one there off of New Jersey in the triangular section, and one off Big Stone Beach in Delaware approximately 6 miles. This superport that we conceive of will work in either direction but it should have a definite land access as pointed out by Captain Robert Price of the Coast Guard here in the Gloucester County Coast Guard Station and responsible for the entire Delaware estuary at this time.

Also, gentlemen, I hope that you will note that Atlantic City Electric is up and slightly in the left-hand corner, and that is the property to which we hope finally oil will be able to be supplied to pick up some of this energy crunch.

If you could see this chart more carefully, you would note that we have committed a separated channel for the bringing in of supercarriers to keep it completely out of the normal cargo carrier channels of normal traffic that must ply the estuary 90 miles into Camden and Philadelphia. And as your Port of Camden, at the old New York Shipyard, develops and as the So. Jersey Port Corporation yards there at Beckett Street develop, you will note that more and more cargo is coming in. We are the second largest cargo-handling port in the United States currently and, of course, we are the largest bulk carrier port in export and import in the United States. We submit to you that

this is one logical location from Big Stone Beach, some six miles off of Delaware Bay, but this does not preclude a pipeline to New Jersey. Pipelines are currently being established across the River for various and sundry reasons, and under river dredge depths are perfectly safe and perfectly reasonable to install and establish. This one concept which we see also establishes other concepts which we believe are pertinent to what it is we're trying to do. For we feel we can develop a port which will supply industry and also supply jobs, recreation for people, and a safe port where we can offload crude oil to the betterment of our entire community as a controlled growth factor for this megalopolis area.

Next slide. Gentlemen, this is the way we see it either from Cape May or from the Delaware Bay side of Delaware. We see it not as a refinery, as you would see here, but more as a community of houses and large installations which are anything but a refinery complex. Out four miles there, you will see a green blotch which is an island - we'll talk about that further - and it's developed from dredge waste which will be available with this superport.

The tuning fork area is the superport complex itself.

Next slide. We conceive of a superport sufficient to handle all the refinery requirements and be able to take care of future requirements of the refineries up to as much as the year 2000. We believe that it is pertinent and necessary that this superport complex be started as immediately as it is humanly possible, or something like it, both satisfactory to the states under controlled coding and zoning regulations and satisfactory, necessarily, to the refineries which are trying to reproduce crude or turn crude, if you will, into domestic products.

This superport is 4200 - and it's only one concept; there is another concept which I will show you briefly -- but this superport is 4200 feet across, 4000 feet along one leg. It is capable of handling up to seven crude carriers at one time, and offloading them all at the same time. It supplies, if you will, in the right-hand corner, a maintenance shop for the tugs which you see. Down in this corner, at the lower left, you will see what looks to be a mechanical caterpillar which is a complete closure, which some of my people have designed sufficiently to know that it will work, so that once a supercarrier is inside the port complex itself it can be enclosed so that there will be no ecological spoil under any circumstances. Furthermore, the tug boats which are used to bring these large, large ships into port are also firefighters, they are crude sweepers, that is, they can sweep crude right from the water immediately, as well as being a docking implement to the large ships which must be helped into dock. You can see two carriers in dock now and barges, currently, until pipelines can be built, which will carry the oil up into the refinery area which are currently established as working entities.

To the upper middle of the screen, you can see administration buildings as well as housing elements for the crews of as many as seven carriers at one time. When you're talking about crews and maintenance people, your talking about over 200 people working full time on this dock.

Also you will see the pink tower rising off the horizon of the dock, which is actually, if you will, a communications network to the ships, very much like in airports, since these ships need to be talked into harbor.

This superport is designed by concepts completely indestructible so that it will have to totally protect

this ship as it docks. It will have to have a sophisticated fendering system. And everything that you see here, gentlemen, or will see, is easily done by the engineers from the States of New Jersey, Pennsylvania and Delaware, and I believe we have sufficient brains to design and create any such complex as we conceive here without any problem.

Over in the left-hand corner, you see heliports. It has its own waste system; it has its own sewerage system; its own water-generating and electric-generating plants; everything available to offload crude just as exactly twice as fast from these carriers as is normally offloaded from any other superport that we know of. And that is because under this large, large complex we have designed 40,000 barrel crude storage facilities. On bay bottom, underneath this monolithic concrete superstructure we have designed a capacity which will serve the refineries that are currently in existence for at least 20 days of crude supply. So that we need not be out of crude, we need not have only two days' supply available, so that we must ground, as we did here a few weeks ago, some airjets from taking off from International Airport while we convert crude fuels into normal domestic fuels just for heating homes. It's necessary that we have sufficient crude to supply all of industry and all of transportation.

We agree with the ecologists that we do not like the pollution levels either in Philadelphia, Camden, Trenton, or anywhere else. And when we see a pollution level of 10 on an index in Philadelphia, a few weeks ago, we're much disturbed about it and have spoken out harshly for pollution control.

I would point out here that there is enough crude storage here to take up a 300 acre tract of land if it was installed someplace on shore. This can be

done in 62 acres. It can also be separated in these 450 foot square tanks which are made up in 9 compartments, 100 feet deep, so that you can immediately segregate and separate various types of crude coming from almost any area. And I would point out to the ecologists who spoke earlier the fact that there is crude known to be off the Continental Shelf which will necessarily have to be developed sometime in the future if we are to commit ourselves to an honest balance of payments. The crude, necessarily, will have to be taken from the wellheads but at the same time it will necessarily have to be transmitted to a superport or some place of off-loading that is non-hazardous and that is safe and that is out of the normal shipping lanes. The normal shipping lanes are one of the major problems.

This creates a superport which is totally safe from the normal shipping lanes and these tanks create a situation which are totally safe from spills because they are all computerized, they are completely run by computers, they're monitored by computers. There are screen gauges designed into the concept so that the tanks are constantly computerized and the tanks are never empty. They are either full always of crude or seawater which is constantly being revitalized. And, frankly, we can conceive of this seawater being put back into the Bay cleaner than what it came out, if that's humanly possible.

We have looked into this and we find, by the way for those ecologists who are concerned about the fish and hatchery life, that in most superports around the world there has been an increase in fishing, and the major problem is keeping the fishermen away from the superport because this is where the clam beds seem to develop and this is where schools of fish seem to congregate. So that it becomes a problem in a traffic

lane which is separated simply for superport handling of super BLCC's.

Gentlemen, to the center of your screen you will see a white line which goes off, which is a causeway, and we will be talking about that causeway after this next slide.

We suppose that the best way to handle from the tankers - and if you will note, by the way, from the tankers, when we handle crude directly from the tanker into the tanks themselves, installed under the pier itself, that you can discharge twice as fast as you can discharge if you had to discharge singularly into lines. Therefore, we can unload the crude carriers and get them out of the area faster and give an opportunity for a much safer traffic situation. However, we conceive of pipelines taking the oil from the tank inshore and up, if you will, up from a hundred foot depth to approximately a nine foot depth on the inshore end of the Bay six miles in on either side, either Cape May or at Big Stone Beach in Delaware. The causeway you can see there is a typical four-lane causeway coming out to the superport.

We have slides developed which we have not with us today showing those pipelines installed exactly under and right beneath the platform, if you will, which is a high-level pier platform, which is the causeway, and built as part of the causeway, which we think is actually more economical and more easily controlled. And since ships cannot get to this causeway, because of dredging situations, we feel that this is a perfectly safe way to handle it. These lines, I might point out very briefly, can be serviced, as you see there, by a diver's bell. They're completely computerized and we believe can be designed totally safe.

Next slide. This is an alternate superport.

This was suggested after some heavy reference to the fact that the supertankers should be completely off-loaded in their own separate areas. The Coast Guard particularly liked this type of superport, and you will notice the same causeway coming from this alternate A proposal, if you will. You will note that one supercarrier is inside the port offloading. You will note that another one is coming into the port and you will notice a white piece, if you will, a large barge and deck facility which has been removed by the tug boats in order to allow the supercarrier to go into the port, handle itself into berth and offload. You will notice also, on the opposite side, a ship is leaving the berth and is going out in much shallower draft so that the ship can turn around. Now this helps in two ways - one, the ships come in at full-draft level, needing 100 feet draft with their own thousand foot wide committed channel bringing them into the superport, and when they're offloaded and going out light they will be going out at approximately a 40 foot to 45 foot draft and they can swing around in an anchorage area above the superport and return. You will notice also that this allows for quicker development of the superport and you can note the white dotted lines going off into the distance which purport proposed super developments of such a complex.

Again the tank farms have been developed under the superport in these areas and these barges that you see as connecting links completely enclose the supercarrier port as almost a drydock would except that it's still full of water. Now this is not an unusual situation at all since they're not an awful lot larger than a normal railroad car float which would be completely enclosing the supertanker into the bay and yet would allow truck traffic and, if you will, engine or maintenance traffic complete access in and out at all times.

Next slide. At four miles in we have decided that since dredged areas are so much harder to come by today and we are running out of dredge locations, places to put dredge spoil. We submit to you that this is a possible concept, one possible concept for use of dredge spoil. And that simply is what we call Hudson's Four Mile Island, four miles off the beach area we've conceived of an island similar to that which can be found in the North Carolinas or off the Keys, an island of about 500 acres in dimension which has within it a place for marinas, a place for shipping, small ships to sail, a place for ship owners to tie up their small ships, and these are 20 foot draft vessels and, therefore, they can be referred to as a ship rather than a boat. At the same time, a kind of high type amusement park and places for dwellings, single condominium dwellings and multiple dwellings, fed by a monorail coming from inshore out, similar to the monorail used in many places, in particular in Japan and out on the West Coast. This monorail would loop the island and go completely inshore. Again, the island would be set up with homes and home developments, condominiums, completely satisfying its own water requirements, its own sanitation requirements, its own living and play requirements. It's also an obvious answer to homeowners who want to work at a superport having a place to live and play while they're only two miles away from work on down the causeway. The monorail would stop at the island and go no further out since we would commit that to an industrial use only.

You will note that the finger coming off to one side allows a place for regattas and the like, but the finger coming off to the lower left would allow for additional dredge islands to be built. And this is not at all unusual, it is not something that has not been done in parts of the world, and it's not something

that cannot be conceived of. This is Hilton Head in the Carolinas, one shot that we had.

Next slide. This is a condominium which has been developed in Hilton Head and these real estate prices have gone up every year and it's a lovely, lovely location and it's a real plus, as well as, gentlemen, being a tax ratable for the state to which it's connected.

Next slide. At two miles in we have developed a marina for shallow vessels, shallow craft, if you will, small boats, a marina similar or exactly like one that one of my companies recently developed at Neshaminy Marina under GSA auspices. And here you can see storage for approximately 500 small boats. Under the boardwalk areas, which are hard to see in this light, are maintenance, shops and restaurants there on the side. You can see the offloading ramp for the monorail as it drops people off. And the monorail itself is highly developed and simple to do. The ships need never be taken out of the water - the small boats, excuse me, need never be taken out of the water simply because they can be surrounded by pneumatic tubes and for winter storage be pumped up out of the water and left completely in their own berth and also, at the same time, totally protected. Keep in mind too, gentlemen, that this is only again one concept. This thing is about 2,000 feet square and will easily handle 500 boats, as we envision it.

This is what we envision rather than a refinery complex at the beach. We envision an extension for our marine biological laboratory either in New Jersey or Delaware as an extension to one of the local state colleges. We believe that this is where the monorail should start. We believe that there should be sufficient parking so that people can get to and from the island without having to drive out with their

cars. We see no reason why theaters, living arts and those things cannot be developed as a total portion so that you can provide not only a superport but a causeway - a causeway to carry pipelines as well as on bay bottom - and supply also a location for dredge spoil to be utilized in a man-made island so that tax ratables, along with superport, can be returned to the State which claims it and also the marina two miles in which will give people a place to play. We feel that this is a place for an educational institution and we see no reason why people with a positive bent on development under a controlled situation cannot conceive of something like this along their bay side.

Gentlemen, we point to you the fact that this can also be a committed channel to Cape May. The blue line that you see shown here would show a potential location for a superport, coming in from Cape Henlopen, again approximately $14\frac{1}{2}$ miles up into the Cape May area. We see no reason why this should not be developed here. The dredging requirements are slightly more for the State of New Jersey. But when I talk about dredging requirements, we're talking about such astronomical numbers, somewhere in the magnitude of 30 million yards, to permit a safe entrance and egress channel for the superport all by itself. This is one of the locations.

Next slide. I point again, gentlemen, that you do have a situation now which I would like to see changed. This is an offloading of a supercarrier before it enters into our Delaware Estuary. The New Jersey refineries, such as Texaco, such as Hess, the bulk terminals at Hess, Phillips Petroleum, Mobile, Exxon, and many of the others along your shores need the crude that comes in to supply your workers, to supply the needs of their refineries for continuous operation. They must necessarily get it in some fashion. These tankers, as well as the barge traffic, continually

ply the river of the Delaware and the Schuylkill. It is my point of view that we can build a superport, not this, - we can build a superport which will safely handle these supercarriers in a positive fashion while providing jobs, providing homes, providing relaxation, and providing the rest if we will see this as a positive entity.

I would point out to this Commission that every place I've shown this, at the planning boards - such as as late as last week at the Planning Commission at Salem County, I had not one man on the entire committee voice one adamant comment or one comment as to anything derogatory. They were all for it. All 200 people who were at the open session were very much for a positive development of a supercarrier port someplace inside the Bay. I would not like to see a port developed outshore, as has been proposed by some of the engineering groups and proposed by the Maritime Administration, some 14 miles off Cape Henlopen, for I've been in the North Atlantic and I know what it means to bring a large carrier into a North Atlantic port.

I might point out to you gentlemen also that I'm a graduate of Pennsylvania Maritime Academy and I have handled ships through these waters and I know whereof I speak. When the North Atlantic gets rough, it's no place to have a port of any kind under any circumstances.

We would necessarily speak to the use of a monobuoy for the quick needs and supplies of Atlantic City Electric or anyone else to meet their current crisis in energy. But for the long haul, I propose to you gentlemen that some positive concept can be developed by your State or by the refineries which would much prefer to fund and finance their own superport rather than have a federal superport legislated

for them. They would much rather build it with honest economic controls put on by the State as well as environmental and pollution controls.

I would point out to you also that the refineries do not see themselves as a national organization, they're international. Hess Amerada has built a 5½ million barrel a day plant in St. Croix because it could not find any place in the United States to build a refinery. Currently, Gulf is offloading at Tupper Point in Canada and they are being charged at so much a ton for environmental protection by the Canadian Government. The Prime Minister of Canada spoke for 45 minutes on superports. He did not once mention the ecological problems or the environmental problems of Canada for it is there that they need a balance of payment and they need crude carriers coming in as a way to answer some of the economic problems of Canada.

I point out to you that Gulf currently is offloading these crude carriers at Point Tupper and barging and shipping in small carriers into this area because we will not allow them a place to properly offload their carriers. They also are utilizing - like all the other refiners and all the other carriers are offloading right here on our own Bay.

I point out to you also, gentlemen, that we need additional locations to build refineries for controlled development of our economy, for we serve, in this small area of approximately 150 mile radius from this State House, approximately 26 to 30 million people, and this area is doing nothing but growing now. It is well to say, we do not want a superport but it is another thing to say we do not want any crude oil at all to come into the area. We cannot turn our back on the fact that it is currently being handled in this fashion.

I would be happy to answer any of the questions that this Commission might like to ask Delaware Valley Council at this time and I again thank you for the opportunity to present to you this very long slide presentation.

Thank you, gentlemen.

SENATOR MERLINO: Thank you, Mr. Hudson.

MR. HUDSON: May I also say, sir, that we have folders on some of the concepts for superport available and we also have folders speaking to what Delaware Valley Council is. Delaware Valley Council is a non-partisan, non-political, regional, tri-state organization, committed to the water development of this area, both for industry and for living.

SENATOR MERLINO: Thank you, Mr. Hudson. And as I said to you earlier this morning, one picture is worth a thousand words but that didn't stop you from a very interesting explanation and dissertation and I, for one, certainly appreciate it and found it most enlightening and informative.

MR. HUDSON: Thank you.

SENATOR MERLINO: If the atomic energy people are salesmen, I can say that Delaware Valley Council is equal to the task of selling the deepwater port.

This Commission has been invited on a tour of the Exxon Plant, I think in Linden, New Jersey. I think you started off your recitation by showing us the port off the Coast of Ireland.

MR. HUDSON: Yes, sir, that's at Bantry Bay, off Ireland.

SENATOR MERLINO: I think Senator Parker found that rather interesting.

SENATOR PARKER: I'm not Irish. Pat wants to go over.

SENATOR MERLINO: Perhaps I'm being a little too subtle these days.

MR. HUDSON: I would point out that that is totally computerized. It's a totally computerized port for those that know it, and up until just a month ago there had only been 29 gallons of oil spilled in four years of operation. They did spill approximately 4 barrels, within the last month or so, which was swept up somewhere within a half hour and with absolutely no pollution, no pollution index in the Bay whatsoever.

SENATOR DODD: Well I would expect nothing less from the Irish. (laughter)

MR. HUDSON: I would also point out returns of sizeable ratables to Ireland.

SENATOR MERLINO: I wasn't aware that the Irish developed any computers, Senator Dodd, or even knew how to operate them.

But, as I say, I read your brochures and listened to you rather attentively and I am just disappointed that we don't have a written presentation --

MR. HUDSON: We shall submit one.

SENATOR MERLINO: -- from which some questions could come forth. The one question that I do have, and I don't recall your making any mention of it, from your experience, the area that you have indicated within the Delaware Bay is one which is not susceptible to rather serious storms?

MR. HUDSON: Yes, sir, there are storms that do come in the Delaware Bay. However, in terms of shipping - and this by one of the Vice Presidents of one of the large refineries - they find it much more acceptable to be able to dock inside a bay because it is necessarily more sheltered water. People say, well what happened? Let me point out, when this large oil spill occurred in and around the British Isles people said, well that can happen here, and it won't happen if we have a port offshore as opposed to inside the bay where, of course, the storms are necessarily

less. What can happen is, an oil spill offshore, 14 miles off of our coast, can spread oil 200 miles. So we're talking about - when you have an oil spill of that magnitude, such as did exist in the British Isles, this is what can happen and this is why I am definitely against a port being built out in the North Atlantic. People feel that it's out of sight, out of mind. It certainly is not.

I might also point out that I'm a homeowner on the Jersey Coast and don't want my beaches spoiled either.

SENATOR MERLINO: How about those homeowners on the Bay side of the Jersey Coast?

MR. HUDSON: I believe with all my heart, sir, - and having lived all my life in the development of marine structures, and being a structural as well as a soils engineer and a marine constructor - that the best and safest place, and the place where we can control it the very best is inside the Bay. Further than that, we obviously can put all the new sensitizing units which are available on to such a superport and completely enclose it so that there need not be any spill which would ever get down in the Bay that I can, even in my wildest dreams, conceive of. And I say that without any equivocation whatsoever.

SENATOR MERLINO: And with the heavy traffic of supertankers that you have indicated, what would be the possibility of a mishap concerning the supertankers themselves?

MR. HUDSON: Considerably less. There is obviously always the possibility of a traffic mishap. More and more the Coast Guard is leaning very hard on traffic regulations within not only the Bay, where again you can control traffic which you can't control out in the ocean, but, more than that, the requirements for safety equipment being put aboard ship today is to

make the shipping much safer. But I point out to you again that the less ships you have, the less opportunities for accidents. When we talk in terms of T2 tankers as against the large crude carriers, we're talking 19 to 1 possibilities of accident. And that, to me, precludes thought of continuing to carry it in small carriers as against the very large crude carriers such as we were talking about here this morning, the 325,000 deadweight tons and up, which are being built to carry the same crude to all the other ports of the world.

SENATOR MERLINO: Would the use of the superport of necessity eliminate traffic of smaller carriers, such as barges, smaller tankers, up the River?

MR. HUDSON: Let's say, sir, that it would help to eliminate a large portion of it, and as the necessity for crude expands, and it will expand, it is expanding even now - the numbers I gave you of the requirements of 1½ million barrels per day, currently, are very conservative; the potential of 6 million barrels a day into this area by the year 1985 is again most conservative; and, again, in the year 2000, 10 million barrels a day is conservative. And I point out to you that at least we would limit traffic as we increase the capacity. There is a necessity to do both.

I would also point out that when our balance of payments become such that we must necessarily find crude off our own shores, the best way to handle it is again in a large carrier which can bring it safely and economically into the superport and its complexes where it can be safely handled. So two things. As the requirement increases we can decrease traffic to a point, now that is to a point but the traffic would certainly be less than if we did not have a superport and, obviously, the traffic requirements would be

horrendous if we do not have a superport.

SENATOR MERLINO: Where do you anticipate this crude oil would be tanked in from?

MR. HUDSON: Mostly from the opposite side of Africa currently, sir, is where we are getting most of the crude for our North Atlantic. I would also point out to you, however, that the Legislators of the State of Louisiana have currently unanimously, along with the Governor, approved for a superport to be built in that State. Galveston is going ahead very strongly and very quickly with plans for a superport. But that does not take care of the United States. There again they are running out of supplies, and they know it. They are, as a State, and all of their politicians and all of their legislative branches, totally for it. We're finding nothing but positives there. And again I point out that Canada is looking for crude to be brought in from Africa, from the opposite side of Africa from us.

SENATOR MERLINO: All of this, particularly with Canada, all this with the knowledge of the vast and recently tapped oil supplies in the north of Canada and in the northern reaches of Alaska, they still will be depending, in places such as Canada, for the shipment of oil from the Middle East.

MR. HUDSON: Yes, sir. We believe that it will be a continuing need and that that need from the Middle East will continue to grow in very, very strong measure in this area.

SENATOR MERLINO: But as I say, now knowing of the vast reserves and deposits that they are now just beginning to tap in the northern reaches of this Continent, you say that this would still be a --

MR. HUDSON: This is a positive venture, yes, sir. Because of the necessity, no matter where a well might be developed, insofar as wells and wellheads, it will

still be necessary to bring oil until we have the capability of pipelining into the refineries, as they currently exist, and new refineries, as they are developed. We will have the necessity of shipping as far as at least my lifetime predicts and probably into our children's lifetime, by bringing it in in large carriers. And the carriers currently being developed - the first carriers developed were of only 100,000 deadweight ton capacity; the next carriers came to 225,000, which is similar to what is being offloaded now in the Bay; current carriers are of 326,000 deadweight ton, and carriers are now being built in Europe of 500,000 deadweight ton - fantastic carriers, beyond all structural proportion that anyone has ever conceived. And I believe that there will be carriers even larger than these developed for servicing not only Europe but all of the United States.

SENATOR MERLINO: And with a port that you envision and describe here today, would that port be capable of taking on these 500,000?

MR. HUDSON: Yes, sir. We want to conceive of a port that could be built for the future, not for the here and now. I don't like the attitude of quick and dirty. Nor should we, as a tri-state community, consider such a thing. We should consider our codes, our zoning, our restrictive requirements, but we should also, however, while we're considering all of that and developing a port which is viable for the future, consider our balance of payment and jobs.

SENATOR MERLINO: What has been the reception in the State of Delaware?

MR. HUDSON: The reception in the State of Delaware, vocally and in the newspapers, has been

very negative.

SENATOR MERLINO: Well, really, what is it?

MR. HUDSON: We are finding, sir, that when we have an opportunity to show the entire picture, the safety and the problems that currently exist now, we are finding many, many of the business people very much for it. When we spoke at the open hearings at Rehobath Beach several weeks ago the Convention Hall was running out of fuel. The Town Manager spoke very much in favor of a superport. Obviously, there are parochial and provincial views that you can find almost anywhere. I would only speak to the fact that many business men are privately now committing themselves to a positive approach. And this is what I've found every place I've spoken, and we are speaking every place we have an opportunity.

SENATOR MERLINO: What is the reaction of the individual who is neither in public office or an owner or operator of a business or industry?

MR. HUDSON: I think that's an excellent point because we put this on as an open conference at the University of Delaware. Several very strong ecologists spoke out in strong terms against the possibility of a superport and had come to the conference with this intent, until they saw the slides and saw the possibilities, and they said, "Well, if we must have something, let's have something that we can live with." And they saw this as at least one viable way. Once you describe what it means to have a port in the North Atlantic, off our shores, completely uncontrolled, to these environmentalists, they are much more concerned about the total protection of the environment, and rightly so. I am too. I consider myself something of an environmentalist but on a positive bent here, if I might add that one point.

SENATOR MERLINO: Are you aware of the pending legislation in this State to forbid the construction of

a superport off the Atlantic Coast?

MR. HUDSON: Yes, sir, and I am afraid that while people are thinking in terms of off your North Atlantic shoreline, they might not be thinking totally in terms of the Bay and the prospects which the Bay offers for a safe port. I certainly am not only cognizant of it but I am also cognizant of the fact that a ban on pipelines from one state to another or from a facility inshore can be a tremendous detriment to this State's economics as well as, I think, the energy crisis which New Jersey faces.

SENATOR MERLINO: We had some testimony here this morning, to the effect that the so-called energy crisis is one which is manufactured and does not really truly exist but is only one created perhaps because of economics. Would you agree with this?

MR. HUDSON: Well, if it were created from a standpoint of legislation to control imports of domestic fuels - we've had to lift legislation to take care of the current crisis which exists - if the testifier was referring to legislation against drilling wells and the necessarily economic benefits that have been taken away from the refineries and the oil companies in gambling to drill wells to find out where oil is, yes I would agree that there is something of a created situation but not created intentionally. I would also speak to the fact that we have enough technology in this country to put men on the moon and we certainly have enough technology to use all the fuels and all the potential fuel energy available to us, not only coal but fuel - I personally happen to believe that we can make safe atomic plants and I speak to this and have spoken to this many times.

SENATOR MERLINO: And using that same technology and knowhow to extract from the earth the supposedly

unaccountable or untold volume of oil and coal and other fuels?

MR. HUDSON: Yes, sir. And Readers Digest, in their January issue, speaks of this in very broad terms, the fact that we have enough fossil fuels, as well as other fuels, available to serve this country for the next three or four hundred years, if not generations. And, of course, that's only a guesstimate at the very best. I would speak only to the fact that we have a balance of payments problem now. I see no need to create more by putting a ban on the development of our shores under controlled and legislated conditions, which I think this body should properly do, legislate and control. It is necessary that this body pay attention to codes and zoning requirements but it's also, I think, pertinent to all of us to be concerned about the economics of our area. If we continue the way we are, we are going to hurt ourselves economically and are now.

SENATOR MERLINO: You speak of controls - I don't mean to be facetious - right here in the State of New Jersey we can't control the zoning and codes within the geographic boundaries of our own State pertaining to housing and other development. How can we possibly control that which lies offshore and into the ocean and into the bay?

MR. HUDSON: You can't control that which is offshore into the ocean, but you certainly can control, both by riparian rights and with jurisdictional agreements both with the State of Pennsylvania and the State of New Jersey.

SENATOR MERLINO: Declare them all wetlands, or something.

MR. HUDSON: Yes, sir, that's one way but that's not a very positive way. I think a positive approach is a coding requirement and a zoning requirement

for superports and their development, as well as other ports, so that shipping can have the right of ingress or egress into our Valley to support the industry that we currently have here.

SENATOR MERLINO: How bad, if any, is the spillage with the method used now?

MR. HUDSON: Currently, I know of no major spill that has taken place. But honestly, among refiners and among handlers we talk about sooner or later it's got to happen and when it happens hopefully it won't happen so that it will be an emotional barrage in the newspapers. But whether it is or not, with handling oil as we are currently handling it and with the increase in traffic, there are obviously more chances for spills than there have ever been or will be.

SENATOR MERLINO: Do you think a major spill under the present conditions would either strengthen or weaken the acceptance of the concept of a superport?

MR. HUDSON: I believe, because the public is not aware of the plus positive factors that can be built into a superport - I honestly believe that it would weaken a stand for a superport. However, I point out again, wherever we've had an opportunity to tell our story, and more people are listening all the time, we are getting nothing but positive affirmation of designing a safe, pollution free, superport that can serve this area and can do a job that's not now being done; also to reduce this traffic hazard of shipping in the area.

SENATOR MERLINO: Thank you.
Senator Dodd?

SENATOR DODD: Mr. Hudson, I have two questions. The cost and timetable.

MR. HUDSON: Yes, sir. This concept which I have shown you this morning is the ultimate, obviously.

The cost of this thing could approach a billion dollars, a billion dollars in total construction cost. I believe, however, that as the need arises - and we started to work on this as much as a year ago. The crisis has hit such epic proportions now that, of course, it's very vocal and everybody knows that there is a crisis in existence. There are simpler things that can be done, just as pollution-free and just as easily constructed. A billion dollars sounds like a lot of money but I believe honestly that if the Canadian Government can charge an import tax on a ton of oil that certainly we can obtain monies for ecological and environmental protection from the cost of building a billion dollar superport which, certainly if it were developed with this concept of island, and I see it as a plus, a place to take care of our dredge disposal, - and that billion dollar island could cost as much as a hundred million, but I know of many, many developers that would be happy to jump in and help develop this thing for a tax ratable return to the State. I think, again, this is a plus. So it's not only a case of dollars of construction value which will be lost but, in my mind, it's tax revenues that will be lost toward the State's payments.

I can conceive of, - and I know this number has been bandied around a great deal and I would be hesitant to use this less than carefully, but I can conceive of a return to some state of a hundred million dollars per year in the development of a good total superport complex. And I don't think that is a way-out number or a number that has not been thought carefully about, just on the basis of the fact that Canada right now has about \$18 million, in a few cents a ton oil import, for their environmental protection. As a matter of fact, I understand that that fund has now been stopped.

But here again, with a superport which you can control, this thing can supply other things besides just construction jobs. Obviously, these things, such as the tanks that we showed underwater, can be built in the dock that was built for the Kittyhawk, it can be built in one of the shipyards in the State of Pennsylvania. So all these funds can be returned to the states, in terms of construction dollars, developmental dollars and engineering dollars, and ratables, in my view, as well as protecting the ecology and making a more pollution-free situation.

So when we talk in terms of a billion dollars, sir, this is a way-out number. Certainly something can be built - that thing you saw in Bantry Bay - I make comment in other places where I have opportunities to speak that I could do one of those on Sunday afternoon, after church, and I think that I could. It's a case of what will John Q. Public find acceptable for their protection of their ecology problems that currently do exist. And I think that they deserve to be heard in this area on a positive thing.

Does that answer 18 questions at once?

SENATOR DODD: What about the timetable?

MR. HUDSON: Timetable? For a superport like you're talking in terms of five years; for a lesser superport, or one that can be built, I think, with all the same controls in it, the initial offloading can start somewhere inside of two years after the port concepts are approved by the Legislature, and they should be approved by the Legislature, sir, by the way.

SENATOR DODD: Thank you. Mr. Hudson, one further question. The proposal for the deepwater port in the Atlantic, are you familiar with that?

MR. HUDSON: Yes, sir, I am very familiar with it.

SENATOR DODD: I believe the projected cost was somewhere around \$300 million but that would include storage tanks, piping, pipelines down to the Philadelphia area.

MR. HUDSON: Yes, sir. That is correct.

SENATOR DODD: Could you conceive of something that simple in the Delaware?

MR. HUDSON: Yes, sir, I can. Positively. You can put - and I know Atlantic City Electric - I am speaking to them as a company and I am not speaking for them - but I know that they would be very desirous of a pipeline, monobuoy type situation, where a ship comes in, ties up to a monobuoy and offloads. In my mind, however, New Jersey, South Jersey and New Jersey need a superport complex to serve what's here now. They certainly need it for the industry that exists here now in some magnitude. Now I can't speak to that magnitude as well as they can, sir.

SENATOR DODD: What kind of timetable would you put on the monobuoy concept in the Delaware Bay as opposed to the Atlantic?

MR. HUDSON: By the time you get impact statements and permits and everything else, you're talking about two years, two and a half, three years to get this whole thing developed. Monobuoy installation is a simplistic approach to one small facet of a very complex problem. It is a singular solution. A monobuoy can actually, obviously, only handle what comes through that pipeline or can be offloaded from that ship, and that's about 100,000 barrels per hour. What I conceive of is a much greater requirement than that. This is one small part of a total solution. And we're all for it. But I point out to you that it has certain dangers as well, the same as we currently have dangers existing now. And that's not to say

I'm against it; I'm not. I'm against any pollutant in this river, my river. I've grown up here.

Does that semi answer your questions?

SENATOR DODD: I don't mean to keep getting into more --

MR. HUDSON: That's all right.

SENATOR DODD: You have maritime experience, obviously.

MR. HUDSON: Yes, sir, I do, a great deal.

SENATOR DODD: Under the present system of offloading through the method of lightering up in the Raritan and in your Bay and the Delaware, is this done in adverse weather, and when does it cease, when there are 20 foot waves or 10 foot waves?

MR. HUDSON: I assume you're referring to the Beaufort Chart on wind scale. Obviously, in any kind of hurricane situation, you couldn't even bring a ship in to dock or port in the Bay or anyplace else. That situation always existed and does exist now.

For the most part, in relatively rough seas, with the current handling capacity they can handle barging operations. The criteria really is bringing the barges next to the ship. Once the barges come next to the ship, the fendering system which is supplied to the ship is mammoth in size, as big as this ring here for just one end of one large unit. It's a very huge thing.

I know some of you Senators are very familiar with the offloading operation that is now taking place down there. But when we get real rough seas, no, sir, they cannot bring the barges alongside and the ship must wait. I would point out to you that one refinery paid some \$3 million in demurrage trying to bring ships in at certain ports, because of a waiting time. I think that under most norm circumstances - and, obviously.

a hurricane or very heavy seas is not a norm circumstance in the Bay. Under most norm circumstances, we should be able to offload a cargo at any time in an enclosed type of superport that we show here as one concept, and I stress again, sir, that this is only one concept. I would like to see somebody else come up with other concepts. I've seen none.

SENATOR DODD: That's quite comprehensive, Mr. Hudson.

MR. HUDSON: Thank you, sir.

SENATOR MERLINO: Senator Parker?

SENATOR PARKER: Mr. Hudson, you indicated that - well, first, let me ask you, is it not true that we have two pipelines now that run - the Colonial pipeline and one other --

MR. HUDSON: Yes.

SENATOR PARKER: -- that deliver oil and/or gas?

MR. HUDSON: That is correct. I don't know whether it is only two, however, whether there are more than two. I'm not really up on this, Senator. I'm sorry.

SENATOR PARKER: Well, let me ask you this. How many barrels - assuming there are two, maybe there are more -- how many barrels of oil do they deliver to this area?

MR. HUDSON: I can't really answer that to you. I can only tell you that new installations are under way in many of the refineries for barging operations simply because they cannot handle sufficient by pipeline or by ships. That I can say.

SENATOR PARKER: Well, is that really the answer or do you want to tell me they're bringing it in from foreign imports? Are we barging and bringing our oil from Galveston and Louisiana by ship to our ports?

MR. HUDSON: Your point is well taken but I think maybe we're both not answering to the total point. My point here is that both Galveston and Louisiana are building superports for imports from foreign carriers and foreign fields. We need the same location for these. The fact that we do have pipelines coming from other areas into the State, yes, sir, is a fact. To what degree those pipelines are serving your refineries is evidently not enough, by the crisis that we have here now and the desire for all of these refineries to expand if allowed.

SENATOR PARKER: Well, maybe I didn't make my question clear. I asked, are we bringing any domestic oil into this country or into the Philadelphia Port?

MR. HUDSON: I would say, yes, we are, but to what degree we are, I don't know. Most of the oil that's coming is coming from foreign fields. And I would point out this, in the entire United States - and, of course, we speak about 44% of the United States here -- but in the entire United States I believe the number is about 60% will have to be brought in from foreign fields by the year 1985. That's a relative and round number that is bandied around by the pros.

SENATOR PARKER: Well, my question, as the representative for the Council, how many gallons or millions of barrels of oil are needed here in this Port area per day?

MR. HUDSON: About a million and a half, currently, sir.

SENATOR PARKER: And how many are supplied or can be supplied by these pipelines to this area?

MR. HUDSON: I would guess in terms of somewhere around ten or fifteen percent, but that is only a guess. I would suspect that some other is coming in by ship and approximately 45% is coming in, if not 50%, from foreign fields.

SENATOR PARKER: Well, I understand that but I want to know what the capability of the pipelines is, not what they have in fact done.

MR. HUDSON: I do not know what the capability of the pipelines is so I cannot answer that question.

SENATOR PARKER: Certainly if the pipelines are sufficient, then you have one or two superports in Louisiana that can be piped in here and supply our needs without our building a port.

MR. HUDSON: Yes, sir, I would say that that's quite possible by about the year 1990. But, unfortunately, we have a committed problem right now.

SENATOR PARKER: Now, let me go back to the political problem in Delaware. The political problem down there cost the Governor his seat, did it not?

MR. HUDSON: Yes, sir.

SENATOR PARKER: And he was opposed to this?

MR. HUDSON: The former Governor, Governor Peterson, set up an Ad Hoc Committee, around Dr. William Gather at the University of Delaware, to study the oil crisis and superport. The Gather Committee did come out in favor of a controlled superport because of the safety problems that they foresaw, and pointed to the fact that they might better have it in Delaware Bay to more properly control not only the pipelines but the port itself, insofar as controls are concerned. I agree with Dr. Gather's report.

SENATOR PARKER: Let me ask you this. You indicated that these supertankers take 86 feet?

MR. HUDSON: The large supertankers are going to be drawing 86 feet, yes, sir. We have to, therefore, commit 100 feet of water.

SENATOR PARKER: That means you are going to have to dredge almost out to the 20 fathoms, 20 miles off shore.

MR. HUDSON: No, sir. Not quite that far. Actually where we have superports shown there is now existant 72 feet of water. We will have to dredge --

SENATOR PARKER: Where is that?

MR. HUDSON: That is approximately 14½ miles up inside of Cape Henlopen, which is on the Delaware shore. And you would have to dredge probably another 10 million yards to totally commit our current channel to it. But I would not suggest this. I would suggest a separate committed safe channel for the operation of supertankers by themselves, or any tankers coming in, for that matter.

SENATOR PARKER: You know, again I don't want to quarrel with you but I have a chart here and I just can't believe that you have that kind of water in the Delaware Bay, even in the channels. Maybe you do but I'm looking at the chart here now.

MR. HUDSON: Yes, sir. I can show you exactly where it is, if you would like, on the chart.

SENATOR PARKER: The access channel is more than 60 feet deep now?

MR. HUDSON: The access channel? No, sir. Some of the channel portions are only 60 and 50 feet but you have, where we propose the possibility of superports, as much as 70 feet of water. Now in most of the Delaware Bay you have considerably less than that. What we're trying to propose is that you commit those sites where they are out of the channel traffic, away from channel traffic, at the deepest water location because, obviously, this limits dredging. And that's one of the criteria. Now that's not to say that dredging will be out.

SENATOR PARKER: Well, you're going to have to dredge, the way I see it, unless you can convince me

otherwise, - you're going to have to dredge close to the 20 fathom curve.

MR. HUDSON: Yes, sir. I think I understand what you're saying now.

SENATOR PARKER: And that's 20 miles off shore, no matter how you go.

MR. HUDSON: Excuse me. I don't think you will have to go that far off, but the point is, my engineers and the Corps of Engineers have come up with approximate dredging requirements in the magnitude of about 30 million yards of dredging materials.

SENATOR PARKER: Well, you said earlier that that was just in the Delaware Bay.

MR. HUDSON: Yes, sir. It will take you out really to the mouth of the Bay, I believe.

SENATOR PARKER: Then you've got to dredge a hell of a ways after that to take care of these ships if they're loaded.

MR. HUDSON: I don't believe so, since they're currently coming in pretty much loaded now.

SENATOR PARKER: Then they must not be drawing 86 feet.

MR. HUDSON: They're drawing 72 feet now on the 225,000 deadweight ton tankers and 86 feet will be committed to the 326,000 deadweight ton tankers which are coming in. And these are ships which we did show on the slides.

SENATOR PARKER: Are they the big ones that you're talking about?

MR. HUDSON: Yes, sir. the 326,000; they're not the 500,000 deadweight, they're the 326,000. The 500,000 deadweight ton will be, we think, somewhere in the magnitude of 90 feet. Although, again, I'm guessing at this point without reference to numbers. I think your point, however, is well taken. There are large dredging requirements necessary.

SENATOR PARKER: I'd say so.

MR. HUDSON: But there will be large dredging requirements of one magnitude or another wherever we build a port.

SENATOR PARKER: Is that true of the Chesapeake Bay?

MR. HUDSON: Yes, sir. Positively. Large dredging requirements, and if you build off shore, North Atlantic, you would have to dredge an awful lot of material just simply to create manmade islands so that you could protect the ships in port.

SENATOR PARKER: Well, isn't the dredging already done down in the Chesapeake?

MR. HUDSON: Not sufficient to handle that tankerage, no, sir.

SENATOR PARKER: It's a lot deeper down there now than it is here.

MR. HUDSON: It is deeper in some locations, yes, sir. But then you would be committing to come through the C&D Canal which currently, as you remember, just had an accident here two days ago or three.

SENATOR PARKER: Not if you piped it. You couldn't get those big ships through the C&D Canal.

MR. HUDSON: No, sir, you could not.

SENATOR PARKER: You can't even get the ones you're lightering now down the Bay.

MR. HUDSON: That's exactly correct. So it does require piping requirements.

SENATOR PARKER: Well, what would the dredging do to the fish ecology, or don't you have any reports? and the clams.

MR. HUDSON: I'm a civil engineer. My background is structures and soils. I cannot answer for the ecologists in this regard. I've heard a great deal of talk about the fact that fish life would be destroyed. I can only answer you by saying this, that

every place where a superport has been built the so-called wild life of our streams, rivers, etc. has not been hurt. In fact, the evidence is all to the contrary that fish life flourishes around these ports, clam beds flourish around these ports. And in some places in Europe they clam right off the superports, or fish.

SENATOR PARKER: Well, let me ask you another thing. Why, with the magnitude of dredging that you're talking about here, do you move the facilities 14 miles out into the Bay rather than say 6 miles out?

MR. HUDSON: Up into the Bay.

SENATOR PARKER: No, I don't mean up in, I mean off shore.

MR. HUDSON: No, it's only six miles off shore.

SENATOR PARKER: I'm not too much concerned about how far up you go.

MR. HUDSON: Well, the amount of dredging is based on how far into the Bay, really. We've tried to establish it as reasonably close to shore as possible, in our own concept, while keeping it far enough away from shore. There's such a thing as eye pollution, in my book. This is part of it. But it's also much more a requirement of where can you best ascertain the best location for supercarriers to come in and offload. Now we've studied all along the New Jersey shore; we've studied all along the Delaware shore and even down in the Virginias. We've looked at the sites selected as possible superports for the northeastern portion of the United States, in the New England States and even around New York. We feel, after having studied this, that this is the best location for a superport.

SENATOR PARKER: I'm just trying to see - 14 miles up, you're up above Lewis, Delaware?

MR. HUDSON: Yes. Cape Henlopen. 14 miles up river, if you will, from Cape Henlopen, almost into

the body of the --

SENATOR PARKER: Big Stone Beach, is that where --

MR. HUDSON: Yes, sir, it's off Big Stone Beach, exactly. Six miles off Big Stone Beach, really. Now it may be able to be brought closer into Cape May if such a site could be made available in Cape May.

SENATOR PARKER: Yes, but you get into shallower water.

MR. HUDSON: Yes, you get into more dredging, no question. I would prefer to see it established off Delaware and piped into New Jersey, with committed locations for pipelines in New Jersey. But I would also suggest that it gets down to safety, need, and, as far as I'm concerned, economics, the economics of the state that finally says yes to this thing and can control it. And I think this is a criteria, this control factor.

SENATOR PARKER: Let me ask you a couple of things about safety. In the normal construction, as I understand it, of these oil facilities, the tank farms have dykes around them --

MR. HUDSON: That's correct.

SENATOR PARKER: And if there's a fire that you have it contained within that one --

MR. HUDSON: That's correct.

SENATOR PARKER: What are you doing in this to contain it?

MR. HUDSON: In this? Actually, the tanks that we suggest, as one possibility, which would be under the Bay, or if you go into the port are monolithically poured into concrete so that you not only can build the shell of the tank as a unit in a shipyard, similar to a tunnel section, and float them in this section, turn them upright, 90 degrees to bay bottom, and sink them on their own platform.

But then you can completely encase them so that they are totally protected. More than that, you can do it in a much less area acreage requirement, 62 acres as against, say, 300 acres for the same tankage.

SENATOR PARKER: What happens if you have a fire in that encased monolithic concrete bulk, if you want to call it?

MR. HUDSON: Well, the whole point here is that oil necessarily flows. But you have a way of dissimilating the oil and filling the tanks with water, and that's why it's so completely safe. You can keep the tank completely full of water, and you should keep it totally balanced, and that's why the water supply system and the water treatment systems would have to be supplied with the port.

SENATOR PARKER: You keep it filled with water when you don't have oil in it.

MR. HUDSON: That's right.

SENATOR PARKER: What happens if you have a fire? What happens if in the connectors it catches on fire?

MR. HUDSON: You close the fire off by filling it with water from the bottom which presses the oil to the top and actually just puts out the fire by extinguishing it. It's so encased and so enclosed that you can actually control the product and do it from far, far away from the port. But let me hasten to add, I cannot conceive, within a structure like this, of a fire in crude. Crude is a very, very heavy product; it's not like naptha or like an airplane gas or anything like that. It's awfully difficult. You can take a burning torch with crude and it would be difficult to set it on fire under some circumstances. It's not to say that all these situations don't exist. The only thing I again come back to pointing out to you is, they exist much

moreso right now than anything that this could conceive of.

SENATOR PARKER: Well, maybe we should prohibit that.

MR. HUDSON: You would then only prohibit all fuel from coming into the area, which is the way the Legislature seems to be aimed with this ban on pipelines and --

SENATOR PARKER: Well, I think the offshore is a lot different from something in here. I don't want to equate the offshore situation with what you're doing here, and I am totally opposed to offshore.

MR. HUDSON: They are not equatable. And there are three or four different types of offshore facilities that you're talking about, and we would have to discuss each one of those in turn, and each one of them has different facets.

SENATOR PARKER: Now, let me ask you one other thing, about a couple of other safety factors. Suppose, as is common in the Chesapeake and tunnel, that you have ships in storms break loose and bang into your facility?

MR. HUDSON: The biggest problem would be the protection of the ship, not the protection of the facility. The best way to protect the facility from the ship is, where the ship is not or is not intended to be, leave it undredged so that the ship would go aground. And I believe this Commission has access to the development of how supertankers are built.

SENATOR PARKER: No, we don't, and that's one of the things I want to get.

MR. HUDSON: I had a slide on that but I thought twice about bringing it. They're built in small compartments. The ships can actually be grounded, and that's what would happen, and that's the way I would conceive of a good superport being built, so

that if a ship necessarily got loose that it would be grounded without getting into the port facility. I hope I make myself clear.

SENATOR PARKER: Well, I know of ships that have been grounded going up and down the river, for various reasons, and I gather, at least in the lower part of Delaware Bay, that grounding them would not do any real damage --

MR. HUDSON: Not in my opinion.

SENATOR PARKER: -- to the ship, in other words, it wouldn't break open, there is not rock or anything there that would cause it to break open.

MR. HUDSON: No, sir. Again, I keep coming back to one point that I think is so imperative that this hearing have at its disposal, the fact that if such a situation did occur it would occur anyway with ships that are offloading or unloading in and around that area.

SENATOR PARKER: Well, I'm more concerned with say some other ship that's anchored up the Bay - you don't have too many that anchor in the lower Delaware Bay really, but suppose a ship was coming down and lost control somehow, or in a bad storm.

MR. HUDSON: Right. This is a real problem.

SENATOR PARKER: You have them going through the Bay Bridge down there in the Chesapeake once a year.

MR. HUDSON: Well, I can't conceive of this happening, for several reasons. One, the committed channel would be far enough away from the normal traffic channel - I'm talking about of cargo, break-off cargo, containerized cargo, and the like, that it would be far enough away from the channel that by and large they could be picked up by a tug if there was a problem on board ship, just by ship-shore radio.

And, obviously, with any facility like this you have to have a certain number of tugboats available with a facility, and more and more we're going to have to commit tugs - and the refineries will too - to such a facility to take care of that accident type --

SENATOR PARKER: Would you have any rip-rap or bulkhead of any kind around the base or --

MR. HUDSON: Yes, sir, I would --

SENATOR PARKER: -- around the top of that that would prohibit or at least protect it?

MR. HUDSON: This would be totally sloped. You can only see the very top surface of it, and, of course, in the cut-away section we couldn't see some of the things that we're committed to, but we would intend to rip-rap the entire slope so that the ship would necessarily get nowhere near the outside of that port. And even if it did, again we would have to protect the ship, not the dock.

SENATOR PARKER: So the only place, theoretically, you'd get through would be the causeway.

MR. HUDSON: The causeway, it couldn't get through, especially if it came in loaded, because it's too shallow, and if it came from the other side light, it would probably be too shallow. And the causeway at a certain point - actually at Four Mile Island there is only 20 feet of water, and at the Marina there is only between 8 and 10 feet of water, that's all. It shallows up very quickly.

SENATOR PARKER: All right. Now, in the construction of the vessels you say you have something on that.

MR. HUDSON: Well, I didn't want to bore the Committee with it and I didn't bring it with me, and I apologize.

SENATOR PARKER: All right. Just send us some.

MR. HUDSON: Fine.

SENATOR PARKER: From what little I've seen

of them, they don't appear to be too seaworthy.

MR. HUDSON: They're the biggest thing I've ever seen.

SENATOR PARKER: Well they break up in a bad storm because they twist - you lost one in Madagascar.

MR. HUDSON: The percentage of spills and/or breakups, with all of the emotionalism that has been reported, is less than one-half of 1 percent - one-half of 1 percent. That's astronomically small. That's safer than air traffic currently.

SENATOR PARKER: All right. I'm not talking about spills, I'm talking about --

MR. HUDSON: Breakups.

SENATOR PARKER: Right, the problems. You know, if you have one of these break up off the coast, like you did the Torrey Canyon, that's just a small one.

MR. HUDSON: That's why I referred to the --

SENATOR PARKER: And that other one where they had the oil spill.

MR. HUDSON: Well, when the Torrey Canyon broke up, the one thing I would point out to you, it broke up, it was not near a port when it broke up, and when it broke up it scattered oil 200 miles. All 200 miles were coated with oil, all kinds of slick. That's an horrendous accident that is really in the annals of shipping's history - really most unusual.

SENATOR PARKER: Well, that boat ran aground but you had a couple of these supertankers disappear.

MR. HUDSON: That's right. Yes, sir, that is correct. I can't speak to that at all.

SENATOR PARKER: In a bad storm they just are gone. And we have enough problems with just regular small ships breaking up around Cape Hatteras and in the North Atlantic.

MR. HUDSON: There's just no question about that. I agree with you thoroughly. The only thing I

again point out is, this is more controlled, this concept is a more controlled, positive concept than anything we are currently doing. And any time I can get a hearing on something that's more positive and more controlled than what we have, I like it.

SENATOR PARKER: Well it may be more controlled from any proposal you have, and I'm convinced that this probably is a clean operation, the way you have it designed, but I'm concerned about these big ships moving in and out. The mouth of that river is I'm sure wide enough, the bay is 18 miles across?

MR. HUDSON: Yes, sir, approximately.

SENATOR PARKER: But if you have one of them go down there, that's the end of Ocean City, Maryland, and the end of Cape May, from Cape May to Asbury, a few hundred miles --

MR. HUDSON: It would seem to me that if the Canadian Government is currently asking so much a ton for oil that it would not be an undue or unreasonable requirement to consider the fact that an ecology fund could be established for such a situation. And I've been on oil cleanups, as I also, along with everything else, have worked at the dock building, pile driving profession out in the river. I've been on oil cleanups. I know what they're all about. I cannot conceive of an oil spill that would permanently ever damage a beach situation that somebody really wanted to clean up.

SENATOR PARKER: I agree with you. During the war we used to clean up the oil all the time on the beach.

MR. HUDSON: Yes, sir.

SENATOR PARKER: But it's not going to do much good to New Jersey's biggest industry, the vacation industry in the summertime, if we have our waters and beaches coated because one of these babies had a problem.

MR. HUDSON: I could not agree with you more. It is one of New Jersey's biggest industries. I can only point out to you that I am one of your vacationers with a beachfront home who doesn't want my beach destroyed either. And I think this is a possible way to avoid it.

SENATOR PARKER: I would like to look at whatever you have on some of this construction.

MR. HUDSON: All right, sir. We'll send to you some of the slides we have and will actually show you a piece and parcel of a ship being constructed so you can see the compartments. It's almost impossible for a supertanker to break up completely.

SENATOR PARKER: I understand that, but just the mere fact that it's compartmentalized creates a problem structurally.

MR. HUDSON: Yes, sir.

SENATOR PARKER: You know, even though each one is separate, this makes them easy to tear apart.

MR. HUDSON: Well I can't speak to the naval architectural safety of the ships except to say that I am told, for what that's worth, that the ships that are currently being constructed are safer than anything that's ever been built. Now what that means, I don't know. They said that about the Spanish --

SENATOR PARKER: Any of them fly American flags or all Liberian flags?

MR. HUDSON: They're probably flags of a necessity, many of them, and we've got to satisfy both situations. But that brings me to another point. The Seafarers Union, and many of the unions within the shipping industry, are as much concerned about this energy crisis as you are here. Mr. Hall has spoken to the fact that if we are going to have an energy crisis it will be the most horrendous thing we've ever

envisioned in the United States within the next five years, if we don't do something about it. He speaks, necessarily, to American flag bottoms.

SENATOR MERLINO: Thank you, Mr. Hudson.

MR. HUDSON: Gentlemen, thank you for having me. You have been most kind.

SENATOR MERLINO: And we will adjourn for one hour for lunch.

(Recess for lunch)

(Afternoon session)

SENATOR MERLINO: We would like to resume the hearings and, again, I am going to deviate from the printed agenda. I plan to adjourn at four o'clock. I see Senator Schluter hasn't recovered as yet from his testimony earlier today at the hearing in the Senate Chamber. If he wants to continue this hearing beyond four o'clock, if he should make his appearance, fine. He's the Chairman. But I plan to adjourn at four o'clock.

If the Petroleum Council doesn't mind, I would like to call on several other persons or groups here who would only take a few minutes. I am not going to hold you to the time that you've estimated for your testimony, but in the order of the time they've requested I will call on the Motor Truck Association, Norman Hughes, who estimated about five minutes.

N O R M A N H U G H E S: Thank you very much, members of the Committee. I am Norman Hughes, Legislative Representative of the New Jersey Motor Truck Association. I appreciate this opportunity, not having made prior arrangements, to make a statement that will be of short duration.

First of all, I should let you know that the New Jersey Motor Truck Association is an owner supported organization of some 1200 members. I think this is important for the Committee to note because trucking hauls more products than all other modes of transportation combined. So that anything that deters the movement of freight by truck will seriously affect the living standard of the entire country.

Just very briefly, the things that are happening that are local in character, that may be a little different trend from the type of testimony you have been having, which seems to me to be suggestive solutions to the energy problem in total and possibly the fuel problem as an adjunct to that.

In New Jersey we sent out a questionnaire to our membership, picked at random 16 representative replies. From these 16 companies, compiling the information received, they were using 9,000,993 gallons of diesel fuel per year. Eight of these were terminated completely, being deprived by their primary source, from the companies with which they had contracts, of 2,978,000 gallons of diesel fuel. The other eight were still being supplied either by their own companies, previously supplying them, or having been successful in lining up additional sources of supply. But in those instances they experienced serious price increases that ranged from as little as 4.15% per gallon on up to increases such as 13.9%, 16%, 21.8%, and in one instance as much as 50% increase.

So that you know this is specific, I do have the privilege of citing the names - Suburban Transfer Service, Inc., for instance, using 200,000 of diesel fuel per year, were terminated on January 1. In that instance, they are currently having to buy their fuel in retail outlets.

Pauls Trucking Company, 200 tractors, 750 trailers, moving 2,000 loads a week, were advised that as of January 31 their present company, which is Hess Oil, will not be in position to renew their contract. They estimate that the increased cost of obtaining fuel, from whatever sources, particularly retail, would be a 50% increase.

Wilson Freight Lines. They use 1,560,000 gallons of fuel a year. Their present supply currently being allowed them, has been cut by 56,000 gallons for February and 64,000 gallons for March, with other cuts not yet announced. This is a general commodities hauler.

Another small company, Delmar Trucking. They haul beverages. They use 125,000 gallons a year. They will be terminated as of the 28th of February. And

they estimate their increased cost from 23¢ a gallon up to 28¢ a gallon.

These are very close-to-home situations, gentlemen, right in our own State. We find that this situation is prevalent pretty much across the country but it seems to be much more chronic in New Jersey and the eastern part of the country, I would presume.

Our national organization, the ATA, of course is concerned about this also and has held numerous meetings with the Office of Preparedness, Department of the Interior. As a result of these, as has been mentioned earlier, the import quotas were suspended at the Federal level from January 1 through April 30. Hopefully, this will generate more supplies of these kinds of fuels.

Perhaps the only thing that may be of some value from the standpoint of our local problem, namely in the State of New Jersey, would be some consideration as to less stringent environmental restrictions on the type of fuel that can be burned by utilities and industries. I understand now it is restricted to 3% sulfur and the state of the art of refinement cannot, as I understand it, produce that kind of that heavy grade oil. To achieve this then, it becomes necessary to dilute that with the lighter distillates, namely the #2 oil which is diesel fuel oil, used not only in diesel trucks, busses, trains, but also in heating homes. Therefore, when this is diverted, for whatever reason, - and I'm not an expert to say whether it's economic, technological or what, - this obviously has lessened the availability of these kinds of sources for the uses that I particularly represent.

That is my statement, gentleman. Thank you for the opportunity.

SENATOR MERLINO: Mr. Hughes, is the reason given by the truckers for their supplies being cut off

the same or varied?

MR. HUGHES: The reason is generally the same, lack of supply.

SENATOR MERLINO: And that is from their usual supplier.

MR. HUGHES: Yes.

SENATOR MERLINO: And you've just stated a couple of examples, one in particular where their cost would go from the now 23¢ a gallon to 28¢ a gallon. Could it be that perhaps it's because of economics, that the supplier no longer would consider them to be that kind of a customer where they would get such a favorable rate?

MR. HUGHES: No. The going rate that exists generally across the industry is pretty much the same. We find in all these replies that it comes in somewhere around 23¢ a gallon, 23.2¢. It's a rather standard price. Again, you could maybe guess at what the reasons might be. We have had price controls. There has been a restriction on how much you can raise your price to your on-going customers, but if you take on a new customer I suspect there's the opportunity to have a higher price. Maybe that's part of it. You can talk to ten different people and you can get ten different rational reasons why this is happening. I would judge, personally, by the widespread existence of this problem, that the situation is perhaps more basic than just strictly an opportunity to raise the price.

SENATOR MERLINO: And what do you base that on?

MR. HUGHES: The fact that it's more than just a desire to get more money?

SENATOR MERLINO: Yes.

MR. HUGHES: Well, I would think that those kinds of situations might be more constricted to a geographic area. But when the Federal Government recognizes a broad enough problem to lift the import quotas, this bespeaks

to me the fact that they do recognize that there is an actual physical shortage of product to create the results that are necessary to satisfy all the needs.

SENATOR MERLINO: Have any of these trucking concerns that you have surveyed had to go out of business?

MR. HUGHES: Not yet, because this has just now happened. To curtail their deliveries, yes. This is what's happening to some already. But I know of none at this moment who has gone out of business. I would add to that that I know of one instance where their bulk supplier cut them off and they go down to the corner and buy it in the local station. There seems to be no shortage there.

SENATOR MERLINO: I get back to, it's a question of economics. The bulk supplier finds it more profitable to sell to an outlet who will sell it retail than sell it, let's say, at a wholesale or bulk price to a truck user.

MR. HUGHES: Well, that could be possible. I wouldn't want to make that statement categorically because I don't have that kind of information at my command. If you look at it in that respect, it seems to be a rational conclusion to arrive at.

SENATOR MERLINO: How big are some of the bigger truck operators in this State?

MR. HUGHES: You mean in terms of consumption?

SENATOR MERLINO: Yes.

MR. HUGHES: I suppose the largest in the State of New Jersey probably use somewhere in the neighborhood of 3 million gallons a year.

SENATOR MERLINO: And that would just be a couple of outfits, wouldn't it?

MR. HUGHES: Yes. There aren't that many real big outfits in the State of New Jersey.

SENATOR MERLINO: Do you know what their

experience has been?

MR. HUGHES: They are experiencing the same cutbacks from basic sources. But in the instance of the two I know of specifically, they have in advance of everybody else known this and have reached to another supplier to augment this, and because of their volume have been able to achieve at least an additional supply but at a higher price.

SENATOR MERLINO: Thank you, Mr. Hughes.

SENATOR PARKER: Just one thing, Mr. Hughes. Have you found any shortage existing or any problem in the hauling of gasoline as opposed to fuel oils? Has that been in any short supply?

MR. HUGHES: This I do not know of specifically. The only statement that I can make relative to that is that in one instance of a company that hauls gasoline in a tank truck operation it has no problem getting fuel.

SENATOR PARKER: In other words, there seems to be, as far as your industry is concerned, from your knowledge anyway, plenty of gasoline available.

MR. HUGHES: You could take that conclusion depending on where you were getting your information, Senator. But I wouldn't want to make that as a broad statement.

SENATOR MERLINO: Thank you, Mr. Hughes.

MR. HUGHES: Thank you very much, gentlemen.

SENATOR MERLINO: The Army Corps of Engineers.

R O B E R T K A I G H N: I would like to thank the honorable members of the Committee for inviting the Corps' participation at today's hearing. My name is Robert Kaighn and I am Assistant Chief of Planning Branch for the Philadelphia District, U. S. Army Corps of Engineers. I am presenting the statement of Colonel Carroll D. Strider, District Engineer, U. S. Army Engineer District, Philadelphia. I have been asked to testify before you today with respect to a study which we are just completing.

BEFORE PROCEEDING, LET ME BEGIN BY CLARIFYING THE CORPS' POSITION. WE WERE AUTHORIZED AND INSTRUCTED BY A RESOLUTION OF THE SENATE PUBLIC WORKS COMMITTEE TO CONDUCT A FAIR AND IMPARTIAL STUDY THAT WOULD DETERMINE THE MOST EFFICIENT, ECONOMIC AND LOGICAL WAY OF PROVIDING FACILITIES FOR THE VERY LARGE BULK CARRIERS. WE WERE NOT DIRECTED BY CONGRESS TO DETERMINE WHETHER OR NOT FACILITIES TO HANDLE THESE SHIPS WERE NEEDED. WE WERE NOT DIRECTED TO DETERMINE WHETHER OR NOT WE COULD SUBSTITUTE OTHER FORMS OF ENERGY FOR OIL. WE HAVE, HOWEVER, INVESTIGATED ALL OF THESE ALTERNATIVES; AND FRANKLY, WE SEE NO ALTERNATIVE ENERGY SOURCE WHICH WILL ALLOW US TO SIGNIFICANTLY REDUCE OUR DEMANDS FOR OIL IN THE NORTH ATLANTIC FOR THE IMMEDIATE FUTURE, THAT IS, FOR THE NEXT 25 YEARS. DURING THAT TIME PERIOD, UNLESS WE ALLOW PRODUCTION OF OIL ON OUR NORTH ATLANTIC CONTINENTAL SHELF, WE WILL BE IMPORTING OIL TO OUR REFINERIES ALONG THE DELAWARE RIVER AND ARTHUR KILL JUST TO KEEP OUR CARS MOVING AND OUR CITIES OPEN. SUMMER BROWN-OUTS AND THE RECENT EXPERIENCES OF DENVER, KANSAS CITY, AND IOWA, WHICH HAD TO PARTIALLY OR TOTALLY SHUT DOWN PUBLIC FACILITIES BECAUSE OF TEMPORARY FUEL SHORTAGES SHOULD REMIND US HOW GREAT OUR DEPENDENCE ON AN UNINTERRUPTED FLOW OF ENERGY REALLY IS.

EVEN WITH OFF-SHORE DRILLING ON THE CONTINENTAL SHELF AND THE NORTH SLOPE OF ALASKA, VAST QUANTITIES OF FOREIGN OIL -- MIDDLE EASTERN AND NORTH AFRICAN OIL -- WILL BE IMPORTED TO THE NORTH ATLANTIC COAST -- BECAUSE THIS IS WHERE THE DEMAND IS GREATEST AND WHERE THE BULK OF OUR POPULATION AND INDUSTRY ARE CONCENTRATED. TODAY, THE NORTH ATLANTIC IS A DEFICIT FUEL AREA. ALL OF OUR CRUDE IS MOVED INTO THE AREA BY VESSEL, MOST OF IT FROM THE CARRIBEAN AND THE GULF COAST.

PROJECTIONS INDICATE A SHIFT IN FUTURE NORTH ATLANTIC IMPORTS FROM THE CARRIBEAN AND GULF COAST TO THE MORE MASSIVE OIL RESERVES OF THE PERSIAN GULF AND NORTH AFRICA. THIS INCREASED DEPENDENCE ON THE PERSIAN GULF WILL PUSH THE TRIP LENGTH FOR A SINGLE VESSEL, FROM OIL FIELD TO PORT AND BACK AGAIN, FROM ABOUT 12 DAYS TO OVER 9 WEEKS. THIS LONGER TRIP MAKES IT MORE ECONOMICAL TO USE LARGER VESSELS, AT THE SAME TIME ALLOWING US TO REDUCE FUTURE TRAFFIC IN OUR PORTS.

OIL COMPANIES NOW TRANSPORT CRUDE OIL FROM THE MIDDLE EAST TO NORTH AMERICA IN TANKERS OF AT LEAST 200,000 DWT -- BECAUSE IT IS CHEAPER TO DO IT. THEY WILL CONTINUE TO USE THEM EVEN WITHOUT DEEP WATER FACILITIES IN THIS COUNTRY.

ALREADY, 100,000 TON SHIPS ARE LIGHTERING OFF DELAWARE BAY AND NEW YORK HARBOR. WITHOUT A PORT, WE CAN EXPECT SHIPPERS TO USE ANY OF SEVERAL POSSIBLE ALTERNATIVES. THEY COULD TRANSSHIP THE CRUDE OIL FROM FOREIGN PORTS SUCH AS THOSE ALREADY EXISTING IN CANADA AND THE BAHAMAS -- IN OTHER WORDS, TRANSFER THE CARGO IN FOREIGN DEEPWATER HARBORS TO SMALLER VESSELS CAPABLE OF ENTERING OUR OWN PORTS. THIS WOULD INCREASE THE NUMBER OF SMALLER VESSELS USING OUR PORTS AND RESULT IN INCREASED HARBOR CONGESTION. IT MIGHT ALSO LEAD TO ESTABLISHMENT OF REFINERIES IN THOSE FOREIGN PORTS AND TOO GREAT A DEPENDENCE ON FOREIGN POWERS FOR COMFORT, IN TERMS OF NATIONAL SECURITY. THIS IN TURN WOULD ALSO RESULT IN SHIPMENT OF MORE REFINED PRODUCTS TO THE NORTH ATLANTIC, AN INCREASE IN THE NUMBER OF SHIPS AND CHANCES OF DAMAGE TO PRODUCT VESSELS, WHICH CARRY A CARGO FAR MORE DAMAGING TO OUR ENVIRONMENT THAN CRUDE OIL. ANOTHER ALTERNATIVE IS MULTIPLE PORT SHIPPING, WHICH MEANS PARTIALLY UNLOADING A MASSIVE, SAY 500,000 DWT SHIP AT A FOREIGN PORT, AND THEN BRINGING IT TO THE NORTH ATLANTIC FOR FURTHER LIGHTERING. IT IS A VARIATION OF LIGHERING OPERATIONS CURRENTLY IN USE, AND WOULD HAVE THE SAME DRAWBACKS. SOME COMBINATION

OF THESE ALTERNATIVES WILL UNDOUBTEDLY BE USED SHOULD NO DEEP WATER FACILITY BE BUILT. BY 1980, WITHOUT A DEEP WATER FACILITY, THE NUMBER OF SHIPS LIGHTERING OFF THESE PORTS COULD JUMP TO 1900 PER YEAR. BY 2000, IT COULD REACH 3700. IN ADDITION, LARGE NUMBERS OF SMALL SHIPS CARRYING CRUDE OIL WILL BE PASSING ALONG OUR COAST WITH INCREASING CHANCES OF COLLISION.

THE PROBABILITIES OF OIL SPILLS HAVE BEEN EVALUATED IN PRELIMINARY DATA SUPPLIED TO US BY THE COUNCIL ON ENVIRONMENTAL QUALITY IN COORDINATION WITH THE COAST GUARD AND OTHERS. WITHOUT SPECIFIC IMPROVEMENTS TO ACCEPT VLCC'S AND AT AN IMPORT LEVEL OF 1 MILLION BARRELS PER DAY (APPROXIMATELY THE AMOUNT USING NEW JERSEY WATERS TODAY) PROJECTED ANNUAL OIL SPILLED IN THE NORTH ATLANTIC COASTAL ZONE CAN BE EXPECTED TO BE ABOUT 3500 BARRELS ANNUALLY. IN THAT ANALYSIS, IT WAS ASSUMED THAT ALL OIL WOULD BE TRANSSHIPPED FROM NOVA SCOTIA TO OUR REFINERIES IN 50,000 DWT TANKERS, WITHOUT LIGHTERING. IN REALITY, IT IS EXPECTED THAT LIGHTERING IN DELAWARE BAY AND THE NEW YORK HARBOR AREA WILL CONTINUE TO OCCUR. THIS LIGHTERING IN OUR COASTAL AREAS WILL INCREASE THE HANDLING OPERATIONS AND RESULT IN ADDITIONAL OIL SPILLS. AS THE VOLUME OF OIL IMPORTED TO THE NORTH ATLANTIC INCREASES, THE VOLUME SPILLED CAN BE EXPECTED TO INCREASE PROPORTIONATELY.

WITH FACILITIES TO ACCEPT VLCC'S, THE PROBABILITIES OF OIL SPILLS ARE MATERIALLY DIFFERENT. WITH A TERMINAL LOCATED TEN MILES OFFSHORE IN THE NORTH ATLANTIC AND TRANSSHIPPING TO THE NORTH ATLANTIC REFINERIES COMPLETELY BY PIPELINE, THE AMOUNT OF OIL SPILLED IN OUR COASTAL WATERS WOULD BE REDUCED MORE THAN HALF TO 1455 BARRELS PER YEAR. USING A TERMINAL AND COMPLETELY TRANSSHIPPING BY VESSEL WOULD INCREASE THE OIL SPILLED TO 10,950 BARRELS PER YEAR FOR EVERY MILLION BARRELS PER DAY HANDLED.

THE VESSEL TRANSSHIPMENT ALTERNATIVES SHOW DRAMATICALLY GREATER LEVELS OF OIL SPILL BECAUSE THEY INCLUDE TWO STEPS IN THE TRANSPORT SYSTEM WHICH DO NOT APPEAR IN THE PIPELINE ALTERNATIVE; ONE, LOADING OIL ONTO SMALLER VESSELS FROM THE PORT FACILITY, THUS RISKING ADDITIONAL TRANSFER SPILLS; AND TWO, SHIPPING THE OIL FROM THE PORT FACILITY TO SHORE BY MANY SMALLER VESSELS EXPOSING THEM TO THE RISK OF COLLISIONS, GROUNDINGS, RAMMING, ETC.

IT MUST BE RECOGNIZED THAT THE FAILURE TO PROVIDE FACILITIES IN THE NORTH ATLANTIC WILL NOT ELIMINATE THE USE OF VLCC'S IN THE COASTAL WATERS OF THAT REGION. IT IS EXPECTED THAT THEY WILL ENTER DELAWARE BAY AND NEW YORK HARBOR PARTIALLY LOADED FOR LIGHTERING. SINCE THESE VESSELS ARE MADE OF MANY COMPARTMENTS, IT IS UNLIKELY THAT THE ENTIRE QUANTITY OF OIL ON THE VESSEL WOULD BE SPILLED. AND IT IS LIKELY THAT A CATASTROPHIC SPILL FROM A COMPARTMENT OF A PARTIALLY LOADED VLCC WILL BE JUST AS BIG AS A SPILL FROM A COMPARTMENT OF A FULLY LOADED VLCC. HOWEVER, BECAUSE OF INCREASED TRAFFIC, THEY WILL BE MORE FREQUENT.

BASED ON THE STUDY, IT IS OBVIOUS THAT IF WE ARE TO PROTECT OUR ESTUARIES AND BEACHES FROM OIL SPILLS IN THE FUTURE, FACILITIES MUST BE PROVIDED WHICH WILL ACCEPT VLCC'S AND ALLOW FOR TRANSSHIPMENT TO THE REFINERIES BY PIPELINE.

FAILURE TO BUILD A VLCC TERMINAL IN THE NORTH ATLANTIC COULD THEREFORE LEAD TO HIGHER CRUDE OIL TRANSPORTATION COSTS, DEPENDENCE ON ANOTHER COUNTRY FOR SUPPLY, INCREASED CHANCES OF COLLISION AND OIL SPILLS, AND CONSTRUCTION OF ADDITIONAL LIGHTERING AND PORT FACILITIES TO HANDLE THE INCREASING NUMBERS OF VESSELS.

IN OUR ATTEMPT TO FIND THE BEST LOCATION FOR A VLCC FACILITY, WE INVESTIGATED NINETEEN AREAS FROM MAINE TO VIRGINIA. IN ALL, WE EVALUATED NINETY DIFFERENT PLANS. WE FOUND THAT THE MOST EFFICIENT AND ECONOMICAL LOCATION FOR VERY LARGE CRUDE OIL CARRIER HANDLING FACILITIES WOULD BE IN THE ATLANTIC OCEAN EITHER OFF LONG BRANCH OR OFF CAPE MAY, NEW JERSEY OR IN DELAWARE BAY AT BIG STONE BEACH, DELAWARE. THE DETERMINATION OF THE MOST EFFICIENT AND ECONOMIC OF THESE SITES DEPENDS UPON THE SIZE OF VESSEL WE CAN EXPECT TO SERVE OUR REFINERIES. UNDER ONE SET OF ASSUMPTIONS, DEVELOPED JOINTLY BY THE CORPS OF ENGINEERS AND THE FEDERAL MARITIME ADMINISTRATION, VESSELS OF UP TO 500,000 TONS CAN BEST BE SERVED BY A REGIONAL MONOBUOY FACILITY LOCATED 13 MILES OFF LONG BRANCH, NEW JERSEY. HOWEVER, IF THE LARGEST SHIP EXPECTED WOULD NOT EXCEED 325,000 TONS, THEN THE MOST ECONOMIC AND EFFICIENT SYSTEM WOULD BE TWO LOCAL FACILITIES, A MONOBUOY FACILITY OFF LONG BRANCH TO SERVE THE NORTHERN NEW JERSEY REFINERIES, AND EITHER A SEA ISLAND OR AN ARTIFICIAL ISLAND LOCATED IN DELAWARE BAY OFF BIG STONE BEACH, DELAWARE TO SERVE THE DELAWARE AND YORK RIVER REFINERIES.

FROM AN ENVIRONMENTAL POINT OF VIEW, THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY HAS STATED CATEGORICALLY THAT OFFSHORE SITES ARE PREFERABLE TO ESTUARINE SITES. ANY OIL SPILLS AT OFFSHORE SITES WOULD HAVE LESS CHANCE OF REACHING SHORE THAN AT INSHORE SITES. IN ADDITION, OIL REACHING THE COAST WOULD HAVE WEATHERED AND WOULD BE LESS LIKELY TO CONTAIN THE MORE TOXIC FRACTIONS OF CRUDE OIL, WHICH EVAPORATE QUICKLY BEFORE THEY REACH THE SHORE. CONSEQUENTLY, THE MOST ENVIRONMENTALLY ACCEPTABLE AND LOGICAL SITES WOULD BE LOCATED IN THE ATLANTIC OCEAN OFF LONG BRANCH AND/OR CAPE MAY. THE LATTER SITE IS SOMEWHAT LESS ECONOMICALLY EFFICIENT THAN OTHERS PREVIOUSLY MENTIONED.

MOREOVER, WE FOUND THAT THERE IS SUFFICIENT PRIVATE INTEREST TO DEVELOP THESE FACILITIES AND SEE NO NEED TO ADOPT A FEDERAL PROJECT OR TO SPEND FEDERAL FUNDS FOR SUCH DEVELOPMENT. RATHER, WE THINK ALL INTERESTS CAN BEST BE SERVED AND THE ENVIRONMENT PROTECTED BY USING THE PERMIT PROCESS UNDER APPROPRIATE CONTROLS. ISSUANCE OF SUCH A PERMIT WOULD REQUIRE PRIOR APPROVAL OF THE AFFECTED STATE OR STATES AND USE OF THE MOST UP TO DATE POLLUTION AND SAFETY EQUIPMENT.

THERE IS SOMETHING ELSE WHICH I FEEL CANNOT BE EMPHASIZED TOO STRONGLY. IT HAS BEEN SUGGESTED THAT A DEEP WATER UNLOADING FACILITY WOULD DRAW NEW REFINERY AND PETROCHEMICAL DEVELOPMENT TO ANY AREA IN WHICH IT WAS LOCATED. IT HAS ALSO BEEN SUGGESTED THAT A DEEP WATER TERMINAL WOULD ONLY SERVE REFINERY EXPANSION. LET ME STATE HERE AND NOW -- THIS FACILITY IS NEEDED TO SERVICE EXISTING REFINERIES. THAT NEED ALONE JUSTIFIES THE CONSTRUCTION OF SUCH A FACILITY. WHAT IT REPRESENTS IS A NEW, SAFER AND MORE EFFICIENT DELIVERY SYSTEM TO SERVE AN AREA IN WHICH THE DANGER OF OIL SPILLS IN INCREASINGLY CLOGGED SHIPPING LANES IS RISING AT AN ALARMING RATE. WITHOUT THIS FACILITY, THE GIANT SHIPS WILL CONTINUE TO LIGHTER, AND SOMETIME, SOMEWHERE, THERE IS GOING TO BE A VERY SERIOUS SPILL. AS TO CONTROLLING REFINERY EXPANSION, GENTLEMEN, THAT IS UP TO YOU. STATE AND LOCAL PLANNING AGENCIES HAVE THE POWER AND THE RESPONSIBILITY TO REGULATE INDUSTRIAL GROWTH IN THEIR COMMUNITIES. BUT TO SATISFY THE REGION'S EXISTING REFINERY NEEDS, A NEW, MODERN, SAFE DEEP WATER TERMINAL SHOULD BE BUILT.

SENATOR MERLINO: Thank you. I presume that we have the more detailed information in the folder which was given to us concerning the Corps of Engineers' studies.

MR. KAIGHN: You have notices which we mailed out concerning two sets of public hearings which we had yes.

SENATOR MERLINO: And that would have some more detailed information than your presentation.

MR. KAIGHN: There is some information here that is not in the statements. The information on the oil spill probability was just given to us recently and was not in there.

SENATOR MERLINO: The information which you have given us in this presentation on the oil spills, was that something that was developed by the Army --

MR. KAIGHN: No, sir. It was developed by the President's Council on Environmental Quality through the use of the Coast Guard and the Environmental Protection Agency and many others, including sea grant universities.

SENATOR MERLINO: You wouldn't have any facts, either yourself or from the Corps of Engineers concerning the actual spillage, if any, from the lighter operations now being used.

MR. KAIGHN: Existing spillage, no sir, I have not.

SENATOR MERLINO: Because we've had testimony here, I think on two occasions, concerning the amount of spillage from the existing facilities now in use in the Delaware Bay area which, as I recall, amounted to next to nothing.

MR. KAIGHN: Now it is a very clean operation.

SENATOR MERLINO: It is now. So it's just speculation that there could be spillage in the amount that you have here in your presentation.

MR. KAIGHN: A large amount of that spillage in this presentation results from increased vessels.

SENATOR MERLINO: It's anticipated increase in the number of vessels and docking facilities and so on.

MR. KAIGHN: Collisions, predominantly.

SENATOR MERLINO? Collisions. Do you have any idea, knowledge or information as to the last time we had any collision in the Delaware Bay area which resulted in spillage?

MR. KAIGHN: No, but I can tell you that just several months ago there was a tanker that ran aground in Delaware Bay when the Captain died at sea and the First Mate tried to bring it in. Fortunately, there was no spillage.

SENATOR MERLINO: No spillage.

MR. KAIGHN: No, sir, fortunately.

SENATOR MERLINO: It was a tanker which was carrying some crude oil.

MR. KAIGHN: Yes, sir, 100,000 ton tanker, I believe.

SENATOR MERLINO: On the recommendation that is made in this presentation concerning the offshore facility, off Long Branch, New Jersey, just what kind of a facility would that be?

MR. KAIGHN: Our proposal was a series of monobuoys depending on the amount of oil we were intending to import through the port, maybe four or five monobuoys pumping through pipelines to shore. The facility would be located 13 miles off shore in about 100 feet of water, pumped from the tank farm to the refinery areas in both New York and on the Delaware River.

SENATOR MERLINO: And, of course, the necessary State permits would have to be obtained.

MR. KAIGHN: Yes, sir.

SENATOR MERLINO: And the Army is aware of the legislation now half-way through the New Jersey

Legislature prohibiting such a pipeline.

MR. KAIGHN: Yes, sir.

SENATOR MERLINO: And without the State permits this offshore facility, under existing laws, both state and federal, cannot be completed.

MR. KAIGHN: I believe that's right.

SENATOR MERLINO: How much time do you think it would take for the Federal Government to assume that jurisdiction in that area?

MR. KAIGHN: I don't think I can answer that question. I don't know that they would do that.

SENATOR MERLINO: And what, if you know, is the reason for the preference of the off Long Branch facility as compared to the Bay facility?

MR. KAIGHN: The difference is in the effects of any oil spills that would occur. To start with, most of the spills that occur in coastal waters occur in entranceways to harbors where you have shallow waters. We have many vessels that can collide. By moving offshore, you eliminate the grounding part of it. You also get yourself out of the traffic lanes where you reduce the amount of traffic. Now, if you do have an oil spill there, the area around the spill is less sensitive biologically to an oil spill. If you compare an oil spill of equal size in Delaware Bay, say, or in the ocean, biologically the damage should be significantly less. Now, in addition, the oil, by the time it reaches the shore or the estuary, if it does go into the estuary, will have weathered - and by that we mean the toxic portions of the crude oil will have evaporated and will no longer be as damaging to the environment. Then, of course, a different problem that you now face with your beaches, the oil approaching the beaches is a completely different story.

SENATOR MERLINO: I don't know that we would be that concerned with the killing aspect of the oil but

the damaging aspect to our Jersey beaches - and you've heard it I'm sure more than one time here today and before that the Jersey Shore area is our biggest industry.

MR. KAIGHN: Yes, sir.

SENATOR MERLINO: And the fact that it is less toxic when it reaches our shore really wouldn't make any difference to the damage it would do to the Jersey beaches, would it?

MR. KAIGHN: No, sir. But we must remember also that the vessels will still be passing by the coast out there and they still can have a collision, whether they're docking at the terminal or not. Most of your oil spills do not come at the terminal.

SENATOR MERLINO: Is it anticipated that the spillage will come from collisions or just from the transferring of the oil?

MR. KAIGHN: In which case?

SENATOR MERLINO: In any case.

MR. KAIGHN: In every case it would be both collision and transfer. But with the smaller number of ships your chances of collision are much smaller, and also when you don't have a lightering operation and the rehandling operations, your handling operations are much smaller.

SENATOR MERLINO: But if you're handling a 200,000 ton ship whether it be offshore or a lighter operation the chance of spillage is the same, isn't it?

MR. KAIGHN: It depends on how many times you handle the oil, sir. Are you talking about a terminal inshore versus offshore?

SENATOR MERLINO: The offshore versus the inshore.

MR. KAIGHN: Terminal. Yes, they would be the same. The difference is that you have less chance of running aground when you're offshore. And inshore you also are away from the traffic lanes.

SENATOR MERLINO: Are you aware of the testimony we had this morning concerning the physical makeup of the Delaware Bay area --

MR. KAIGHN: Yes, sir.

SENATOR MERLINO: -- and it's effect on grounding ships?

MR. KAIGHN: Yes, sir.

SENATOR MERLINO: That there would be very little likelihood of any damage, any serious damage which would cause a spill, from a ship grounding in Delaware Bay.

MR. KAIGHN: There would have to be a channel dredged in Delaware Bay.

SENATOR MERLINO: Pardon?

MR. KAIGHN: There would have to be a channel dredged into Delaware Bay. Our proposal was an 80 foot channel which would limit you to about a 300,000 ton ship. There is still a chance of that ship running aground although granted with good guidance those chances could be eliminated.

SENATOR MERLINO: What about the general condition, atmospheric condition and storm condition, in that area off Long Branch as compared with that in Delaware Bay?

MR. KAIGHN: Most certainly the conditions off Long Branch are much more severe than in Delaware Bay. With the type of facility we have, the monobuoys, a ship can stay tied up out there in waves up to 20 feet high without unattaching itself from the buoy. There will be problems in hook-ups many times, when they won't be able to hook up. They will have to wait until lower tides because under present conditions a ship cannot tie up to a monobuoy in anything greater than a six to eight foot wave, which happens quite frequently in that area.

SENATOR MERLINO: Has the use of Long Island Sound been studied by the Corps?

MR. KAIGHN: We looked at Long Island Sound, yes, sir. It was not deemed as economical a site as this place that we mention, predominantly because these are essentially located to be just in refinery areas. All of the refineries in the North Atlantic with the exception of one, are located either in New York or the Delaware River. The other one being on the York River in Virginia. So the most economic site is between those two locations. And that's what we were asked to find, the most economic site.

SENATOR MERLINO: Well, as I say, aside from economics, would there be any particular advantage to say a Long Island Sound site?

MR. KAIGHN: There would be no particular advantage. I'm sure you have the same problems there as you have in Delaware Bay.

SENATOR MERLINO: But it wouldn't affect New Jersey as much.

MR. KAIGHN: That may be true, but not in New York or Connecticut.

SENATOR MERLINO: You say that the Army would envision that this would be a project of a wholly private undertaking rather than one expending public funds.

MR. KAIGHN: We say it would not be a Federal Government undertaking. There would be nothing to stop the state from undertaking it if they wanted to, or privately.

SENATOR MERLINO: Would there be any dredging to do with the off Long Branch site?

MR. KAIGHN: No, sir.

SENATOR MERLINO: As compared with the Delaware Bay site, there would be dredging.

MR. KAIGHN: Yes, sir.

SENATOR MERLINO: And that would be for the Army Corps of Engineers to --

MR. KAIGHN: General procedure would be that way.

There is no project right now which would authorize the Corps of Engineers to do it. It would have to be adopted by Congress.

SENATOR MERLINO: Well, doesn't the Corps of Engineers maintain a continued dredging operation in Delaware Bay?

MR. KAIGHN: We have an authorized channel that goes up the Delaware to Trenton which is authorized by Congress for the Corps of Engineers to maintain. The Corps does not go around dredging projects unless Congress --

SENATOR MERLINO: They haven't dredged in Trenton for years.

MR. KAIGHN: Well, they dredge up to the Fairless Hills plant. We do not go around dredging facilities unless we are directed to do so by Congress, unless there is a Federal project authorized that would provide funds.

SENATOR MERLINO: This would be off the normal channel that you are now authorized to maintain.

MR. KAIGHN: Yes, sir. It would also be deeper.

SENATOR MERLINO: Senator Dodd?

SENATOR DODD: I just have one question. I don't know if you are equipped to answer this, but a hypothetical case. If there were an international incident affecting the supply of oil to the United States, how long are we able to sustain our reserves that we have now, which I understand are zero.

MR. KAIGHN: Our reserves in the ground?

SENATOR DODD: No, our reserves in our tanks.

MR. KAIGHN: Most of the refineries in this area have about seven days' supply when they're full. I assume if they're half full, about three to three and one-half days.

SENATOR DODD: Theoretically, world tension somewhere over in the African fields or in the Persian Gulf something would happen that would stop shipping,

within seven days we would be without?

MR. KAIGHN: There is a possibility that there would be such a thing as compulsory storage. This is happening now in Europe where they are required by the government to have thirty or sixty days' storage in case something like that might happen. It's quite likely if we do become heavily dependent upon the Middle East the same situation would occur.

SENATOR MERLINO: Senator Parker?

SENATOR PARKER: Just a couple of questions. Senator Merlino, I think pretty near hit the whole problem. But I understand that the Army Corps of Engineers and/or the Federal Government would be required - or by custom, I guess, always does undertake the financial obligation for the dredging. That would be so here in Delaware Bay, wouldn't it?

MR. KAIGHN: As I said, what would have to be done, we would have to write a report recommending this to Congress and Congress would have to adopt the project and, if so, then yes.

SENATOR PARKER: Certainly an obvious factor is the cost to the United States Government in opening up the channel, whereas opposed to offshore you don't need any dredging.

MR. KAIGHN: Yes. We have included that dredging in our analysis when comparing the Long Branch site versus the Big Stone Beach site.

SENATOR PARKER: And a facility such as the six mile superport would minimize any oil spills, would it not, the way they have it set up? In other words, even if there was a spill, it would be contained in the immediate area there unless there was a situation where a ship ran aground, and Delaware Bay is all soft bottom and it wouldn't ruin the ship.

MR. KAIGHN: Any spill that would occur at the dock would be contained.

SENATOR PARKER: So the only thing you're worried about really, on Delaware Bay, is traffic and oil spills in the entrance to the Harbor, which for the birds and stuff I could see in the estuary would be worse. Right?

MR. KAIGHN: Right.

SENATOR PARKER: Why can't you control the ships the same way the airports do by only allowing a certain number to go up and monitoring them the whole time on radar and other aspects? You could do that without any problem, couldn't you?

MR. KAIGHN: Yes, most definitely. I would expect that it would be done. Now I might say, the statistics that were used are world wide statistics.

SENATOR PARKER: Right. And most of the accidents that have occurred in Delaware Bay are those where they've been under their own monitoring system, their own radar and --

MR. KAIGHN: Yes, that's right.

SENATOR PARKER: Now the only reason why, I take it, or at least one of the major obstacles to putting it in the New York or Long Island area is strictly political. You say there are no technical problems in putting a refinery up there, is there?

MR. KAIGHN: Well, we're not talking refineries, we're talking deepwater port now.

SENATOR PARKER: Well, you're talking about servicing refineries. All refineries, for some unknown reason, happen to be in New Jersey, and New York just doesn't happen to have any.

MR. KAIGHN: That's right. The decision was made some time back, I'm sure.

SENATOR PARKER: I'm sure it was made some time back.

MR. KAIGHN: But, as I say, we were directed to find the most efficient, economic place.

SENATOR PARKER: There is nothing that the Army Corps of Engineers could see as to why Montauk wouldn't be just as good a point as Delaware Bay for bringing in and putting those refineries up there.

MR. KAIGHN: Except that it would be less economical.

SENATOR PARKER: They would have to put in a new refinery. They don't have any up there.

MR. KAIGHN: We're talking about servicing existing refineries. It would cost you more money to get your oil to the Bayway Refineries or the Delaware River refineries.

SENATOR PARKER: Right. You could pump. You know, the cost of constructing the pipelines, instead of 13 miles from offshore, you would pump 100 miles down along Long Island.

MR. KAIGHN: This is a possibility. I don't know if it's feasible or not. Within the individual oil companies it may not be a feasible plan, the alternative of deepporting or lightering may be cheaper.

SENATOR PARKER: It's not your contention, is it, that they're not going to build additional refineries along the Delaware?

MR. KAIGHN: I would say there would be no difference in the refineries built along the Delaware with or without a deepwater port.

SENATOR PARKER: Why is it that Teneco and LAP or LAF, whoever it is, are buying up all the available land along the Delaware between Route 130 from Burlington to Cape May?

MR. KAIGHN: Because they want to build refineries there. That's where the demand is but what I'm saying is not depending on the port.

SENATOR PARKER: All right. That's all I have

SENATOR MERLINO: And if they have some reason to get assurance that the deepwater port will be built into the Bay area, they feel certain that they will have enough oil to process their refineries. It isn't just as it's stated in here that the necessity is merely to supply the existing refineries then.

MR. KAIGHN: No. Certainly there is a demand for much more refinery capacity in the North Atlantic and in the New York-New Jersey area. But this facility right now is needed just to service the existing refineries. If more refineries are developed it certainly could be expanded and should be expanded.

SENATOR MERLINO: There is no reason why refineries can't be built up on the New England Coast, in that area, and have a deepwater port up there.

MR. KAIGHN: Except that refineries don't seem to be too interested in building up there because the demand is down here.

SENATOR MERLINO: Because they've gotten their zoning and planning operations operating a little better than we have here in New Jersey.

MR. KAIGHN: Well they have in the State of Maine now apparently approval to build a refinery in the Portland area and no one seems to be building one yet.

SENATOR MERLINO: Well, they had trouble there with sugar beets, I guess they don't want to tackle oil.

SENATOR PARKER: Well, New York has the biggest demand and maybe New York ought to build its own refinery out on Long Island.

SENATOR MERLINO: They can build one in upstate New York and bring their oil in down the St. Lawrence River.

Thank you.

The New Jersey Gas Association. Mr. Kassak estimated that he would take from ten to fifteen minutes.

P E T E R J. K A S S A K: Good afternoon. I am Peter J. Kassak, immediate Past President of the New Jersey Gas Association, and Vice President of Operations and Engineering for Elizabethtown Gas Company. I am here representing the New Jersey Gas Association to present its views concerning the gas supply crisis that now exists in New Jersey. The New Jersey Gas Association is an organization of gas companies in the State of New Jersey and was formed to provide a forum for the interchange of ideas and information among the member companies. Although the gas shortage to date has affected each of the companies in varying degrees, the statement that I will make this afternoon will cover the general situation as it affects all of us in the gas industry in New Jersey.

America, for the first time in its history, faces a shortage of natural gas. The demand for gas, a clean burning - low sulfur fuel has increased markedly with the advent of strong air pollution regulations. Many large industrial and commercial firms in New Jersey were forced to switch to gas in order to comply with State Air Quality Standards.

The production of natural gas, however, has not kept pace with this rapidly increasing demand, in fact the production of natural gas rather than increasing has been decreasing. For example, in 1967, there were approximately 22 trillion cubic feet found in the lower 48 United States and by 1969 this had fallen to a little above 8 trillion cubic feet and for the first time in American history we, as a nation, have used more gas than we discovered in a single year. That situation has continued every single year since then. There have been many reasons given for this reduction in production, but the main one appears to be that the regulated price of natural gas established by the Federal Power Commission has been too low to encourage the necessary exploration and production effort.

As a result of the reduced exploration effort, three of the four interstate pipeline companies serving New Jersey are no longer able to meet their delivery obligations under existing contracts. Deliveries of gas to New Jersey companies are being curtailed by the pipelines.

The curtailment levels have run from 9 percent to as high as 22 percent. Unfortunately, the predictions and estimates for the next few years indicate that these curtailments will increase. One pipeline estimate for 1976 indicates a curtailment of 33 percent.

A natural gas shortage in a highly industrialized state such as New Jersey can have a great economic impact. In 1972, Commissioner Ronald Heymann of the Department of Labor and Industry, spoke to a New Jersey Gas Association Marketing conference in which he indicated he had personal knowledge of some large industrial firms who were anxious to locate in the State of New Jersey. Because of the shortage of natural gas in the State, they had to locate in another state. Even with the pipelines curtailing deliveries at their current levels, which is bad enough, unless the gas companies are permitted to build the planned facilities that will provide alternate sources of gas supplies, service to industrial and commercial customers will be further reduced in the foreseeable future.

Since all of the gas distribution companies in the State were aware of the pending shortage of natural gas at the well head,

each one looked to alternate supplies in order to meet the demands of its customers. These supplemental sources of gas include liquified petroleum gas (LPG), which is a substitute natural gas made from propane; synthetic natural gas (SNG), which can be made from petroleum feedstock or liquified natural gas (LNG).

Each one of these alternate gas supplies requires that additional facilities be built in the state. It is extremely important that these facilities be constructed with a minimum of delay. Let me give you a few examples of the delays that are being encountered both on a Federal and a State level.

Some of the New Jersey companies have created exploration affiliates and are searching for gas in the Southwest with the intent of having the interstate gas pipelines deliver this gas to New Jersey. My own company requested in July, 1972, that the Federal Power Commission approve the transportation by Transcontinental Gas Pipeline Company of the gas that we have discovered. We had hoped that this badly needed supply of gas would have been available to our customers this winter. However, the Federal Power Commission has not acted on this request as yet, and in fact, has now set this matter for hearing in February 1973. Obviously, this supply of gas has been lost for this winter. President Ozzard has intervened on behalf of the State of New Jersey before the Federal Power Commission in this matter.

In addition to delays of this type on the National level, there are many examples of delays by State or municipal bodies that affect the gas supply in the state. One specific case is the attempt by Transcontinental Gas Pipeline to build a second LNG storage facility in the Hackensack meadows. They were prohibited from building this second tank by the Hackensack Meadowland Commission which has jurisdiction over that area. Approval was finally given in the courts for Transcontinental to continue construction of this much needed facility which will be available for the winter of 1974-1975, rather than the original planned date of the winter of 1971-1972.

There are other examples of attempts by our gas companies to build SNG, LNG, and LPG plants which have been finally started after much delay and obtaining many approvals.

I do not believe the natural gas distribution companies in New Jersey object at all to obtaining approvals, meeting with the Department of Labor and Industry and other agencies that are concerned, but the crisis usually evolves when there are ill defined, or indeed changing goals, which have to be met during the construction of the

facility. We need assistance in the establishment of definite guide lines in order to minimize delays necessary before construction can begin. In other words, we ask for your assistance in establishing a timetable for the multitude of approvals that are required in order that we may bring these badly needed sources of gas on stream quickly and thereby alleviate the critical shortage of heating fuel to the Citizens of New Jersey.

A delay of only six months in receiving approval of a permit to construct or operate can result in not having a facility in service during a severe winter period. The gas companies of New Jersey are in serious trouble and face the prospect of even more stringent sales restrictions in the future if we can not proceed with the supplemental gas supply plans that are now on the drawing boards. For example, it is imperative that we receive the necessary approvals of the contracted LNG from Algeria which is part of the EASCO plan formed by Public Service to import gas. In addition, the SNG facilities which are being planned throughout the state have to be completed on the planned schedule dates or else our large, new industrial customers will suffer even more in the future. Without new supplies of gas and with increasing curtailment levels, service to existing customers is placed in jeopardy.

The Federal Power Commission recently published in the Federal Registers of 1/15 and 1/22/73, proposed rule-making dockets concerning end use of natural gas throughout the United States.

As it appears now, any additional firm gas sales would be restricted to residential customers rather than sold for industrial uses. This could have a great effect on industrial growth in the State of New Jersey, which in the long run, has an impact on all the residents and taxpayers of the State. It is this kind of understanding of the overall gas supply situation that should require this committee and the State to help us in New Jersey in solving this gas energy crisis.

In summary, there exists today a critical gas shortage in the State of New Jersey. The major means of supplementing the gas supply require the construction of gas facilities within the State. I again state that any additional delay in obtaining the required approvals necessary for the construction and operation of the facilities will increase the severity of the gas energy crisis.

Before I close, I would like to mention the member companies of the New Jersey Gas Association. They are:

Elizabethtown Gas Company
New Jersey Natural Gas Company
Public Service Electric & Gas Company
South Jersey Gas Company

I am sure there are representatives of each of these companies in the room who would be willing to answer specific questions if I cannot.

Thank you for the opportunity of reviewing with you the gas supply situation in the State.

SENATOR MERLINO: Thank you, Mr. Kassak.

Do you know how much of the gas in New Jersey is being used to fire power plants?

MR. KASSAK: I can only say specifically for my own company, we are not during the winter period selling gas for power plant electricity. Maybe a representative from Public Service, which is where it would probably be sold.

SENATOR MERLINO: When you say "during the winter", how much of your business, your sale of gas from Elizabethtown Gas is used in power generating plants?

MR. KASSAK: Well, with the exception of about 120 days a year, when we curtail sales to the power plants, it represents 25 to 30 percent of our total sales, daily sales.

SENATOR MERLINO: That's now.

MR. KASSAK: Yes.

SENATOR MERLINO: How much of an increase is that over what you were selling them five years ago or ten years ago?

MR. KASSAK: Well, in our case we did not enter into these contracts until about 1965. We're selling gas during the summer when we have the gas available.

SENATOR MERLINO: What did you do in the summer before you went into the contracts to sell it to the power generating stations?

MR. KASSAK: We just paid for it and didn't use it.

SENATOR MERLINO: Which means that you had an adequate supply for your industrial and home users in the wintertime.

MR. KASSAK: Well, see it doesn't affect the winter sale because we buy a certain maximum every day through the year. Whether you use it in the summertime or not, you still have to pay for it.

SENATOR MERLINO: If you didn't supply the power generating companies with 25% of your sales in gas, would there be any shortage for the home user today?

MR. KASSAK: It would be the same situation because the only time we have this shortage is during the winter and it's created mainly by the heating load. And we don't sell any of that gas to the power companies at that time so it wouldn't affect the situation at all.

SENATOR MERLINO: So, in other words, if you had more storage facilities, you could remedy the situation.

MR. KASSAK: Yes, it would help a great deal.

SENATOR MERLINO: And you mentioned several occasions - for instance, the Hackensack Meadow, that was a storage tank.

MR. KASSAK: Yes, that's storage.

SENATOR MERLINO: And has it been generally the experience of your company to run into delays like this in constructing storage facilities?

MR. KASSAK: Yes, in any kind of production facility which would also be similar to a storage and we would generally only use it in the wintertime.

SENATOR MERLINO: Well as to production against storage, there is a difference.

MR. KASSAK: It's different in this respect, the production is generally made out of hydrocarbon feed stock which we would store for winter use and then make the substitute natural gas out of it, in case of our own company. There are some synthetic natural gas plants that are being planned for the State which would operate on a 300 day a year basis or 365 day a year basis, but that has nothing in case with the production facilities that we're now using. We're using them as a storage facility really.

SENATOR MERLINO: Is Elizabethtown Gas in the process of building a synthetic plant?

MR. KASSAK: Well, we're contracted for part of one that Public Service is putting up in Linden, and we have been discussing other projects that are being planned in the State. We've just completed, last year, a liquified natural gas storage facility in Elizabeth which has helped us a great deal.

SENATOR MERLINO: Thank you.

SENATOR PARKER: On the synthetic gas, what do you make that from?

MR. KASSAK: The plans right now, on the ones I've seen so far they'd be making it out of naphtha.

SENATOR PARKER: Do you make it out of coal?

MR. KASSAK: Well, there are some projects under way, research projects on coal gasification. I visited one in Chicago about a year ago that was built by the American Gas Association and the Bureau of Mines and one other government agency that supported this thing. It's the only pilot plant in the United States making gas out of coal. But it's a very small pilot plant. I understand they are to break ground on another research project that the Bureau of Mines is supporting in the Pittsburgh area this week. But the coal gasification, even though it's on the horizon, is a fair ways off, from all I can see, 1980 or 1985. And, unfortunately, I'm not an expert on the coal fields but I think the best coal fields for making gas are way out in Idaho or somewhere else, not in the Pennsylvania area.

SENATOR PARKER: Just one thing further. I understand your statement to indicate that you have purchased your own wells out of State and can produce enough gas but you just can't transport it here.

MR. KASSAK: That's right.

SENATOR PARKER: I assume this probably is the same problem with the others, this is why we don't have

natural gas; it's not the supply in the ground that's creating the shortage, it's bringing it up and out and transporting it.

MR. KASSAK: That's right, getting people to dig for it. From all the statistics I've seen, there is quite a bit of gas there. We sure would rather buy domestic gas than spending our money in Algeria and bring it over here. The number of gas wells drilled in the United States has dropped from 1956 to now probably about 40%.

SENATOR PARKER: Who owns the pipelines? I know there are conglomerates and owned by others, are they owned by the oil industry basically?

MR. KASSAK: I really don't know how they're set up. I didn't think so. We've drilled our 70th well, last week, so we have a fair stock down there.

SENATOR PARKER: That's just Elizabethtown itself, that's not the New Jersey Association.

MR. KASSAK: Just Elizabethtown.

SENATOR PARKER: Any other Jersey companies down there?

MR. KASSAK: Public Service is, I know. I'm not sure of the other two.

SENATOR DODD: Mr. Kassak, natural gas we understand is to be found off our Atlantic Coast in New Jersey in great abundance?

MR. KASSAK: From everything I've read so far, and I have attended seminars on this subject, I'm sure there is. They found some already off Nova Scotia, two fairly good substantial drills.

SENATOR DODD: As opposed to underwater drilling for oil, what would be, in your knowledge - I don't know whether you're versed in it - the ecological impact of drilling for natural gas as opposed to oil offshore?

MR. KASSAK: There would be no pollution from natural gas. It's nontoxic, it's nonpolluting. You just don't want to light a great amount of it.

SENATOR PARKER: Even if it catches on fire, it just burns.

MR. KASSAK: That's right, it just burns.

SENATOR PARKER: Just one thing further. Can you give us any figures on say profits and your total part of the gross national product, if you want to call it that, as opposed to the oil industry? Are you real little compared to the oil industry? Are you about even with them?

MR. KASSAK: The natural gas industry as a whole is the fifth largest in the United States. Aside from that I have no comparison.

SENATOR PARKER: You don't know what the oil industry is.

MR. KASSAK: No.

SENATOR PARKER: But you're basically competing with natural gas against the oil.

MR. KASSAK: Against the oil. Except most of the producing wells are probably owned by the oil companies and they sell the gas to us.

SENATOR PARKER: What's the price on gas? Is it a lot cheaper than oil basically?

MR. KASSAK: Yes. Also the builders would prefer to put it in. It's a lot easier for them.

SENATOR PARKER: But basically what you're saying is that it's more profitable for the oil industry to push oil than it is gas.

MR. KASSAK: That's right. There is more profit on it at the well head. From what I understand, it's like two to one.

SENATOR MERLINO: Thank you, Mr. Kassak.
The New Jersey Petroleum Council.

W I L S O N M. L A I R D:

I am pleased at the opportunity to appear here today. Prior to joining the American Petroleum Institute, I served as Director of the Office of Oil and Gas in the Department of the Interior. Before that, I was State Geologist for North Dakota for nearly 28 years. I also wore the hats of Supervisor of Oil and Gas and head of the Department of Geology at the University of North Dakota.

The energy supply problem facing the United States is not as new as many may believe. Over most of the past decade, we have been depleting the nation's proved petroleum reserves faster than new reserves can be found and produced. These earlier signs of more serious trouble ahead were recognized only by people in the petroleum industry and a few government officials. More recently, beginning about two years ago, communities across the country began to experience shortages of natural gas. Some had their supplies restricted, and many potential users -- including new home buyers -- found their local gas distributing company unable to take them on as new customers.

Today, as we all know, the natural gas supply situation is even more widespread and recognized. Newspaper, magazine and radio/television stories on the energy situation are everyday news items. In many parts of the country -- particularly this winter -- it has been the lead story on many front pages.

It is therefore a timely subject for serious concern and thoughtful consideration. You are to be commended for taking on the heavy task of seeking to solve the problem in your state.

The task will not be easy nor simple. And the problem will not be solved for New Jersey unless it is solved also for the entire nation. It is the domino theory played out across a map of the United States. Topple a domino placed on the New Jersey portion of the map, and it will sooner or later tip over dominoes set up on the map areas of Louisiana, Illinois and Colorado. And the reverse is also true.

This theory applies equally to the various energy fuels. Shortages or restrictions on the use of one energy source puts a greater strain on other energy sources. And weather conditions are the impetus that begins to topple the various domino pieces.

The fuel shortage that began in the Midwest in December, and spread to other parts of the country soon afterward, offers a perfect illustration.

The first fuel to be affected was natural gas -- already in short supply throughout the country. The wet autumn and unusually low, early-winter temperatures created an extra demand. Gas companies were forced to cut off supplies to many heavy users -- such as electric power plants, factories and schools. In the Detroit area alone, last month, more than 250 large industrial firms had to switch from natural gas to fuel oil. This was done under provisions of "interruptible" contracts, which permit cutoffs to insure sufficient natural gas supplies for priority users -- such as homes and hospitals.

In past years, these unusual weather conditions would have caused much less of a problem because many heavy users formerly burned coal. But environmental protection regulations in many areas now prevent these heavy users from doing this.

It had been expected that nuclear power plants would be in operation by now, ready to assume some of the energy load. But, here too, in many instances, environmental restrictions have held up plant completions.

As a result, the main burden has been placed on fuel oil -- to continue to meet the needs of regular customers, and to meet the needs of many natural gas customers -- and to meet these needs on a crash basis.

General George A. Lincoln, as Director of the Office of Emergency Preparedness, recently put this situation into clearest perspective:

"Many of the localized fuel shortages have been the direct result of the interruption of natural gas supplies to interruptible customers. Representatives of the Government and of the gas industry have issued repeated warnings to such customers alerting them to the likelihood of the interruption of supplies. However, such persons have in many cases neither built storage nor acquired alternate fuels to meet the day of interruption. The supply of alternate fuels to such interrupted gas customers has resulted in the use of fuel supplies that would otherwise be available to regular fuel dealers and consumers."

As you can see, many factors interact to bring about such an energy supply problem. All of these factors must be considered, together, if reasonable and long-term solutions are to be found and implemented.

That is why the petroleum industry has been urging, for several years, the development of comprehensive and coordinated policies embracing all forms of energy to insure that the vital and growing energy needs of this nation are met.

The industry believes strongly and sincerely that the present drift cannot continue. The nation's potential for energy resources is great, but the national purpose to find and develop these resources has been lacking.

Here in the United States, we may still have, in the ground, as much as 2-3 times the amount of all the petroleum we have produced in our nation's history. Much of that oil and gas is thought to lie in such remote areas as the North Slope of Alaska and the U.S. Continental Shelf.

We in this country are thus not running out of oil and gas potential. At current rates of consumption, potential petroleum reserves would be sufficient to meet our energy needs well into the 21st Century.

By that time, scientists and other experts say non-conventional energy sources -- geothermal power, solar energy, and others -- could be ready to assume a large share of our nation's future energy needs. Greater research and development of alternative energy sources should thus be encouraged.

While the long-range energy potential is promising, the short-term problems are pressing. And nowhere is this more evident than in the case of petroleum.

Exploratory drilling in the search for new oil and gas fields has not kept pace -- and, in some instances, has not been permitted to keep pace -- with increased consumption. The number of exploratory petroleum wells drilled in 1971 was down more than 50 per cent compared to the peak year of 1956. As a result, over the past decade, domestic crude oil reserves in the 48 contiguous states have dropped from nearly 13 times yearly production to less than nine times annual production, and natural gas reserves have declined from 20 times yearly production to less than 12 times annual production.

A number of factors -- political, economic and environmental in nature -- have helped bring about this growing shortage of available domestic supplies of oil and gas.

Politically, continued federal control of natural gas producers, dating from 1954, has largely brought about a shortage of this clean-burning and convenient fuel.

Economically, the increased taxes imposed on the petroleum industry through the 1969 Federal Tax Reform Act -- a step that added more than \$500 million annually to the industry's tax burden -- have discouraged investment in high-risk petroleum exploratory ventures.

Environmentally, the continuing controversy over the construction of the trans-Alaska pipeline has prevented the movement of some 10 billion barrels of crude oil and some 26 trillion cubic feet of natural gas -- discoveries made exactly five years ago this month -- to consumers in the lower-48 states.

Prohibitions against the siting of refineries and other facilities, and restrictions or bans against drilling in the marine environment are other factors that have impacted on the domestic industry's efforts to meet the growing energy needs of the American public.

Two near-term alternative courses of action have been proposed. Both, however, carry with them risks and limitations.

The first is energy conservation -- or the more efficient and careful use of energy. Economies in energy consumption can be achieved in homes, in business and industry, in agriculture, in transportation, and in government. Such things as improved insulation in homes and office buildings; more efficient air conditioning systems; better transportation patterns and more efficient motor vehicles would reduce energy demand to some extent. Programs to awaken public awareness of potential supply constraints and to encourage more efficient use of energy in their daily lives could result in substantial energy conservation. The petroleum industry is seeking to reach the public with these messages.

Energy conservation, while important, cannot however solve the energy problem. We must be careful not to mislead the American people into believing so. We will need much more energy to maintain our growing population's way of life, and to permit those segments of our population who have not yet achieved a decent and equitable standard of living to do so. Our nation will also require increased energy to achieve an improved physical environment, more satisfying working conditions, better schools, hospitals, housing and public transportation.

The second proposed alternative course of action -- the one advanced, most often, here along the East Coast -- is to permit unlimited imports of oil.

Let me say first of all: imports of oil and natural gas will have to increase regardless of actions taken to expand explor-

ation for new domestic reserves. We will have to turn increasingly to foreign oil and gas because of the long lead-time -- anywhere from three to ten years -- between discovery and full production of new oil fields, and because of the continuing increase in energy requirements.

Currently, the United States is importing some 28 per cent of its oil and four per cent of its natural gas. If present economic and political conditions continue, we could, within the next decade, become dependent on foreign sources for more than 50 per cent of our oil needs -- a much enlarged need compared to the nearly 16 million barrels of oil consumed daily in the United States today.

Along the East Coast, imported oil accounted for an even higher percentage in 1972: nearly 48 per cent of all the oil, and nearly 95 per cent of residual fuel oil.

Most of the imported oil, over the years, has come from Western Hemisphere nations, particularly Canada and Venezuela. But the needs of these two countries are growing; and reports indicate that their proved reserves are declining.

Of necessity, then, the United States will become increasingly dependent on Eastern Hemisphere sources. This trend is already clearly discernible. For the first ten months of 1972, the U.S. Bureau of Mines reports, crude oil imports from the Middle East and Africa accounted for 40 per cent of total U.S. crude oil imports. Western Hemisphere sources accounted for 48 per cent -- down from 64 per cent a year earlier.

This trend means that the U.S. could become almost entirely dependent on imported oil from a highly concentrated, rather than a geographically dispersed, group of nations. Dependence on a small number of distant foreign countries for a vital portion of our energy supplies will be a new fact of life in the economic and political history of our nation.

We should recognize that over-reliance on foreign oil -- especially from politically turbulent areas of the world -- could pose a real threat to the nation's economic, political and consumer security. For example:

- o Eleven times since the end of World War II there have been disruptions in the flow of crude oil from the Middle East and North Africa.

- o The Organization of Petroleum Exporting Countries, formed a number of years ago and dominated by Middle East nations, is growing stronger and larger. They have already succeeded in obtaining substantial cost increases for their oil.

o We will be competing for this Eastern Hemisphere oil with Japan and the countries of Western Europe who are already heavily dependent upon the Middle East for their oil requirements.

o Finally, our growing requirements for oil and gas imports will probably bring about a large and growing deficit in the United States balance of trade and payments.

The rise in this nation's balance of trade and payments deficits; the recent increase in the cost of foreign oil; and the much-higher projected cost of imported liquefied natural gas are largely ignored by critics of the oil import control system. Instead, they continue to cite four-year old (and subsequently discredited) statistics on the cost to consumers of limiting oil imports.

All of which brings me back to what the petroleum industry and many governmental officials see as the one clear and best solution to our mid-term petroleum supply problem. That solution is to expand the search for domestic oil and gas reserves, both on land -- including such remote areas as the North Slope of Alaska -- and on our Outer Continental Shelf.

The U.S. Geological Survey estimates that there are between 160 and 190 billion barrels of crude oil and between 820 and 1,100 trillion cubic feet of natural gas still to be found under our nation's continental margin and recoverable under present technology and economics.

Some of the nation's continental shelf areas have already been explored. Particularly in the Gulf of Mexico, they are producing sizeable volumes of oil and gas -- and have been for more than 25 years. In fact, we currently get 18 per cent of our domestic crude oil and 17 per cent of our domestic natural gas from marine wells. Every day, than, large quantities of petroleum are being produced safely from marine wells.

Two areas of the U.S. Continental Shelf hold promise for sizeable volumes of oil and gas. They are the northeast Gulf of Mexico and the Atlantic Ocean. Scientific analysis indicates that the northeast Gulf area may contain as much as 16 billion barrels of recoverable crude oil and 39 trillion cubic feet of recoverable natural gas.

The Atlantic Continental Shelf offers even greater promise. The U.S. Geological Survey estimates that between 30 and 42 billion barrels of oil, and between 183 and 211 trillion cubic feet of natural gas -- recoverable under current technology and economics -- lie beneath the ocean floor of the Atlantic.

Three areas of the Atlantic Ocean have been identified, by geologists and geophysicists, as offering the best potential. The first is Georges Bank, geographically adjacent to New England and extending up into Canada. Exploration is already taking place in the Canadian portion of the Georges Banks area. Three wells (predominantly gas and condensate) have been completed and await construction of facilities to get these products to consumers. The second is the Southeast Georgia Embayment (including the Blake Plateau Trough), lying adjacent to the southernmost coastal states. The third is the Baltimore Canyon Trough.

No exploratory wells have been drilled on the Atlantic Continental Shelf adjacent to the United States, and, of course, no part of this large sea area has been opened up for leasing. However, interpretation of the geology of this area indicates that it contains sediments similar to and of the same geologic age as those in the Gulf of Mexico adjacent to Louisiana and Texas, where -- as I mentioned earlier -- large volumes of oil and gas have been discovered and produced.

More specifically, geological interpretations for the continental shelf adjacent to Cape May, New Jersey, indicate from 10,000 to 15,000 feet of sediment conducive to the accumulation of oil and gas.

The Baltimore Canyon Trough area seems to offer one of the most -- if not the most -- attractive opportunities to drill in an area potentially productive of oil and gas. Geophysical data suggest that, generally, sediments along the Baltimore Canyon area thicken seaward. Initial activities -- once approval were received to begin drilling -- could be expected to be concentrated in the most attractive parts -- located from 15 to more than 50 miles from land -- far out of sight and hearing from anyone standing on the shore.

Scientific experimentation, while valuable and encouraging, cannot guarantee that oil or gas will be found. Only actual drilling can confirm or deny the existence of petroleum in commercially acceptable amounts. And even before any actual drilling for oil and gas were conducted, a lease sale would have to be held, following acceptance of environmental impact statements prepared by the U.S. Department of the Interior, and public hearings.

The petroleum industry is convinced that the continental shelf off the Atlantic Coast offers a real possibility for helping to meet substantial consumer petroleum requirements in the future. The industry is equally convinced that any oil and gas discovered and developed from this area would be produced with virtually no environmental disturbance and certainly no permanent ecological damage.

The industry is also convinced, based upon its long experience in the Gulf of Mexico, that the petroleum and fishing industries can coexist harmoniously; and that tourist and recreational activities would not be adversely affected.

Marine drilling is, of course, not the only solution to the nation's petroleum energy shortfall. The East Coast, especially, is "energy deficient"; it consumes much more petroleum energy than it produces. It is also short of sufficient refinery capacity. And it has no ports capable of handling the very large tankers that are being constructed in some parts of the world to carry -- more economically and safely -- the crude oil from the producing to the consuming nations of the world.

These are just a few of the factors that require the development by government of comprehensive and coordinated energy policies. Policies that will strike a reasonable and rational balance between the ever-growing needs of American consumers for adequate and secure supplies of petroleum energy, and the highly laudable desires of the American public for a more wholesome physical environment.

Before concluding my talk, I would like to summarize the following three charts:

UNITED STATES ENERGY DEMAND

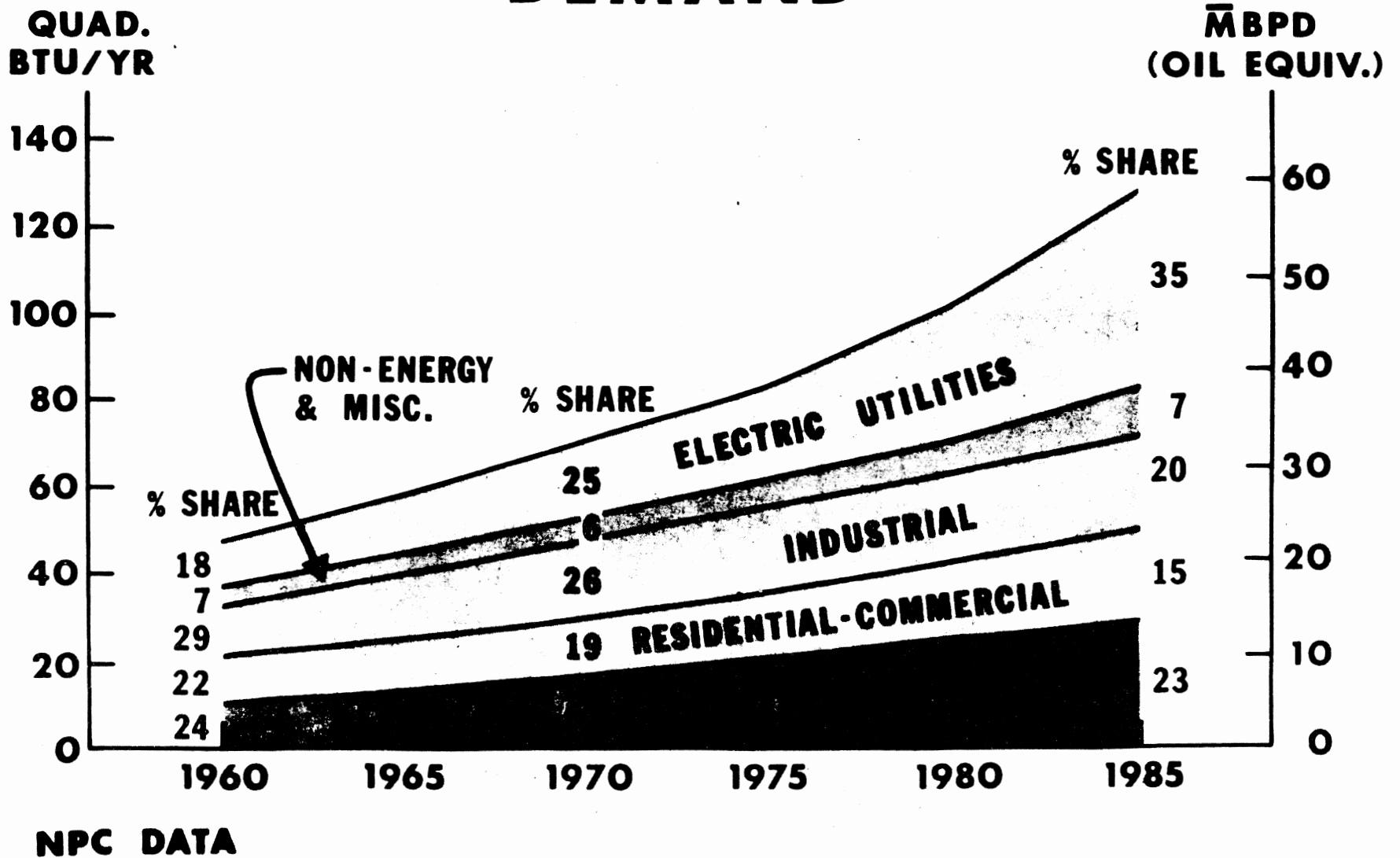


Chart #1

CHART #1 - United States Energy Demand

Energy and growth go hand and hand. The attainment of our high standard of living has been assisted by adequate supplies of relatively cheap energy.

The first chart shows recent history and anticipated future of U. S. energy demand. Energy demand is expressed in terms of quadrillion of British thermal units per year on the left-hand scale. The right side is done in terms of millions of barrels per day of oil equivalent.

On the top line we can see the growth of total energy demand. Below that we have indicated the combined demands from the five primary energy consuming sectors, Transportation, Residential-Commercial, Non-energy and Miscellaneous and Electric Utilities.

Total energy demand is expected to grow to 125 quadrillion British thermal units or the energy equivalent of 59 million barrels of oil per day.

Transportation is projected to maintain its share at 23 to 24 percent. It is expected that this sector of the demand picture will be almost entirely supplied by petroleum fuels.

Residential-Commercial is the sector originating primarily from heating, cooling, cooking, and water heating. Energy requirements for this sector are expected to increase at slightly less than historic rates and account for 15 per cent of total energy demand by 1985.

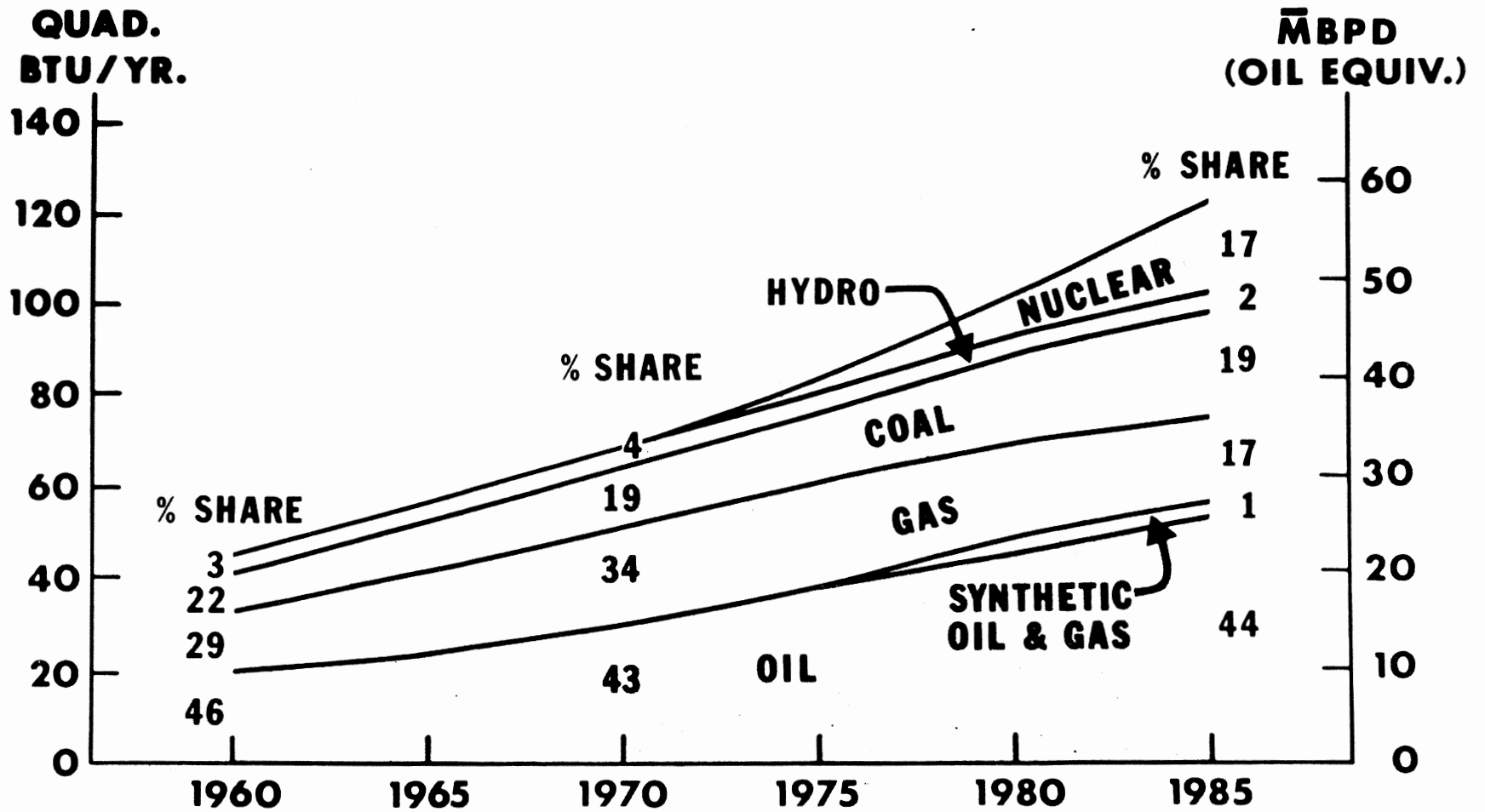
Industrial demand is expected to have the lowest growth rate over the forecast period. The gauge for this sector is manufacturing and mining operations. Natural gas is currently the dominant industrial fuel, but due to supply limitations, is expected to be overtaken by oil in the mid-1970's.

Non-energy and Miscellaneous demand is projected to maintain its share of the total energy demand. Non-energy uses include lubricants, asphalts, petrochemicals, and other raw materials.

Top ranking in future growth aspects will be electric utilities. It will account for over 35 percent of total energy demand in 1985. The projected annual growth rate is 6.7 percent per year. This large sector which depends on other fuels for electricity generation also accounts for the large losses in conversion and transmission. It is an area where technological advances could save large amounts of energy.

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UNITED STATES ENERGY SUPPLY



NPC DATA

Chart #2

CHART #2 - United States Energy Supply

This chart indicates the anticipated contributions of the various types of energy to our total U. S. energy needs which were illustrated on the previous chart. The scales remain unchanged, with quadrillion British thermal units per year on the left, and millions of barrels of oil per day equivalent on the right.

Beginning at the top of the chart, nuclear energy is expected to experience rapid growth and supply 17 percent share of total energy by 1985. This 1985 share is the energy equivalent of 3.7 billion barrels per year or nearly 900 million tons per year of coal. This estimate assumes resolution of nuclear's environmental and siting difficulties.

Hydropower growth is limited by the availability of economic dam sites. While hydro will experience some modest absolute growth mostly in the Far West, its share of total energy is expected to decline from 4 percent in 1970 to 2 percent in 1985.

Coal's rate of demand growth over the next 15 years is expected to be equal to that of total energy, maintaining its 19 percent share. For this to occur in the face of increasingly stringent air quality control, the forecast assumes that commercially applicable flue gas desulfurization technology will begin to be available for new plants by 1975, and that increasing use will be made of low-sulfur Western coal.

Control policies combined with apparent limitation of the sources of natural gas will reduce growth over the next 15 years. As a consequence, the participation of gas is expected to slip from 34 percent to 17 percent of total energy fuel supply by 1985.

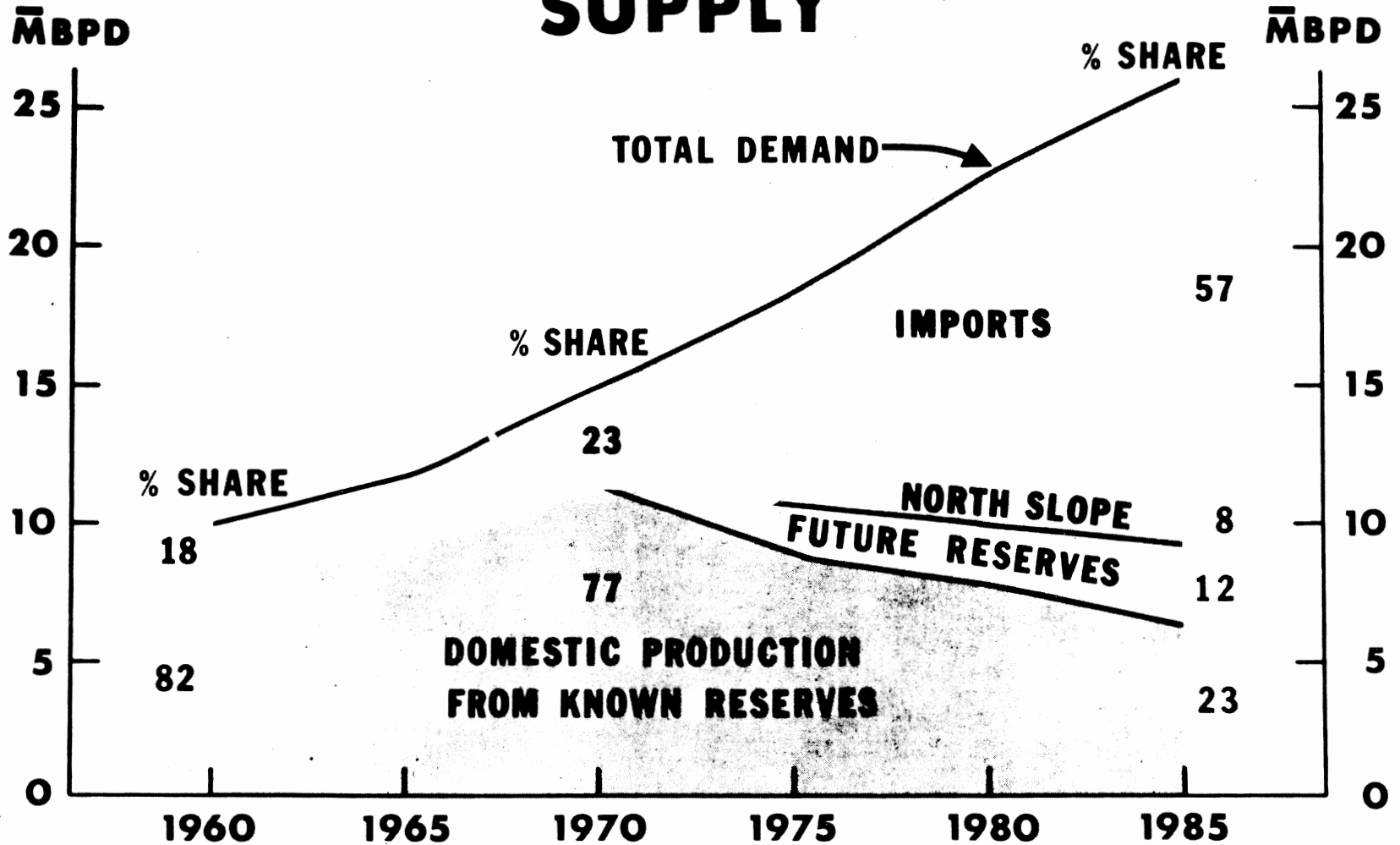
Oil is expected essentially to maintain its share of total energy supply over the forecast period. Just as total energy demand nearly doubles over the next 15 years, liquid petroleum demand is expected to increase from nearly 15 million barrels per day in 1970 to 26 million barrels per day by 1985.

Synthetics from oil shale and coal are expected to begin to contribute to the energy supply by the late 1970's.

Because petroleum is the most flexible energy source from the standpoint of supply availability, transportation, and utilization, any failure of other energy sources to achieve their projected growth will be reflected in increased demand for oil. Sources of energy other than oil are expected to supply about 36 percent of the incremental energy demand growth between 1970 and 1975. Oil is consequently called on to supply the remaining 64 percent. Toward the end of the forecast period, demand pressure on petroleum should ease somewhat as the increment in energy demand from 1980 to 1985 is supplied 68 percent by other sources and 32 percent by oil.

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U.S. LIQUID PETROLEUM SUPPLY



NPC DATA

Chart #3

CHART #3 - U. S. Liquid Petroleum Supply

Earlier discussion has emphasized the role of petroleum in balancing total energy supply and demand. The top line on this slide represents total U. S. liquid petroleum demand in millions of barrels per day. Demand is shown nearly to double from about 15 million barrels per day in 1970 to an estimated 26 million barrels per day in 1985.

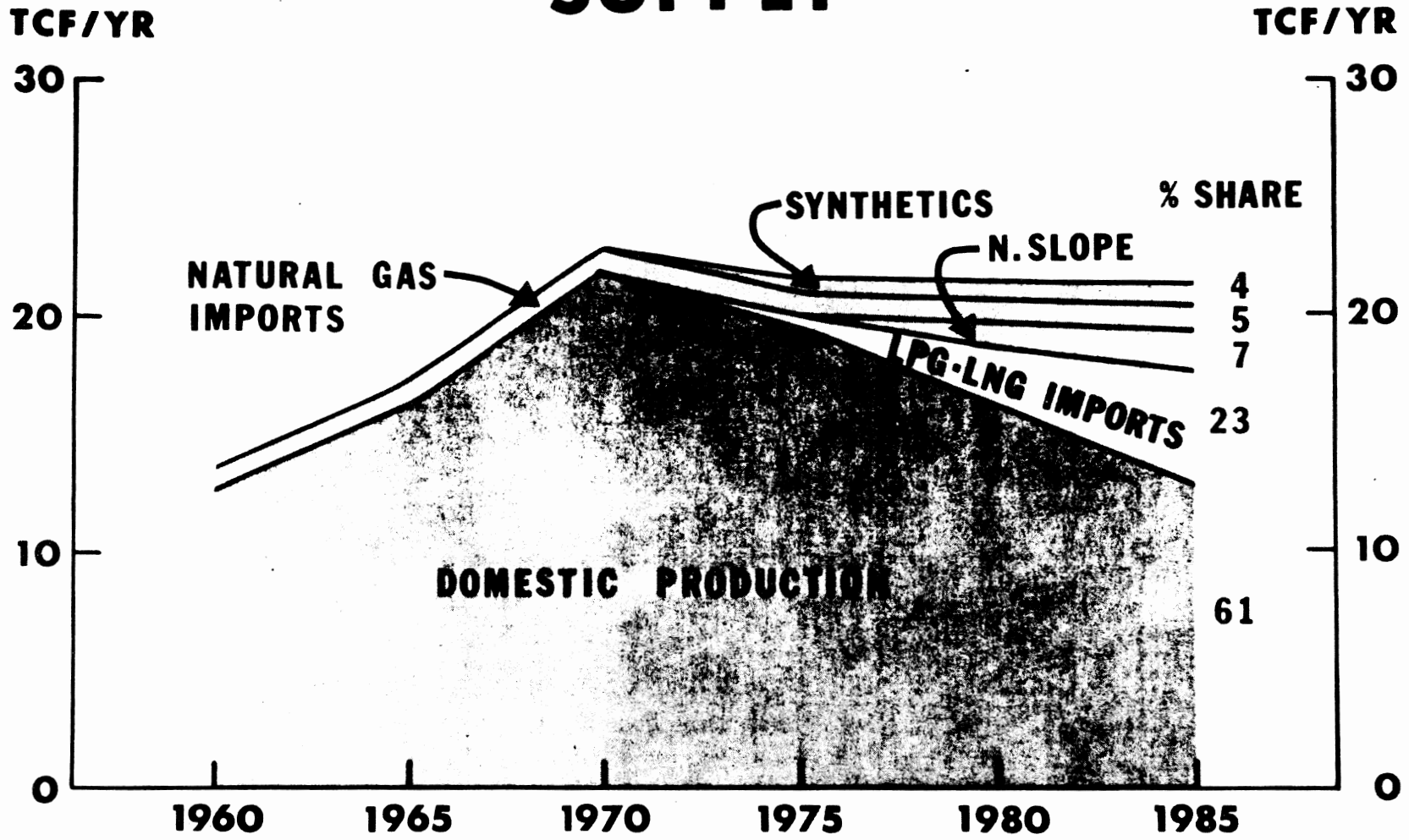
Domestic liquid petroleum production was projected to peak in 1972 at nearly 11.5 million barrels per day and then slowly decline to 9.1 million barrels per day by 1985; however, the peak may have been reached sooner than anticipated. Production from known domestic reserves is anticipated to decline from 77 percent of total required supply in 1970 to 23 percent by 1985, or 31% if North Slope oil is included. Production from future reserves is forecast to account for about 12 percent of total required supply by 1985.

At the end of 1970, U. S. oil reserves were estimated at 39 billion barrels. However, 10 billion barrels of these reserves are located on the Alaskan North Slope and are currently unavailable because of the lack of facilities to transport the oil to market. From 1971 to 1985, additions to reserves are expected to total nearly 42 billion barrels, an amount of oil equal to about 1/3 of the total petroleum found in the United States in the last 100 years.

By 1985, total domestic petroleum production is expected to satisfy about 43 percent of the U. S. petroleum demand. Consequently, the U. S. is expected to rely on foreign sources for 57 percent of its petroleum requirements in 1985, or 15 million barrels per day. Virtually all of the growth in U. S. oil imports will come from Middle Eastern and North African countries where the bulk of the free world reserves are located. The security of these Eastern Hemisphere sources is questionable. Supplies from these areas have been disrupted a number of times in recent years for military, political, and economic reasons.

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UNITED STATES GAS SUPPLY



NPC DATA

Chart #4

CHART #4 - United States Gas Supply

This chart shows the expected supply of natural gas from all available sources in trillions of cubic feet per year.

The outlook for natural gas is supply-limited throughout the next 15 years. In recent years, demand for natural gas has grown at an average yearly rate of about 6 percent. In the absence of strong incentives, it appears unlikely that continued growth in domestic demand for gas can be met, and other energy resources will be called on to fill the gap.

Gas supply is expected to remain essentially constant through 1985. The 1985 U. S. gas supply from all sources is estimated to be 21-1/2 trillion cubic feet, down slightly from the 1970 level of nearly 23 trillion cubic feet.

Domestic production from U. S. reserves is expected to decline from nearly 22 trillion cubic feet per year in 1970 to 14.5 trillion by 1985. Gas production from Prudhoe Bay on the North Slope of Alaska is expected to supply 1-1/2 trillion of the 1985 total.

It is estimated that in the lower 48 states that 141 trillion cubic feet of gas will need to be found during the next 15 years. This would represent about 22 percent of the total gas that has been found in the U. S. to date.

LNG and LPG imports reach 5 trillion cubic feet by 1985 or 23 percent of the total gas supply.

Natural gas imports hold a fairly constant level of around a trillion cubic feet throughout the entire period.

Synthetic gas volumes from coal and from reforming naphtha are estimated at 1 trillion cubic feet or 4 percent of the 1985 supply.

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That concludes my presentation, Mr. Chairman. I will be glad to answer, at this time, any questions you may wish to ask me; and to assist you, at any time in the future, in your efforts to develop proposals to resolve the energy problems facing the people of the State of New Jersey.

Thank you.

SEN. MERLINO: Dr. Laird, concerning the domestic reserve - I guess we would include all of North America in that - how far away are we from the Alaskan North Slope of getting that crude oil to market?

DR. LAIRD: Senator, I can't answer that question because I can't tell what the courts are going to do on the environmental suits which are in there now against the Government. As far as the construction of the pipeline is concerned, the physical part of the problem, it probably could be done in between two and three years.

SENATOR MERLINO: Was that anticipated construction of refineries in the Alaska area or is that going to be piped all the way down to the existing refineries in this country?

DR. LAIRD: The present plan of the Alaska pipeline is to pipe this oil to the Port of Valdez on the south coast of Alaska, from which it will be transported largely to the western United States.

SENATOR MERLINO: For refining there.

DR. LAIRD: Yes, sir. In the Los Angeles and Seattle areas, and San Francisco.

SENATOR MERLINO: Now, you've mentioned the potential reserves being in this particular area and in the Gulf and the Continental Shelf area. Are there any known reserves in the northern Canadian area?

DR. LAIRD: There are reserves there. They have not been evaluated yet. More gas has been found up there than oil, but they have had some substantial

oil finds; at least they've had a few wells which have indicated substantial reserves. They have not been evaluated as to the amount yet because there are only one or two wells - well, maybe three or four - that have gone down in there, not all in the same place. It differs from the North Slope in that there have been between 40 and 50 wells completed there and, because they have more information, they are in a better position to evaluate the reservoir.

SENATOR MERLINO: Well, is there any reason why the industry doesn't explore the Canadian fields more than they have?

DR. LAIRD: They are doing this very extensively in the Arctic Islands. But you realize that this is a very expensive area in which to operate and one which has considerable physical problems associated with it.

SENATOR MERLINO: Well, when it comes to the question of possible national security, wouldn't it be more feasible to expend the energies and the money there than to become dependent upon foreign oil fields?

DR. LAIRD: Well, sir, there is another problem, which I didn't mention, in connection with that, and that is that they are a very, very long way away through very difficult terrain. And this terrain is very similar to that that they have been arguing about in Alaska, plus another factor, these reserves have been found on some of these islands and so you have sea crossings where you have a great deal of pack ice.

SENATOR MERLINO: Well that shouldn't be too difficult to overcome, should it?

DR. LAIRD: Well, sir, I have been on the North Slope of Alaska and have observed the route of the Alaska pipeline and I think it can be done. But there are certain others in the country who seem to have some reservations about this.

SENATOR MERLINO: I don't mean to be facetious about this but it's becoming a rather hackneyed phrase that we who can send men to the moon and leave our derelict automobiles up there and come back again safely really shouldn't find anything like an ice pack or an ice field so insurmountable. Or is it just a question of economics here with private industry as compared with the vast resources of the Federal Government?

DR. LAIRD: That's correct.

SENATOR MERLINO: You also mentioned that under the 1969 Tax Act that it is now costing, you said, some five or six hundred million dollars a year more than it had up to that point. Do you find that that is a condition which now perhaps stops the industry from going ahead with any difficult explorations or developments?

DR. LAIRD: Well, sir, let me answer that question by saying that exploratory drilling for a wildcat venture - that is where there is no production - is an extremely expensive operation.

SENATOR MERLINO: But the giants in the industry don't really go in for wildcat speculation, do they?

DR. LAIRD: Oh, yes they do, sir. Yes, they do indeed. They do it either directly or indirectly, acting in a sense of supporting smaller groups that do it. And as far as the operations in the more hostile areas, such as I mentioned the North Slope of Alaska and off the coast, primarily these are practically all large companies.

SENATOR MERLINO: But there would be no hesitation for the larger companies - in fact, they're champing at the bit to go out and drill off the Atlantic Coast, aren't they?

DR. LAIRD: That's correct.

SENATOR MERLINO: There is no hesitation. They're willing to just go out there and take a wildcat shot.

DR. LAIRD: Yes, sir.

SENATOR MERLINO: Would it be more than just a wildcat shot?

DR. LAIRD: No, sir. That is exactly what it is. It's a wildcat shot. There is no proven production when you get south of Sable Island which is off of Nova Scotia on the Atlantic Coast.

SENATOR MERLINO: Then the field which is now being developed off Nova Scotia, is that a combination of the larger American-based companies?

DR. LAIRD: That's primarily Mobile, and I believe some of the other companies have a piece of this but what percentage they have, I don't know. But in addition to that, Shell Oil Company has drilled some thirty or more tests in that area north of the Sable Island area and they have had some encouraging shows but as yet no production.

SENATOR MERLINO: Isn't it a fact that most of these ventures no longer become a one-company operation, they're generally done in concert with the other companies, aren't they?

DR. LAIRD: A great many of them are, yes, sir.

SENATOR MERLINO: And this is all within the Federal Antitrust Acts, I believe. It would have to be.

DR. LAIRD: Oh, I think there is no problem with Antitrust on that or they never would have done it in the first place.

SENATOR MERLINO: There has been some discussion - in fact most of the discussion that you hear from perhaps other than those who are involved in the industry - that the shortage and the crisis which is now facing us is one which was manufactured rather than one which developed because of natural causes. You, of course, don't agree with that.

DR. LAIRD: I certainly don't.

SENATOR MERLINO: And, of course, the crisis

in the electrical energy industry has also been labeled as one which was brought about by the diversion of the fossil fuels to creating electrical energy than to using it in its other uses such as gasoline and #2 fuel oil for homes as such.

DR. LAIRD: That's correct.

SENATOR MERLINO: So, therefore, if the electrical generating producers would use a different fuel they would create less of a demand on your fossil fuel companies.

DR. LAIRD: Correct, particularly for #2 fuel.

SENATOR MERLINO: We heard - I don't know whether you were here this morning - the suggestion that in the State of Pennsylvania they are now embarking on the possibility of utilizing the coal reserves in this country, at least in Pennsylvania, to fire the energy producing plants rather than using fuel oil. Are you familiar with this proposal?

DR. LARID: Are you talking about direct burning of coal, sir?

SENATOR MERLINO: Direct burning or the conversion of coal into gas - either way, the using of coal.

DR. LAIRD: Let me answer that in two parts. I guess there are companies that are able to go back to the burning of coal provided they can get some leeway on the matter of emission and so forth from the stacks. And, of course, as you well recognize, not so many years ago most of the power plants in the United States were fueled by coal, largely in this area from Pennsylvania. Because of environmental restrictions they had to cease doing this, sulfur restrictions, the particulate emissions, and so on. Now this is not the only place in the United States that has had the same problem. This has been particularly

acute in the middle west where they are burning the coals from the Illinois fields which are much higher in sulfur, proportionately, than those in Pennsylvania. They've had to cease using those coals even though - not entirely but to all intents and purposes -- because of the high sulfur content.

Now I would like to make a point about this sulfur, and that is that you can only process coal in the raw form to a certain degree to get the sulfur out of it. Part of it is entrained chemically when the coal is formed and is impossible to separate mechanically prior to burning. There are other areas where coal is being used in the firing of plants. I refer particularly to my home state of North Dakota where they mine lignite and they have a number of large power generating plants there fueled by lignite directly. There are large complexes of several plants in the Four Corners area of Northeastern Arizona which are burning coal there to supply the needs of the Los Angeles area.

Now in the case of gasification, as has already been pointed out, there are several experimental plants, one of which is in Pennsylvania; one of which is in Illinois, in Chicago at the Illinois Institute of Gas Technology; there's another one which is not in operation yet but it's under construction in Rapid City, South Dakota; and another near Tacoma, Washington. The gasification of coal is nothing new. They used to make manufactured gas, I'm sure, in New Jersey, as they did in my home town of Erie, Pennsylvania, many years ago. But they no longer do that because, in the first place, it wasn't as high a BTU value as natural gas; secondly, it did have other problems incident to it which are of an environmental nature, plus the fact that natural gas then became much more readily available as a desirable clean fuel. Furthermore, the Federal Power Commission

kept the price artificially low, so it encouraged the use of gas.

Now there are plenty of places in the United States where coal gasification can be done and probably will be done in the future. One of them is my own state of North Dakota. Lignite, for example, which is a lower form of coal than bituminous, is readily gasifiable, and it has been done for years. They had a plant at the University of North Dakota doing this as many as 30 years ago. So it's not a new process but there have been new processes which are more efficient, being developed. Frankly, I think coal gasification for the future is something that's going to happen and it's very desirable. But it also has attendant problems which were mentioned this morning by Mr. Mustard, relative to the problem of strip mining, which is another environmental problem. The same thing is true on the development of the oil shales in Northwestern Colorado, Southwestern Wyoming, and Northeastern Utah.

SENATOR MERLINO: Now the question of the emissions from the coal burning. Would it be more economically feasible to research methods to eliminate these emissions than it would be to, let's say, import gas and oil from North Africa and the Middle East?

DR. LAIRD: I think it's a program that should have had first order priority a long time ago, sir. Now there are four or five processes which can do this. When I was Director of the Office of Oil and Gas I had a briefing by Monsanto Chemical and they had an experimental plant at Allentown, Pennsylvania, which isn't so far away. The unfortunate - I don't know whether it's unfortunate or not, depending upon your point of view -- one of the problems with that particular plant was, in addition to cost, it required a considerable amount of geographic area in the first

place, and, in the second place, one of the important byproducts it produced was sulfuric acid. Now there is only a limited market, unfortunately, for sulfuric acid and it's one of the most potent acids, as you know, so you would have a problem of disposal in that particular type of process.

SENATOR MERLINO: Moreso than disposing of the waste products of the atomic plant?

DR. LAIRD: Well, I wouldn't want to say because I'm not that familiar with the problem of atomic waste except that I do recognize the problem.

SENATOR MERLINO: Now, we've had some discussions here, some testimony, concerning the deepwater port, bringing in the foreign oils to this country. Of course, bringing it in in bulk in that way would of necessity, I would hope, reduce the cost of such oil, would it not?

DR. LAIRD: Well, sir, in the first place I don't think there is any solution, certainly not in the ten or fifteen years immediately ahead of us, except bringing in more oil from foreign sources. We simply cannot catch up domestically in that period of time. It should bring in the oil at a cheaper rate. However, remember that in 1970 or '71 - I forget the exact date - an agreement was executed between the producing companies and the OPEC nations, the Organization of Petroleum Exporting Countries, and that had an escalation clause built into it of some 5% a year based on the standard of living. I don't remember the details of it now.

SENATOR MERLINO: Whose standard of living?

DR. LAIRD: Ours, or the consuming countries, not necessarily ours, it would be Western Europe and Japan also. I don't know exactly how this formula was arrived at or exactly what the formula is but it was done on this general basis. So you are going to

have an escalated cost if they didn't do another thing. But subsequent to that particular agreement some of the countries, notably Libya, have arbitrarily raised the price anyway, even beyond that. Now when we place ourselves to the extent of 50% of our energy supplies upon these nations, I do not think it is good policy economically or militarily or politically.

SENATOR MERLINO: That's exactly my sentiment. My question was to expend our money and energies here in this country for research and exploration of whatever we might have here by way of natural resources.

DR. LAIRD: I think that this is desirable and should be done at a far greater rate than is being done at the present time.

SENATOR MERLINO: Now it has been said here that, of course, we do have a Federal Atomic Energy Commission. Don't we have a like agency within the Department of the Interior or some other department of the Federal Government, the Bureau of Mines might be one, wherein the Federal Government has done some research or has funded research.

DR. LAIRD: In the Office of Coal Research, which is in the Department of Interior, they had a budget last year, I believe, of some \$21 million plus for experimentation of this kind that you mention, particularly in the gasification of coal. My understanding is that this amount has been more than doubled for the coming proposed budget. I don't want to set figures before you because I don't remember exactly what they are, but it is being expanded materially. However, I don't think that the same amount of money proportionately is being put into this type of research which, in my opinion, would be more immediate than that in the atomic.

SENATOR MERLINO: Well, heretofore, - perhaps I'm merely guessing at this but heretofore the petroleum industry itself carried on its own research and exploration, did it not?

DR. LAIRD: It has carried on its exploration and it has carried on a great deal of research. And the companies, as you know, have been interested in coal operations and have financed, partially financed, with the government, some of these studies on coal gasification. The American Gas Association I believe has some twenty or thirty million dollar contract, over a period of years, with the Bureau of Mines and the Institute of Gas Technology to carry on this program also.

SENATOR MERLINO: Well, do you feel that the change in the tax structure, as it affects the petroleum industry, in 1969, has more or less decreased the industry's desire to go into any further research?

DR. LAIRD: Well, it decreased the amount of money that they would have had available for it, certainly, by some five or six hundred million dollars.

SENATOR MERLINO: Rather than decrease its profits it has decreased its expenditure for research.

DR. LAIRD: Well, I'm not an authority on the economics of the tax or the profit situation of the companies except to say that if you consider the oil industry as a whole it is about 11.2% profitability versus 12.2 on practically all other industry. So it is not that profitable as a whole.

SENATOR MERLINO: I have nothing more.

Senator Dodd?

SENATOR DODD: Doctor, what about the Pacific area for oil?

DR. LAIRD: The Pacific Ocean area off the coast of the United States?

SENATOR DODD: Yes.

DR. LAIRD: Well, as you are well aware, there are very large reserves off the Coast of Southern California. And some of those reserves are now not being prospected or not being drilled even though they know they are there because of the environmental problems.

SENATOR DODD: They're basically having the same problems that we are on the East Coast.

DR. LAIRD: Except moreso. Now there are other possibilities off the Coast of the other parts of California, as well as Oregon and Washington and also in the Gulf of Alaska, as well as in the Bristol Bay which is off the Bering Sea just north of the Aleutian Chain. There are even possibilities off the Beaufort Sea which is in the Arctic Ocean, just north of Prudhoe Bay, but the problems of working there in that pack ice are the first order of magnitude. So I think it will be some time before that area will be prospected, as far as underwater is concerned.

SENATOR DODD: Your opening statement was basically - if I can put it in a nutshell, and please correct me if I'm wrong - that the lack of natural gas forces industry and other areas to utilize oil, mainly the common #2 grade oil.

DR. LAIRD: That's the immediate problem, yes, sir.

SENATOR DODD: Now what would be the immediate steps to allow the exploration of natural gas off the Continental Shelf?

DR. LAIRD: Well let me tell you about that, Senator. In the first place, when you go to drill a wildcat well you have no way of knowing beforehand whether you're going to get oil or gas because oil and gas occur together. Now there are certain areas

which tend, for geologic and other reasons, to be more gas prone, but you couldn't guarantee that you're only going to get gas when you start out. Now, we think that these areas off the Atlantic Coast, on the basis of what has happened in Sable Island, are potentially a high gas -- potentially, I want to emphasize that because I don't know this, - potentially a high gas producing formation, but we don't know that.

SENATOR DODD: If you dug for gas and came up with oil, you're not going to turn that down.

DR. LAIRD: No, sir.

SENATOR DODD: Or vice versa.

DR. LAIRD: Right.

SENATOR MERLINO: Senator Schluter?

SENATOR SCHLUTER: Sir, do you have copies of the slides that were projected here that we can have for our records?

DR. LAIRD: Senator, I will have to send them to you. I do have copies of them but I don't have them with me. They're black and white copies.

SENATOR SCHLUTER: Thank you.

SENATOR MERLINO: Thank you, Dr. Laird.

Mr. Murphy.

B O B G. M U R P H Y: I welcome this opportunity to speak to you today on the subject of drilling and producing operations on the outer Continental Shelf lands. I am Bob G. Murphy, Gulf Coast Environmental Manager, Cities Service Oil Company, Houston, Texas. I am a registered Professional Petroleum Engineer, also industrial engineering, management and safety, and I have been associated in drilling and producing operations in the petroleum industry both on and off shore for about 20 years.

SENATOR MERLINO: Do you have a prepared statement, Mr. Murphy?

MR. MURPHY: Yes. (Given to Committee)

Gentlemen, since Dr. Laird comes from Washington and I come from Huston, some of our testimony overlaps so, with your permission, it's in the written testimony and I'll just skip over that part in order to save your time.

No one seriously questions our need for a clean environment, with water as free from pollution as possible. The petroleum industry believes the search for oil on the Continental Shelf is totally consistent with these goals. Let us look at the record.

We have been drilling in coastal waters for years in such areas as Alaska's Cook Inlet, off Southern California, and in the Gulf of Mexico. In fact, oil and gas are being safely produced in major quantities from marine wells all over the world. Of the more than 16,000 marine wells completed in the U. S. Coastal Waters, only three produced any serious pollution. And in no case was there any permanent damage to the environment.

Nevertheless, all one has to do is mention marine drilling in California, and someone will mention Santa Barbara. The spill was certainly serious. This is a fact. But it was not an ecological disaster. Exhaustive studies by experts have shown that the Santa Barbara spill did not permanently damage the ecology of the area.

Most people learned about the spill through the heavy publicity given to it at the time over television and in the newspapers. They have never caught up to the scientific evidence from these later studies and many, understandably, still think of Santa Barbara as a permanent ecological disaster. But the factual studies do not support this view. In fact, only 2% of the small amount of the total

pollution in the oceans today are due to marine drilling and production.

Gentlemen, on this slide you will notice the lefthand side shows 2% marine drilling and the next one, 30% automobile crankcases which is really internal combustion engines. Detroit says there are 112 million internal combustion engines in the United States. They're predicting 180 million by 1985. Now this is two ways. Of course, you change the oil in all these engines and it gets in the rivers and tributaries and bayous and ends up in the ocean. But the real source is through the emissions, and gets in the rain cycle and the clouds and ends up in the ocean. The tankers are responsible for 28%; other shipping 19%; and industrial waste is 21%. On your printed material, this is Department of Interior data by the U. S. Coast Guard.

The oil industry's objective is to find, develop and produce oil and gas in an economic and safe manner. By safe, we mean the avoidance of accidents that result in injury or loss of life - human life, land and marine wildlife. Further, we mean an operation which safeguards property, including public lands, private lands and facilities.

Basically, the one who initiates an activity is responsible for conducting a safe operation. However, as in most industries, it is not left entirely to the judgment of that industry to establish safety standards, but is expressed in some form of public regulatory and inspection system.

The entire exploration, drilling, and production process on the outer Continental Shelf lands is carefully tailored to meet environmental protection standards. First, for example, extensive impact statements are required by the National

Environmental Policy Act of 1969 before lease sales can be held. Additionally, public hearings must be held to determine the need for the sale, as well as its impact. Once a sale is held, actual operations are controlled by regulations promulgated by the U. S. Geological Survey of the U. S. Interior Department. The U. S. Geological Survey has, and continues, to strengthen and upgrade the Outer Continental Shelf regulations by the issuance of 12 orders covering exploration, development and producing operations.

Prior to commencement of operations the U. S. Geological Survey now approves plans and equipment for exploration and development drilling, design and installation of platforms, plus design and installation of required safety systems and equipment. The regulations have been strengthened to require additional safety features for pipelines and platforms, testing of safety devices, reporting of all spills as well as control and removal of pollutants. The U. S. Geological Survey conducts both announced and unannounced inspections of drilling and producing operations and strictly enforces the regulations. Operators are required by the Outer Continental Shelf orders to maintain an oil spill contingency plan. This plan outlines the emergency procedures and organization necessary to control and clean up an oil spill. Industry has gone a step further and is also establishing pollution prevention plans for all oil field operations, both offshore and onshore. These plans are designed to prevent the problem of pollution and eliminate the need of spill control and cleanup. Infractions of the Outer Continental Shelf rules result in warnings, shutdown of operations including production, and/or fines.

All operators are aware of the hazards in offshore operations and have established their own policies, procedures and regulations to minimize these risks. After leases are awarded and drilling site selected, exploratory wells are drilled by the following type mobile drilling rigs that could be used in Atlantic waters.

(Showing slide) This is a jack-up rig being towed out of port and it is generally used in water up to 300 feet deep.

This is another picture of a jack-up rig on location in the drilling operation.

This is a picture of a drilling rig called a semi-submersible. It's kind of like an iceberg. Half of its base structure is underneath the water. It's positioned by anchors and controlled by computers as a function of the seas. In extremely deep waters, over 300 feet, we resort to the drilling type ship. These are also controlled, stationary by anchors and controlled by computer systems.

Nonetheless, proposals to search for oil and gas on the Atlantic and Outer Continental Shelf have been met by particularly emotional opposition, and much of it is unfounded. For example, it is not true that exploration off the Atlantic Coast will mean a forest of oil derricks just off the beaches. In nearly all cases, drilling will be out of sight and sound from the shore.

I will not labor on the geologic formations. Dr. Laird covered them, but the geologic settlements are such that the optimistic drilling locations are from 15 to 50 miles offshore.

Modern drilling techniques, which permit multiple wells to be drilled from a single platform, have greatly reduced the number of rigs needed to fully produce a reservoir area.

This is a schematic drawing of directional drilling from one platform. Gentlemen, we can drill as high as 36 wells from one installation. This slide also illustrates the multiple service use concept. In fact, in the Gulf of Mexico the surface area that we use for platforms is 1/100th of 1% of the surface area of the waters. And this leaves the shipping lanes open for commercial shipping, for fishing, for the shrimpers and for the sports fishermen.

Present Outer Continental Shelf regulations specify the minimum casing program that operators must comply with in order to obtain approval to drill. A casing program is designed to protect the wellbore and permit safe drilling operations as drilling depths and pressures increase.

That simply illustrates one of the orders that as you drill into the surface, the sediment, you have to set casing, and it's cement, all of the casing back to the surface, and this protects all of the zone, the oil zones, the unconsolidated sediments and the water zones, and prohibits comingling of the zones.

In addition to the casing program, the Outer Continental Shelf orders make it mandatory that blowout prevention equipment, for emergency use only, be installed on drilling wells and also specify the testing of this equipment, as well as recording this test information for the United States Geological Survey. The blowout prevention equipment consists of pipe rams, blind rams and an annulus or bag-type blowout preventer. When this equipment is activated, which is not normally needed, it serves to create a closed system and facilitates the control of fluids in the wellbore.

Gentlemen, that's a schematic drawing of a very sophisticated device but a very exacting and accurate device also.

The OCS orders also spell out the requirements for drilling mud and the monitoring equipment that must be installed and used while drilling.

Generally reservoir pressure is a function of depth and the depth or burial of the particular formation. Or as you drill deeper into the earth, the higher the pressures. We simply increased the hydrostatic weight of the mud which has more pressure in a downward direction than a reservoir has in the upward direction, and controls the reservoir pressure.

Before any platform can be installed in the Gulf of Mexico, the general design of the platform and its process flow equipment must be reviewed by the U. S. Geological Survey. The structural plan for the pilings, jacket and deck sections, along with such features as type of deck, corrosion protection, safety and pollution control equipment and the production facilities must be approved. The OCS orders set out the equipment which require shut-in devices and alarm sensors, details of the control system, and the testing and reporting procedures for these devices. Some of the pollution control equipment includes curbs, gutters, drains and sumps that will contain and collect contaminants in the event of spillage from the process equipment.

The quality of the effluent disposed of in offshore waters is specified by the Outer Continental Shelf standards which call for monthly sampling and testing of the effluent to insure compliance.

That is a slide there, gentlemen, of a platform designed for 300 feet of water and we've compared it to the Washington Monument.

This Outer Continental Shelf regulation requires the use of equipment designed to insure that no effluent containing more than 50 parts per million oil be disposed of in the ocean water. This is an

infinitesimal amount of oil and meeting this requirement is a real technological and operational problem. To put this quantity of oil and requirement into perspective for me, is to remember that one part per million is equivalent to one ounce of bourbon in 7,800 gallons of water. Gentlemen, that's a very weak drink.

Firefighting systems requirements for platform facilities and quarters are specified by the Outer Continental Shelf order 8 and by the U. S. Coast Guard. Examples of this type equipment are shown by this slide. And there are numerous stations like this on a platform. The industry also installs life saving devices such as swing ropes, life preservers, life rafts and survival capsules as shown in this slide.

That capsule floats like a top on the water. It is self-propelled. It holds 27 men. It has food, water and fishing equipment for five days. If there are 54 men, or complements of 27 on a platform, then we have one survival capsule for that number of men. Often we have three of these on a platform.

In other producing operations, the OCS orders specify the downhole safety equipment, subsurface safety valves. This is a recent new requirement and probably one of the most effective devices that we have. It is simply a valve that's installed in the tubing at least 400 feet below the surface, but it is controlled at the surface. As an example, it is a fail-safe device that closes - the valve closes naturally. Should anything happen at the surface, a fire or a fusible plug would burn in two, simply a lighted match will burn the fusible plug in two, or any type of accident that would run into this wellhead, the valve automatically closes and shuts the well in below the surface.

This is a surface safety valve. The principle is the same, which is a redundant system for the sub-

surface safety valve. All of the valves use this system in the flow equipment, in the flow path on the platforms.

The U. S. Geological Survey personnel conduct inspections, both announced and unannounced, of the producing equipment on the platform to insure that the safety devices comply with Outer Continental Shelf orders. Emergency shutdown systems must be installed on all platforms at each remote means of egress.

This is a slide of the fusible plug that I spoke about that's used on all surface equipment. In case of any fire they are simply activated immediately and all equipment is shut down.

These are the remote control shutdown devices. It's simply one valve. They're at the heliports and at all boat landings, and all one man has to do is run by, push one valve, and that total installation is shut in, on the surface and sub-surface, all the wells, automatically, instantly.

It has been estimated that the industry spent \$50 million last year for the installation of these required safety devices. As drilling and development continue, these expenditures must necessarily continue in order to remain in compliance with the rules and regulations.

Some of the safety equipment used consists of multiple alarm and shutdown systems that respond to high pressure, high liquid levels, low pressures and low liquid levels. There are also sensors that detect fire and gas. All of these devices aid us in determining location of a potential source of trouble before an accident occurs and shuts in production should there be an equipment malfunction. In summary, the OCS orders are practical construction and maintenance codes for the protection of personnel, equipment and the environment.

This is a platform installation we have in the Gulf of Mexico, covering all the safety devices I have described. It has only six wells and it has over 200 safety devices.

As for sports fishing around the Gulf rigs, fishermen report the platforms act like natural reefs, they attract small marine life which, in turn, draw larger fish. It is not uncommon to see numerous sports fishing boats anchored around the platforms.

Gentlemen, the following is a very fast self-explanatory slide presentation with a minimum of dialog of an actual case history of the marine exploration and development of an offshore lease purchase in the Federal 1968 lease sale by my company and its partners.

As a registered Professional Petroleum Engineer, I participated in the supervision of drilling, completion, and production of the subject wells.

Gentlemen, this particular lease was one of 100 or so that was purchased in the 1960 sale off of Texas. This particular lease happened to be approximately 40 miles out of Port Labaca. The water depth is 168 feet.

This is simply a picture of a shore base that services the offshore rigs. It's like any other marine terminal and completely free of pollution. This is the type of rig we use to drill in the 168 feet of water and we established production on the first well. We confirmed that production with the second well. And in the meantime, our equipment engineers had determined that we did have enough reserve to install a platform so they designed a platform. This is a picture of men working on the rigs.

Senator Dodd, this might answer some of your questions. This happened to be a geologic anticline and you will see that water, oil and gas have accumulated in this particular structure. This was flat steel.

It is cold rolled to make the legs of one of the platforms. This, gentlemen, is from 1½" to 3" thick, depending on the need in the leg as a function of the bending movement of the waves and the winds.

This is the starting of the erector set for the platforms being built. The two rails in the middle, - after it's constructed it will roll down these rails and load it on a barge.

Here there are quick slides of the erection of a platform. It's taking shape. There it is with it's outrigger legs. There it is being loaded on the barge. This is the template for the deck section. Construction of the deck section. The deck section is nearly completed. And there it is loaded on the barge. This is a shot of a derrick barge that we use to install this equipment in the water. This is just a magnitude shot to show you the people, the barge and the size of the legs. This is an aerial view of the platform, of the jacket section of the platform being raised to unload.

Now we had drilled a well, cemented and cut it off 15 feet below the mud line. At this point we'll set this jacket over this initial well and repipe up to the surface of the structure. This particular jacket weighed 1300 tons. Here we're getting ready to unload it off the barge. It's being pulled off by tugs. Right there I thought a few million was gone, but it floats because we sealed the legs with rubber plugs. Here the frogmen are in position. There are tugs back there now positioned over the well. What they will do is cut out the rubber plugs on the far end, change the ballast and take up the painted yellow part with a derrick barge. You can also see there are 12 well templates there. And there it is in position.

Now, to anchor it in the ocean we used 1600 tons of piling. This piling is built just like the legs

were only smaller and it drives down the center of the eight legs. It's getting in position there. Here they're welding them together. They're generally 30 feet in length. You see, the platform is 200 feet tall. And this is a hydraulic hammer and these legs are driven to the point of refusal. Now this depends on the sediments of the ocean. These legs were driven from 200 feet to 600 feet in the ocean floor. And that is the deck section completed - the jacket section completed, pardon me. Some days it's rough. This is a deck section. It weighed 650 tons deadweight, and to lift that weight we have to have two derrick barges. It's put in position. We're loading on the equipment. We're putting on people.

If you have young men up here who like to live with gusto, I suggest they join the marine operations. Here it is with the drilling rig on the platform preparing to drill. And this is the marine environmental criteria for this structure in this S. Brazos Block A-76. The platform is designed for 100 year storm. That simply means from weather history the chance of a storm occurring once in 100 years. That particular criteria was the function of 125 mile an hour winds, waves 59 feet tall. The platform integrity is guaranteed at 100% for 25 years, and its total weight is 3400 tons. We have seen this slide previously.

We're serviced by helicopter, serviced by boat. This is the pipe lane barge. This happened to be 80 inch pipe. You will notice that it's spooled. It's continuously in a spool on one end and it's going in the ocean on the left end. The equipment is put on after the wells are drilled. There are 200 safety devices. And, gentleman, that gas goes into a gas distribution system that does come to the northeastern states. This has the capacity of 100 million cubic feet a day and this is equivalent to heat 50,000 homes

in northeast United States on a peak load day.

Mr. Chairman, Committee Members, as a Professional Engineer with experience in marine operation and as an American citizen, it is my belief America can develop our Atlantic Coast marine energy resources and protect and enhance the environment at the same time. I know all concerned will give careful consideration to the data presented here today and also to continue their investigations from other sources prior to any decisions which could have a critical effect on the environment and well-being of the citizens of this State and Nation. A clean environment is vital - energy is vital. On balance, it is my belief, no real issues separate the two.

In summary, I ask all concerned to join in the effort to provide energy for the United States, at the same time protect and enhance our environment, which, in turn, will improve the quality of life for all Americans.

Thank you.

SENATOR DODD: Thank you, Mr. Murphy.

SENATOR MERLINO: What happens to these rigs when the wells are exhausted?

MR. MURPHY: They have to be taken away and the ocean has to be restored to its original condition. These are the Interior Department rules.

SENATOR MERLINO: Have there been any wells which have been exhausted that have been removed?

MR. MURPHY: Yes, sir, many. See, we celebrated our 25th anniversary this year in Louisiana in offshore drilling.

SENATOR MERLINO: It goes without saying, of course, that the studies that were made to install these operations in the Gulf of Mexico will necessitate the study of the conditions offshore in the Atlantic

and in the Shelf area also.

MR. MURPHY: Yes, sir. It's even localized in the Gulf. Actually this was a protected part of the Gulf. We have designed platforms for two hundred mile an hour winds and we have recorded in a hurricane 228 mile an hour winds.

SENATOR MERLINO: How many of these platforms have been destroyed by the elements?

MR. MURPHY: By the elements?

SENATOR MERLINO: By storms or --

MR. MURPHY: There have been some. Let me qualify that answer, Senator, in this way. We're not, you know, driving the same cars and taking the same medicine we took 25 years ago, and our structure designs left something to be desired. Also it was progressive. We started in ten feet of water and went to twenty feet and now we're out to four hundred feet of water. We have had - I don't know what the number is in the industry but there have been several that have been destroyed and partially destroyed by a hurricane.

SENATOR MERLINO: And have there ever been any occasions of collision by --

MR. MURPHY: Yes. Also you have the Coast Guard regulations and they have fog horns and three-mile lights and five-mile lights and five-mile fog horns and eight-mile fog horns, and all of this. But there have been some collisions, yes. It generally does more damage to the ship than it does to the platform.

SENATOR MERLINO: And as far as the spillage is concerned, until you get it refined down, as I am sure you have now, what was the incidence of spillage from runaway wells or --

MR. MURPHY: Well, the only real - on the beaches, like I told you, was in Santa Barbara. Now there have been incidents in the Gulf. There have been

three major accidents. A couple of them had 100,000 gallons or so, something like that, you see, but the oil was contained, it didn't get on the beaches. It was picked up with spill equipment. We also, which I didn't mention, have an organization of all of the oil companies in the Gulf of Mexico, called the Clean Gulf Association. We have on standby, 24 hours a day, with operation spill equipment stationed all up and down the Gulf of Mexico, you see. And should we have a spill, we have very elaborate communications systems from the platforms to onshore, microwave and there are now telephone lines to the platform. We can call from our Houston office and just call the platform direct, you see. And, of course, we work with the weather service. We know well in advance now about the hurricanes, as far as our personnel are concerned in taking this shut-in precautions before the storm gets there, and this type of thing.

SENATOR MERLINO: Has your company had any experience with the operation off Nova Scotia?

MR. MURPHY: No, we have not.

SENATOR MERLINO: You know of it, I'm sure, of the operation.

MR. MURPHY: Oh, yes.

SENATOR MERLINO: And is it similar to that which you've just shown us?

MR. MURPHY: Yes, it is. It certainly is.

SENATOR MERLINO: Do you know their experience?

MR. MURPHY: Well, to my knowledge, Mobile has had no trouble at all. I think they drilled considerable dry holes up there before they found any oil.

SENATOR MERLINO: Your slide indicated, I think, 100 million cubic feet of gas from that well.

MR. MURPHY: Yes, this was a very lucrative structure.

SENATOR MERLINO: But there was no oil in this.

MR. MURPHY: There's condensate but no oil.

SENATOR MERLINO: No oil.

MR. MURPHY: No, sir. Offshore Texas, as Dr. Laird indicated before, its general environment - I'm talking about its general geologic environment - lends itself to the gas structures, at least what we've had. Now, offshore Texas has not had the experience that offshore Louisiana has, in density of drilling. It also has not been as productive as offshore Louisiana.

SENATOR MERLINO: For oil?

MR. MURPHY: For any hydrocarbons.

SENATOR MERLINO: What studies has your Company made concerning the Continental Shelf area?

MR. MURPHY: Of the United States or the Atlantic Seaboard?

SENATOR MERLINO: Off the Atlantic Seaboard.

MR. MURPHY: We have participated in seismic operations to determine whether we think there are hydrocarbons there or not.

SENATOR MERLINO: And your company is the --

MR. MURPHY: Cities Service Oil Company.

SENATOR MERLINO: Cities Service Oil Company. And would you venture a company opinion as to what's there?

MR. MURPHY: I'll venture my opinion. The geologic sediments, as I best understand it - and Dr. Laird might take issue with me since, you know, there's always controversy between engineers and geologists - it doesn't appear to me -- let me retrogress here a minute -- as you noticed in that one geologic structure we had there was an anticline, or if we take water and oil in a container and shake it up then the oil comes

to the top, so you must have some type of structure, an anticline or stratigraphic trap of some kind to trap the oil. It probably didn't form there. It migrated there through porous media and got to its highest point where it was a ceiling barrier and that's where the oil is. And you know that's how we looked for oil in the early days. The surface geologist simply looked for an anticline on the surface, of some type, where it could be a structure due to internal eruption or a salt dome, this type of thing, you see. Now, to qualify it, I would say, from my limited experience in geology, I would think it had a tendency to probably produce gas more than it does oil due to its geologic age. It is lacking though in structure. There are no salt domes, as far as we know, off the Atlantic Seaboard to give you faulting and this type. It would probably have to be stratigraphic traps or pinch-outs, or this type. The basic sediments are there though. But we'll never know until we drill. There is no way to know.

SENATOR MERLINO: Is Cities Service prepared to join in the competition for the leases?

MR. MURPHY: Yes, definitely.

One question that one of the Senators asked someone previously - I think it was you, Senator Merlino - about the companies joining combines. Well, generally this is big risk money. Onshore, as an example, it takes 1500 wells to find a 50 million barrel oil field. Well, a 50 million barrel oil field is like 40 days' supply - as one of these other gentlemen testified - in this Trenton area, which is nothing. Now, the onshore areas, the large oil fields were found well from 1900 up through the 1940's - you know, the East Texas oil fields, the giant fields of that type, the West Texas fields. We have explored the continental United States

and, using a general expression, the odds are slimmer and slimmer each day. Last year we drilled 29,000 wells and the year before that 27,000 wells. In 1956 we drilled 56,000 wells, you see. Part of this is because of the price of gas and people are not drilling for gas, you understand. But the only real opportunity that we have, as far as petroleum is concerned, filling the energy gap, is to drill on the Outer Continental Shelves or import the oil or to find some alternate energy source. And let me make it very plain, and we have stated this in detail, gentlemen, the petroleum industry cannot fill the energy gap. We would like to help fill it in an intermediate term, in the next 15 to 25 years. But I assure you, from all of our studies, that it will take every form of energy that we have. It's going to take coal -- and, incidentally, Senator Dodd, coal is a fossil fuel but it lacks hydrogen, the reason it isn't oil or gas, so you can mix hydrogen with coal and make coal gas. But where do you get hydrogen? you know, H₂O. From water. But it takes tremendous amounts of energy, you see, to get the hydrogen from the water to make the coal gas. It's like electricity. It takes 3 BTU's of oil to make 1 BTU of electricity, or 33% efficient. And I'm not knocking the electric companies. We like the electric lights too. This is just a fact of life. But the point I'm making is, if we're going to continue the way of life as we know it, and then all the world, the poor nations, - I just don't think that ultimately the rich energy nations can go without sharing with the poor nations also. Even if we ration energy now, we're in serious trouble unless we get solar energy or maybe atomic fusion, you see, instead of fission, or maybe harness the tides of the Bay of Fundy, you know, or end up with a little utopian energy field here. But

it's a very serious problem in all the ramifications. And we feel we can help part of it if we have the opportunity. We certainly can't solve it all.

SENATOR MERLINO: Thank you very much, Mr. Murphy.

MR. MURPHY: Thank you.

SENATOR MERLINO: We will now adjourn this hearing.

(Hearing Adjourned)

Testimony of
Atlantic City Electric Company
Before the New Jersey State Senate
Ad Hoc Committee on Energy and the Environment
February 6, 1973

My name is James P. Hayward. I am President and Chief Executive Officer of the Atlantic City Electric Company.

Atlantic City Electric manufactures and distributes electric energy in the southern one-third of New Jersey. We serve a year-round population of 800,000, plus millions of visitors to the area. Our electrical load is about three-fourth's year-round, and one-fourth resort-oriented.

We appreciate the Senate's concern with the energy situation. These hearings should be a constructive step towards solving the problems.

We have prepared four charts to convey data which will assist your Committee in this study.

This information supplements that presented by Public Service Electric and Gas Company and Jersey Central Power and Light Company at your first hearing, January 23.

(See Chart I)

ELECTRICAL CONSUMPTION IN SOUTHERN NEW JERSEY



MILLIONS OF KILOWATT - HOURS

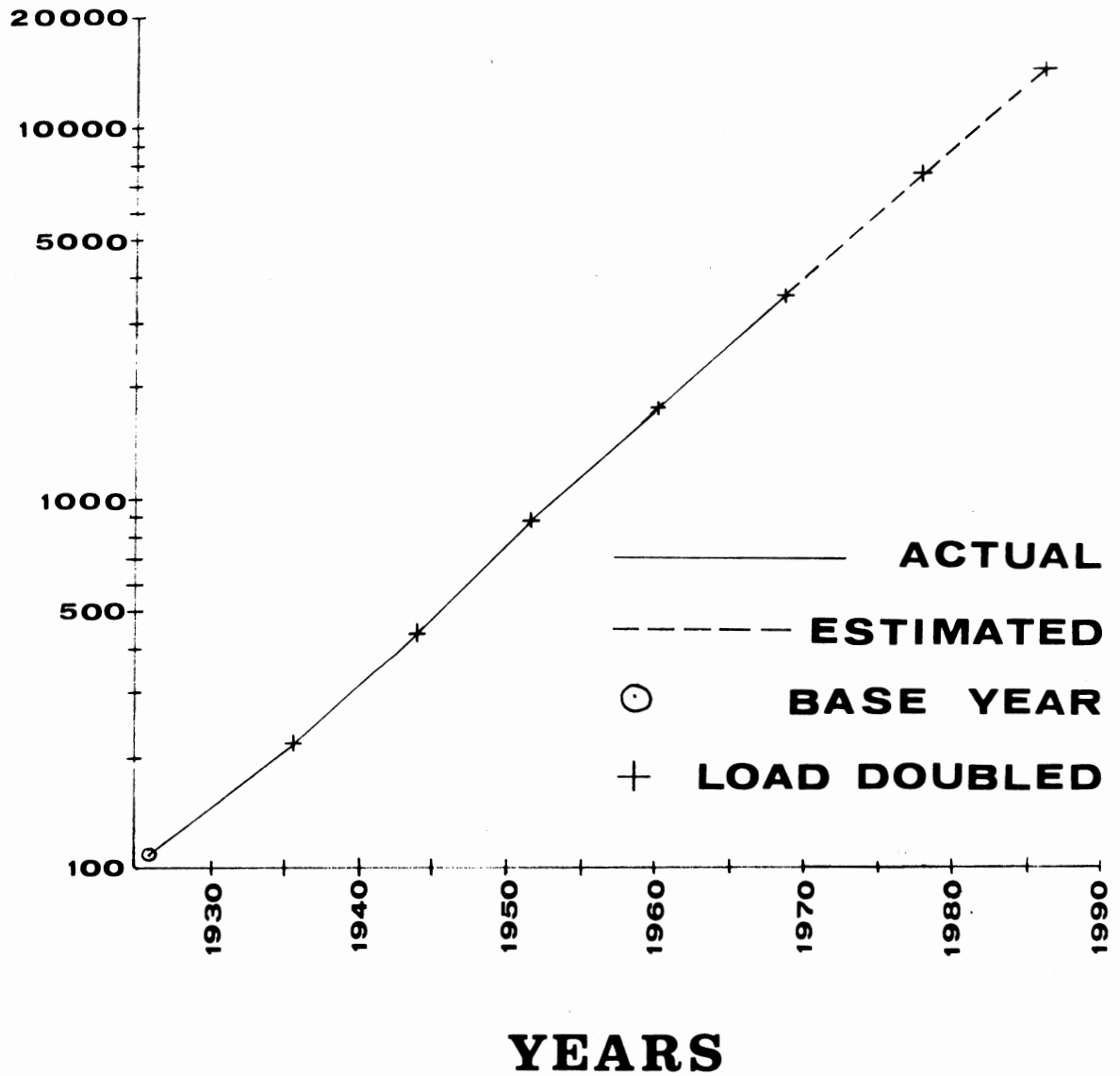


CHART I REMINDS US THAT ENERGY AND GROWTH PROBLEMS HAVE BEEN SOLVED BEFORE. The electric consumption in Southern New Jersey doubled from 1926 to 1935.

It doubled again from 1935 to 1944.

It doubled again from 1944 to 1951.

It doubled again from 1951 to 1960.

And again from 1960 to 1968.

The electric consumption in Southern New Jersey will double again by 1978 and again by 1986.

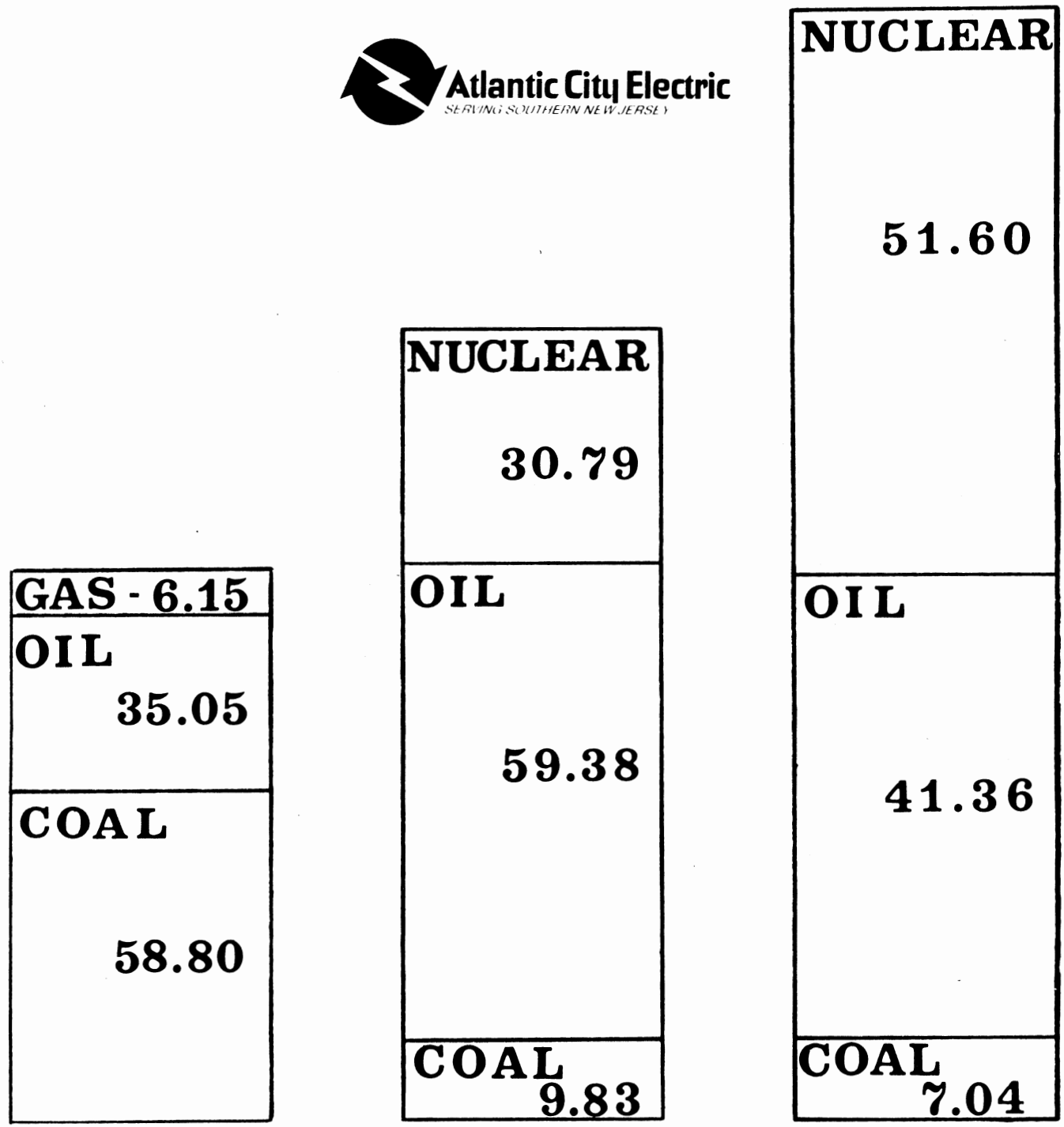
Southern New Jersey is strategically located and has more potential growth capabilities than many of our neighboring states. We are now experiencing new construction in both the western and eastern portions of our service area that is unparalleled in our history.

Compounding the energy requirements of the residential growth is the projection for commercial and industrial loads. Historically, accelerated residential development is followed by construction of business facilities to adequately service the increased population.

The environmental needs of industry, municipalities and businesses in general result in increased demands upon our utility system.

(See Chart II)

PERCENT OF FUELS NEEDED FOR SOUTHERN NEW JERSEY'S ELECTRICITY



1971

1975

1980

FEB. 6, 1973

CHART II

CHART II SHOWS THE PERCENTAGE OF FUELS NEEDED FOR SOUTHERN NEW JERSEY'S ELECTRIC LOAD. The years 1971, 1975 and 1980 are presented.

1971 was predominant in coal-fired generation, 59%.

By 1975 oil predominates, 59%. Coal has almost disappeared due to public policy changes. The only coal left for Southern New Jersey's electricity is that burned by the mine-mouth plants in mid-Pennsylvania of which Atlantic City Electric owns a share.

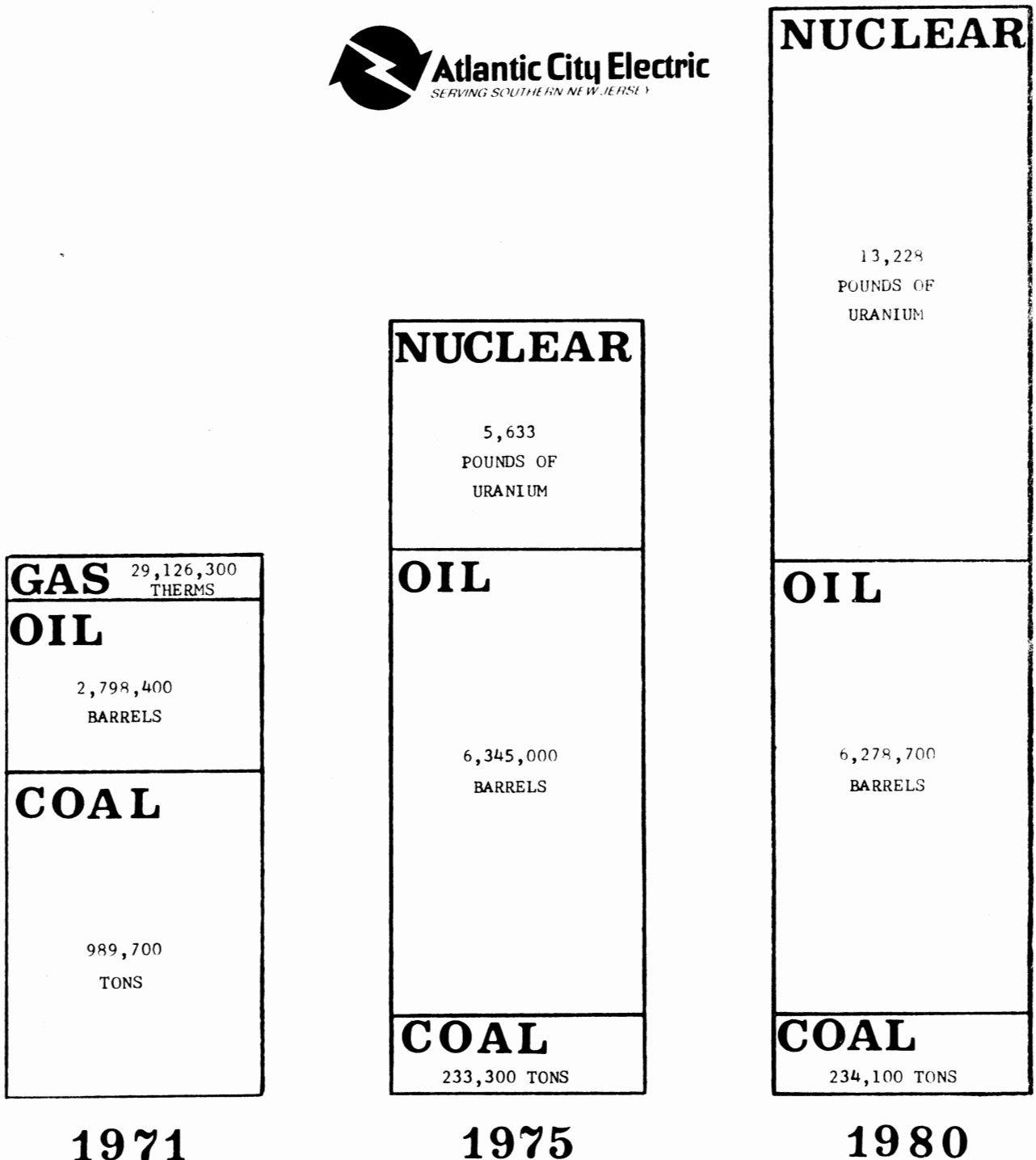
Nuclear fueled power comes in for 31% of the supply as Peach Bottom and Salem Stations go on line in 1973, '74, and '75.

By 1980 nuclear fueled generation will provide one-half of the power needs.

But note that oil, as in 1975, must supply twice as much power as it does today.

(See Chart III)

FUELS NEEDED FOR SOUTHERN NEW JERSEY'S ELECTRICITY



1971
FEB. 6, 1973

1975

1980
CHART III

CHART III SHOWS FUELS NEEDED IN TERMS OF THERMS, BARRELS, TONS AND POUNDS. We can see that coal usage goes down from about a million tons to 233,300 tons, the amount burned in the mine-mouth stations.

Oil will increase from about three million barrels in 1971 to six and one-third million barrels in 1975 and 1980. More than double.

Nuclear fueled generation will require 5,633 pounds of uranium in 1975 and 13,228 pounds in 1980.

Our two major stations have the ability to burn coal or oil, but the change-over to oil indicated on the charts -- which has been accomplished at substantial expense -- is the result of public policy changes.

(See Chart IV)

GENERATING CAPACITY 1980

Atlantic City Electric

SERVING SOUTHERN NEW JERSEY

*Asterisk
Indicates
Licenses
Not Yet
Issued

1971

COMBUSTION TURBINES	17%
ATL. CITY STATION	7%
ENGLAND STATION	31%
DEEPWATER STATION	33%
MINE-MOUTH PLANTS	11%

961.1
MEGAWATTS

1975

COMBUSTION TURBINES	24%
SALEM NUCLEAR	5%*
PEACH BOTTOM NUCLEAR	11%*
ENGLAND UNIT III	11%*
ENGLAND STATION UNITS I & II	20%
DEEPWATER	21%
MINE-MOUTH PLANTS	7%

1486.5
MEGAWATTS

1980

COMBUSTION TURBINES	28%
PEACH BOTTOM	7%*
SALEM	8%*
NEWBOLD	10%*
ATLANTIC	5%*
UNASSIGNED	5%*
ENGLAND UNIT III	8%*
ENGLAND STATION UNITS I & II	14%
DEEPWATER	10%
MINE-MOUTH PLANTS	5%

2148.5
MEGAWATTS

CHART IV SHOWS THE GENERATING CAPACITY FOR SOUTHERN NEW JERSEY'S ELECTRICITY -- 1971, 1975 and 1980.

In 1971 we see the six steam powered stations providing 83% of the capacity and nine combustion turbines (or jets) providing 17% -- a total of 961.1 megawatts. This is 30 times the capacity in 1926.

In 1975 the additional Unit #3 at England Station must be in service, and our share of Peach Bottom Nuclear and Salem Nuclear will be needed to meet the demands of our service area.

In 1980 we will also need our share of Newbold Island and Atlantic Generating Station (offshore).

Please note the asterisks indicate units for which licenses have not yet been issued. It takes 30 months to build a unit such as England #3 and it takes many years to build a station such as the offshore plant, after a construction license is granted.

The plans and expenditures shown above reflect maximum use of today's technology. We are, however, actively seeking alternate sources for generating electricity in the future.

Atlantic City Electric's research contributions have multiplied several times over in recent years -- and will multiply again. We have joined an impressive R and D effort by the entire electric utility industry.

By such efforts we hope to speed up the day when the fast-breeder will be on line -- when coal gasification will be commercial -- when fusion will yield its splendid solution, and so on. None of the advanced sources other than nuclear fission will be available by 1980, however.

These are some of the facts about electricity for Southern New Jersey's people in the decade ahead. We will be glad, however, to provide any other information that will be helpful.

We try to anticipate the dictates of the New Jersey Senate -- and other legislative and administrative bodies. We urge that these dictates make our job possible -- on time -- for the public depends on us to deliver.

It should be pointed out that we are only a service organization. We are required to serve all the demands that your constituents put upon us as well as to meet all the controls and regulations.

Electricity cannot be stockpiled or inventoried. It must be manufactured the instant a switch is flipped. We must be ready when each call is made upon us -- have the needed fuels on hand -- and have the plants available and tested even though they require years to license and years to construct.

To do our job as you require -- and as New Jersey's constituents demand -- we pledge the devotion of the 1700 people of Atlantic City Electric -- and all the expertise that comes from our 87 years of corporate experience.

2/5/73

REPORT OF THE
BOARD OF PUBLIC UTILITY COMMISSIONERS
TO THE NEW JERSEY STATE SENATE AD HOC
COMMITTEE ON ENERGY AND THE ENVIRONMENT
FEBRUARY 6, 1973

This report has been prepared by the Bureau of Energy Resources, Board of Public Utility Commissioners on behalf of President William E. Ozzard of the Board.

The Bureau's responsibilities include regulation of the electric and gas utilities as it pertains to providing safe, adequate and proper service. Under this statutory responsibility, and in light of the present "energy crisis", the Bureau implements the Board's vital interest in the conservation of energy resources to assure the people of the State that the electric and gas utilities provide continuous safe, adequate and proper service to their customers with the minimum adverse effects on the general public. In this capacity, the Bureau works with the various utilities, monitoring their day by day operation and offering assistance in what we believe is constructive regulation. The Bureau also cooperates and coordinates work programs and efforts with other agencies on the state, federal and municipal level to achieve the goals set forth by the Board.

We are here presenting, in written form, our analysis of the energy crisis as it affects our electric and gas utilities, showing their 1972 performance as well as the situation anticipated in the foreseeable future. While we are also interested in the present fuel oil problem, we note that others are more primarily concerned with this matter and have, or will, provide your committee with first hand information on the subject. (I am sure you are aware that our Board presently lacks jurisdiction over the production, distribution and use of all oil, except for such use by our regulated gas and electric companies).

GAS COMPANIES

In 1968 the gas industry reported a decline, for the first time, in the nation's gas reserves, from 289 to 282 trillion cubic feet. Since that time the reported gas reserves have continued to show a decline. In 1972 the Federal Power Commission reported that the country's year-end gas reserves for 1971 had dropped to 247 trillion cubic feet.

In 1972 the Federal Power Commission issued a forecast of the Nation's gas requirements and supplies, projected through the year 1990. The forecast shows the country's demand for gas will grow from 26.1 trillion cubic feet in 1972 to 46.4 trillion cubic feet in 1990, while domestic production of natural gas will decline steadily from 23.8 trillion cubic feet in 1972 to 17.8 trillion cubic feet in 1990.

As a result, the deficit between the forecasted supply and demand will continue to increase from 2.3 trillion cubic feet in 1972 to 28.6 trillion cubic feet in 1990. It is expected that a part of the deficit will be made up through the years from sources other than the traditional domestic supplies. The new gas is expected to come from Canadian and Alaskan imports of natural gas, LNG (liquidified natural gas) imports and from the domestic production of synthetic gases made from coal and oil. The report further shows that of the projected demand of 46.4 trillion cubic feet for the year 1990, domestic production is expected to supply 17.8 trillion cubic feet while the other sources, cited above, are expected to supply 11 trillion cubic feet, leaving an unsatisfied demand for gas of 17.6 trillion cubic feet. Thus, unless new sources of gas are developed in the meantime, 38% of the available natural gas market in 1990 will have to seek other sources of energy, probably oil and coal. A similar study of the nation's future gas requirements was carried out in 1972 by the Chase Manhattan National Bank and their projection agrees reasonably well with the Federal Power Commission data.

The accuracy of the Federal Power Commission data on the country's natural gas reserves has been questioned, since the data comes from the gas industry itself, and the Federal Power Commission has had no way of verifying the information. It has been suggested that the gas industry has deliberately underestimated the nation's gas reserves in an attempt to stimulate an increase in the well head prices set by the Federal Power Commission. As a result, the Federal Power Commission, in 1971, established a group of National Gas Survey committees through which it is directing an independent estimate of the country's reserves of natural gas. This information is expected to become available in 1973.

In the meantime there exists a short-term shortage of developed deliverable natural gas. According to the Federal Power Commission, the cause of the shortage is a complex combination of circumstances, among which are, an unexpected increase in demand for gas to meet new environmental limits on air pollution and a pronounced decline in exploration and development, the latter brought on in part by the Federal Power Commission's inadequate ceiling prices on gas in the 1960's. Nevertheless, the gas shortage is real.

It is believed that the country, as well as New Jersey has not yet felt the full impact of the gas shortage because of the unseasonably mild weather we have enjoyed last winter and thus far this winter.

As a result of the near-term shortage of available gas some of the gas pipeline companies have experienced increasing difficulty in obtaining additional supplies of gas to meet their contractual requirements.

Of the four gas pipeline companies which supply gas to our New Jersey gas distributing utilities, the two major suppliers, Texas Eastern Gas Transmission Company and Transcontinental Gas Pipeline Company who, together, supply 96% of the gas delivered to New Jersey Gas, have had to curtail their contractual gas deliveries to the State, for the past two winters. At the present time Texas Eastern is curtailing its deliveries by 18%, (reduced from 22%). Transco is now curtailing its delivery by 8%, reduced last week, from 9%. These curtailments are expected to become worse, at least through the 1975-1976 winter season.

In 1970, the Board of Public Utility Commissioners requested that, because of the gas shortage, the four New Jersey gas distributing utilities adopt sales policy restrictions regarding both new and existing gas customers in order to protect the reliability of service to existing customers and to insure that new applicants for gas service were treated fairly and equitably. These policies are periodically reviewed by the Board's staff.

At this time none of our four gas utilities are able to meet the gas requirements of their commercial and industrial customers, and two of the companies, Elizabethtown and New Jersey Natural, are unable to take on any new residential or commercial and industrial customers. The full impact of these restrictions in gas service upon the economy of the State has not yet been measured.

In further response to the gas shortage, the Board of Public Utility Commissioners issued its Executive Order 71-3 in December, 1971. The order specifies the manner in which the New Jersey gas utilities are to curtail gas service to their customers in the event of an acute shortage of gas; such as during a protracted cold spell. The Order is intended to protect the available supply of gas to residential users and certain essential community services and to minimize any disruption to the normal commerce and productivity of the State.

In order to provide as much reliability as possible during periods of short supply the Board's staff has been encouraging the four utilities to develop arrangements for exchanging gas in mutual assistance. Through the cooperation of the gas pipeline companies, who are interconnected, it is possible to divert gas, by displacement, to different sections of the State. In this manner, both Elizabethtown and New Jersey Natural were able to receive needed gas, last winter, from Public Service. Thus far this winter, Public Service has again been able to supply needed gas, on several occasions to New Jersey Natural. South Jersey Gas Company has also come to the assistance of New Jersey Natural this winter, via displacement.

All four gas utilities have advised that, at the present rate of curtailment from their suppliers they expect to meet the gas requirements of their firm customers if the remainder of the winter remains normal.

The following is a summary of the present and future gas capacities of our four gas distributing utilities.

In 1972 Public Service Electric and Gas Company supplied 203.2 billion cubic feet of gas or 64.5% of the gas consumed in New Jersey. Of this amount, 95.9% was supplied by the gas pipeline companies while the remaining 4.1% came from other sources, including the company's own gas manufacturing facilities.

The company's forecast of its future gas requirements shows that in 1981, it will need 353.5 billion cubic feet of gas. The company expects to meet 60% of this requirement from existing sources, namely, the gas pipeline companies and its own existing facilities. Of the remaining 40%, the company expects 26% to be supplied from new LNG imports, for which negotiations are still under way, with the remaining 14% coming from new gas manufacturing facilities to be built by Public Service.

A significant part of the company's new gas manufacturing capacity is expected to be supplied by the SNG plant the company is building in Linden.

According to testimony presented by the company in support of its application made to the Board of Public Utility Commissioners, for permission to construct the plant, the company will not be able to meet its 1973-1974 winter peak day gas demand unless the output from this SNG facility is available on schedule.

In 1972 Elizabethtown Gas Company supplied 33.1 billion cubic feet of gas which represents 10.5% of the gas consumed in New Jersey. Of this amount, 92% was supplied by the gas pipeline companies, the remaining 8% came from other sources, including the company's own facilities.

The company's projection of its future gas requirements shows that in 1976 it expects a gas demand on its system of 38.7 billion cubic feet. Of this amount the company expects 65% to come from the gas pipeline companies, 7% from other existing sources, with the remainder to be supplied by new facilities. These new facilities include a new propane air plant which the company expects to have completed in time for the 1973-1974 heating season. The company is also counting on receiving delivery of certain newly discovered gas in Louisiana which belongs to Elizabethtown but which cannot be delivered to New Jersey until the Federal Power Commission approves the delivery arrangements. Additionally, a part of Elizabethtown's projected 1976 gas capacity is expected to come from the SNG plant which Public Service is building in Linden. If all the proposed sources of supply materialize in 1976, the total supply will be 12% greater than the company's projected requirements.

New Jersey Natural Gas Company in 1972, supplied 37 billion cubic feet of gas which represents 11.8% of the gas used in New Jersey. Of this amount 99% came from the gas pipeline companies and 1% came from the company's own facilities.

The company's projection of its gas requirements through the year 1980, shows that the company expects a demand for 47.3 billion cubic feet of gas. Of this amount, the company expects 70.7% to come from the gas pipeline companies, 1% from its own facilities (now under construction or already in operation), and 28.3% from LNG imports, for which negotiations are still under way.

In 1972 South Jersey Gas supplied 41.5 billion cubic feet of gas which represents 13.2% of the gas consumed in New Jersey. Of this amount 99.7% was supplied by the gas pipeline companies with the remainder coming from the company's own facilities.

The company's forecast of its future gas requirements shows that in 1981 it expects to have a market for 66.3 billion cubic feet of gas, of which 60.9% is expected to come from gas pipeline companies and the remainder from LNG imports, for which the negotiations are still under way, and from gas manufacturing facilities the company proposes to build and from which it expects delivery in time for the 1974-1975 winter season.

It is apparent from the above data that a significant percentage of the future gas requirements of the State will have to be met from sources not available today. If the construction of any of the planned facilities are prevented or delayed a portion of the future gas market will go unserved and will have to seek other sources of energy either within the State or elsewhere. The economic penalties to the State for such dislocations cannot be measured in advance.

ELECTRIC COMPANIES

The New Jersey electric public utility companies operating under the jurisdiction of the Board of Public Utility Commissioners are: Public Service Electric and Gas Company; Jersey Central Power & Light Company; New Jersey Power & Light Company; Atlantic City Electric Company; Rockland Electric Company; Sussex Rural Electric Cooperative; and Glen Wild Lake Company, Inc. Sussex Rural and Glen Wild Lake do not have their own generating plants and rely solely on neighboring electric utilities. Rockland Electric Company, a wholly owned subsidiary of Orange and Rockland Utilities, Inc., also has no electric generating plants in New Jersey and receives its electric power for the some 45,000 Rockland Electric Company customers from Orange and Rockland Utilities, Inc. in New York which is sold to Rockland Electric Company under a cost of service contract on file with the Federal Power Commission.

In order to insure reliable and economic electric service, Public Service in New Jersey, Philadelphia Electric Company and Pennsylvania Power & Light Company, both in Pennsylvania, were intertied, and the grid was called the Pennsylvania-New Jersey Interconnection. This high capacity, inter-company power grid, the "world's first" integrated power pool with a backbone of 230 kv transmission lines, began operating in 1928. It became the Pennsylvania-New Jersey-Maryland Interconnection in 1956, when Baltimore Gas and Electric Company and Jersey Central Power & Light Company, Metropolitan Edison Co.,

New Jersey Power & Light Co. and Pennsylvania Electric Co., the four subsidiaries of General Public Utilities Corporation, also joined. The present interconnection structure was established in 1965, with the inclusion of the Potomac Electric Power Company. Through agreements with the signatories, Atlantic City Electric Company, Delmarva Power & Light Company, and United Gas Improvement Company are also participating in the PJM power pool.

Reliability and economy of service is accomplished, in part, through the availability of generation capacity outside a given utility's service area to meet peak demands within the area. Other benefits of pooling include: greater operating efficiency by tending to bring the capacity requirements for the base load and peak load closer; economies of large scale units; systematized scheduling of additions throughout the pool area; and orderly programs of major maintenance.

At the end of 1967, the 12 PJM companies entered into a new service-reliability compact, the Mid-Atlantic Area Coordination (MAAC) Agreement. The objective is to augment reliability through coordinated planning and scheduling of all generating plant and bulk power transmission additions and revisions. The signatories are pledged to submit their plans to the Executive Board for study by the Area Coordination Committee and review by this Board to determine if established reliability standards are met.

The participating utilities serve a population of more than 20 million people in all or parts of Pennsylvania, New Jersey, Maryland, Delaware, Virginia, and the District of Columbia. This 48,700 square mile service area, triangularly shaped, stretches 350 miles east from Erie, Pa., to the lower Hudson River, then 350 miles south to Cape Charles, Va., and back to Erie.

PJM has interconnection agreements with four neighboring systems: The Cleveland Electric Illuminating Company, the Allegheny Power System, the Virginia Electric and Power Company, and two companies of the New York Power Pool-Niagara Mohawk Power Corporation and New York State Electric and Gas Corporation. A total of 23 tie lines interconnect PJM with neighboring systems, including four 500 kv lines, two 345 kv lines, nine 230 kv lines, and 8 lines at 138 kv and below.

An important feature of the PJM Interconnection is that the member companies are operated on a daily basis as though they were one company. Operations are conducted by an operating staff under the direction of a manager. The operating staff's responsibilities are (1) to maintain the reliability of the bulk power supply, (2) to coordinate the operation and maintenance of the Interconnection generation and transmission facilities; and (3) to coordinate accounting for the interchange of power and to maintain records pertaining to the operation of the Interconnection.

Although the member companies are operated as one system through the Interconnection office, each company retains control over its own facilities and service and determines the availability of its facilities for Interconnection use. Such facilities are always first available for the use of the owner.

The PJM Interconnection companies plan the installation of generating capacity so that on the average for only one day in ten years will the system load be higher than the available generation. Using probability studies it is found that a 20% reserve is needed in PJM in order to meet the once in ten year criterion. The Federal Power Commission's National Power Survey for 1970 recommended a 20% reserve. If the PJM Interconnection did not exist and the member companies operated independently, each member company would need about a 30% reserve in order to maintain the same degree of reliability.

A principal factor in a number of power shortages which have affected power supply in the United States in recent years has been the delay in having new generating units and transmission facilities available for service when planned. The PJM systems have experienced such delays with certain major built system projects due to previously unforeseen factors such as regulatory and licensing delays, labor disputes, and, in the case of transmission lines, lengthy proceedings involved with right-of-way acquisition. If such delays continue, PJM generation reserves in the 1973-76 period could be below present objectives.

The PJM annual system peak load estimate is essentially the summation of the individual member companies system summer peak load estimates. If all planned generation is placed in service by their currently scheduled service dates, PJM has reserves to meet the standard of 20% for every year except 1973. If all units 400 mw and larger are delayed one year, all years except 1976 and 1980 have less than 20% reserves. If all units 400 mw and larger are delayed two years, load shedding would probably be necessary each year of the forecast unless neighboring power pools have excess capacity (see Figure #1).

Appendix A, B, and C show the load and capacity forecast for a period of nine years of the major electric utilities that serve New Jersey. A review of these appendices indicate that Atlantic City Electric Company has adequate planned reserves after 1974, Public Service has adequate planned reserves for all nine years, whereas New Jersey Power and Light Company and Jersey Power and Light Company do not have adequate reserves at all for all the years.

Figure 2 indicates that the combined load capacity of all New Jersey electric companies appear to be adequate except for the years 1973, 1974, 1976, 1977 and 1978. If all units 400 mw and larger are delayed one year, the installed reserves are not at all adequate except for the years 1975 and 1980. However as stated earlier, the above four companies are members of the PJM interconnection and operate with other eight companies as a single system. Therefore, the reliability of service is more appropriately delineated by the total PJM load capacity forecast (Figure 1).

CONCLUSION:

The projections contained in this report indicate that any major obstacle or roadblock resulting in delays to the utilities' plans for meeting their anticipated loads could be seriously jeopardized by the strong trend toward more stringent environmental and ecology controls. Therefore, it appears obvious to us that these trends must be tempered to allow the utilities to meet their goals with the measures planned. To do otherwise points strongly to measures such as rationing the available supplies of energy.

ATLANTIC CITY ELECTRIC COMPANY CAPACITY FORECAST
December 31, 1972

<u>YEAR</u>	<u>NET LOAD</u>	<u>ADDITIONS OR RETIREMENTS</u>	<u>UNIT NET CAPACITY (a)</u> (MW)	<u>TOTAL GENERATING CAPACITY (b)</u> (MW)	<u>INSTALLED GENERATION RESERVE</u> (MW)	<u>70</u>
1972	970			1029.4	59.4	6.12
1973	1030	Carll's Corner #1 (CT) Carll's Corner #2 (CT)	5/73 39.3 5/73 39.3	1108	78	7.57
1974	1110	Peach Bottom #2 Missouri Ave. #7 retirement Mickelton (CT)	9/73 80 1/74 -31 5/74 50	1207	97	8.73
1975	1195	Greenwich retirement Peach Bottom #3 England #3 Missouri Ave. #6 retirement Salem #1	9/74 -12.5 9/74 80 12/74 160 1/75 -29 3/75 81	1486.5	291.5	24.39
1976	1285	Salem #2	3/76 83	1569.5	284.5	22.14
1977	1380	Unassigned (CT)	5/77 100	1669.5	289.5	20.97
1978	1482	Unassigned (CT)	5/78 100	1769.5	287.5	19.39
1979	1598	Forked River #1 Newbold Island #1	11/78 107 5/79 110	1986.5	388.5	24.31
1980	1722	Atlantic #1	5/80 115	2101.5	379.5	22.03
1981	1857	New Bold Island #2 Deepwater #3 retirement #4 retirement Unassigned (CT) Atlantic #2	10/80 110 11/80 -53 11/80 -53 5/81 50 5/81 115	2270.5	413.5	22.26

Notes

- (a) Based on summer capability and share of jointly-owned units.
Capacity shown for units not yet purchased is approximate.
- (b) Capacity totals are as of June of the year indicated.

PS GENERATION CAPACITY FORECAST
December 1, 1972

Appendix B

YEAR	NET LOAD (MW)	ADDITIONS OR RETIREMENTS	UNIT NET CAPACITY (a)		TOTAL GENERATING CAPACITY (b) (MW)	INSTALLED GENERATION RESERVE	
				(MW)		(MW)	%
1972	6201	As of 12/1/72			7836		
1973	6560	Burlington #10 rerating Kearny #12 (GT) Linden #9 (GT)	12/72 5/73 5/73	78 196 196	8306	1746	27
1974	7080	Burlington #10, Module 105, Combined Cycle Addition Peach Bottom #2 (1065 MW) Essex #1 (end of temporary retirement) Bergen #4 (GT)	9/73 9/73 10/73 5/74	40 453 115 34	8948	1868	26
1975	7630	Peach Bottom #3 (1065 MW) Salem #1 (1090 MW) Bergen #4 (GT) rerate Yards Creek Reallocation	9/74 3/75 5/75 5/75	452 464 11 50	9925	2295	30
1976	8210	Essex 2,3,4,5,7 L-P retire- ments Kearny 1-6 L-P retirements Burlington 1-4 L-P retire- ments Salem #2 (1115 MW)	10/75 10/75 10/75 3/76	-166 -100 -45 475	10089	1879	23
1977	8830	Sewaren #7 Sewaren #8	12/76 3/77	400 400	10889	2059	23
1978	9500	Unassigned	5/78	800	11689	2189	23
1979	10220	Newbold Island #1 (1100 MW)	5/79	990	12679	2459	24
1980	11000	Atlantic #1 (1150 MW)	5/80	920	13599	2599	24
1981	11850	Newbold Island #2 (1100 MW) Atlantic #2 (1150 MW)	10/80 5/81	990 920	15509	3659	31
1982	12780	Kittatinny (1300 MW)	5/82	845	16354	3574	28

Notes

- (a) Based on summer capability and share of jointly-owned units.
Capacity shown for units not yet purchased is approximate.
- (b) Capacity totals are as of June of the year indicated.

NEW JERSEY POWER & LIGHT COMPANY
 JERSEY CENTRAL POWER & LIGHT COMPANY
 CAPACITY FORECAST December 31, 1972

YEAR	NET	ADDITIONS OR RETIREMENTS	NET	TOTAL	INSTALLED	
	LOAD		UNIT	GENERATING	GENERATION	RESERVE
	(MW)		CAPACITY (a)	CAPACITY (b)	(MW)	%
			(MW)	(MW)		
1972	2147	As of 12/1/72		2162	15	0.69
1973	2431	Sayreville #3 (CT)	6/72 54			
		Werner #4 (CT)	6/72 54			
		Re-Rate Sayreville				
		#1-3 (CT)	6/72 6			
		Re-Rate Werner				
		#1-4 (CT)	6/72 8			
		Sayreville #4 (CT)	12/72 56	2340	-91	-3.74
1974	2087	Gilbert (CC) CT Part	10/73 190			
		Three Mile Island #1	5/74 198	2728	41	1.52
1975	2919	Gilbert (CC) Cycle Part	7/74 126			
		Yardscreek decrease	5/75 -50			
		Firm Purchase - Pennsylvania				
		Electric	5/75 193	2997	78	2.67
1976	3207	Deletion of Firm Purchase	9/75 -193			
		Three Mile Island #2	5/76 220	3024	-183	-5.7
1977	3532	Unassigned location (CC)	3/77 155	3179	-353	-9.99
1978	3885	Union Beach #1	11/77 400			
		Union Beach #2	5/78 400	3979	94	2.41
1979	4270	Forked River #1	11/78 963	4942	672	15.73
1980	4689	Atlantic #1	5/80 115	5057	368	7.84
1981	5148	Atlantic #2	5/81 115	5172	24	0.46

Notes

- (a) Based on summer capability and share of jointly-owned units.
 Capacity shown for units not yet purchased is approximate.
 (b) Capacity totals are as of June of the year indicated.

PJM LOAD AND CAPACITY FORECAST

Figure 1

As Scheduled

	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
Capacity - mw	36720	41787	47810	50158	54726	59185	65863	70458	76797
Load - mw	31320	34050	37005	40150	43405	47025	50705	54640	58930
Reserve - mw	5400	7737	10805	10008	11321	12160	15158	15818	17867
- %	17.2	22.7	29.2	24.9	26.1	25.9	29.9	28.9	30.3

All Major Capacity Additions Delayed (One Year)

	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
Capacity - mw	35580	37210	41830	48158	50671	54460	59713	65863	70372
Load - mw	31320	34050	37005	40150	43405	47025	50705	54640	58930
Reserve - mw	4260	3160	4825	8008	7266	7435	9008	11223	11442
- %	13.6	9.3	13.0	19.9	16.7	15.8	17.8	20.5	19.4

All Major Capacity Additions Delayed (Two Years)

	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
Capacity - mw	35580	36070	37253	42178	48671	50415	54998	59713	65777
Load - mw	31320	34050	37005	40150	43405	47025	50705	54640	58930
Reserve - mw	4260	2020	248	2028	5266	3390	4283	5073	6847
- %	13.6	5.9	.7	5.1	12.1	7.2	8.4	9.3	11.6

NEW JERSEY LOAD AND CAPACITY FORECAST

Figure 2.

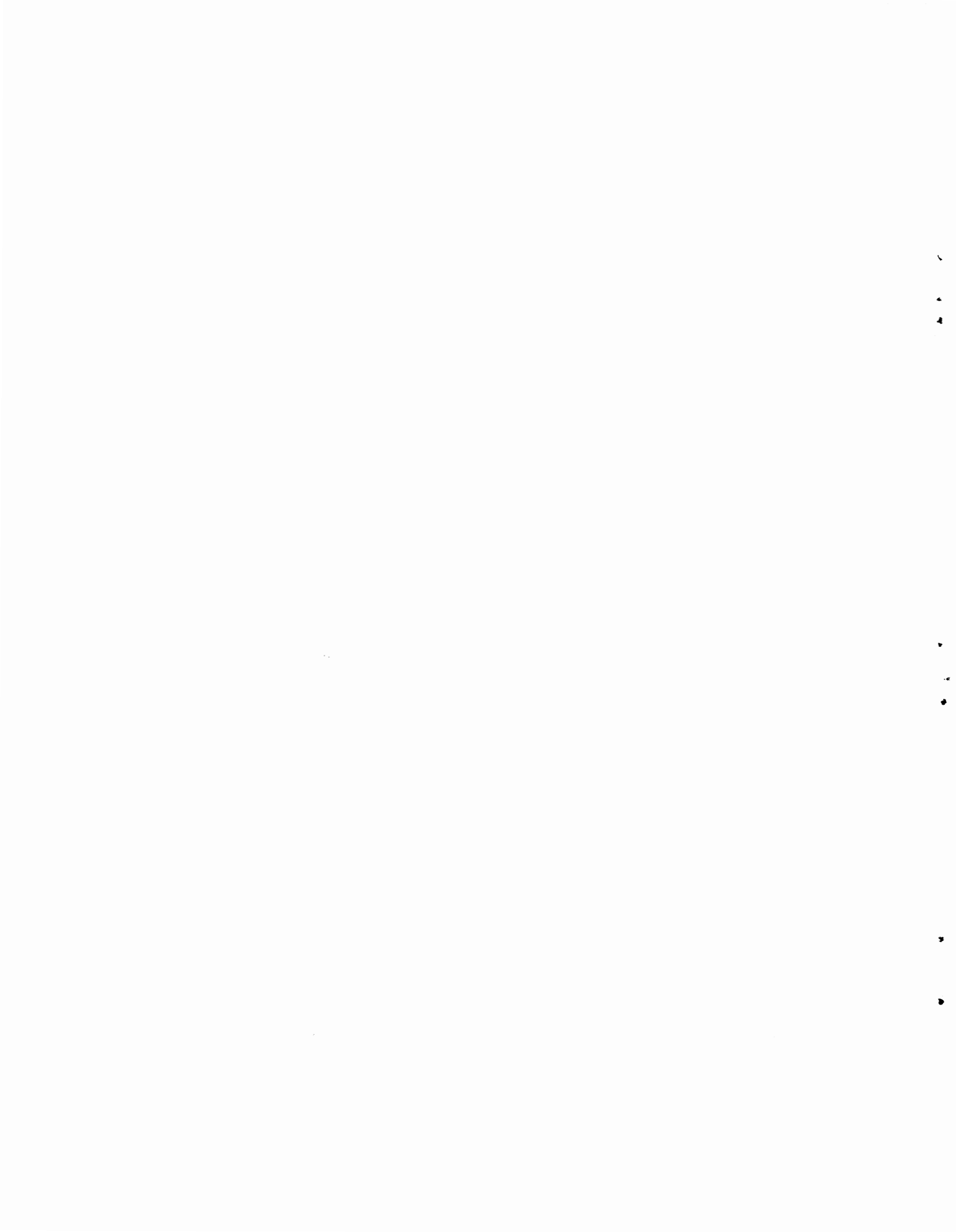
As Scheduled:

	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
Capacity - MW	11754	12883	14408.5	14682.5	15737.5	17437.5	19607.5	20757.5	22951.5
Load - MW	10021	10877	11744	12702	13742	14867	16088	17411	18855
Reserve - MW	1733	2006	2664.5	1980.5	1995.5	2570.5	3519.5	3346.5	4096.5
- %	17.29	18.44	22.68	15.59	14.52	17.28	21.87	19.22	21.72

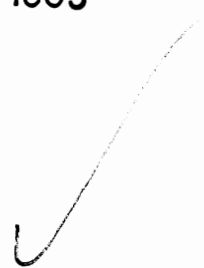
All Major Capacity Additions Delayed (One Year)

	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
Capacity - MW	11754	12152	14062.5	14981.5	15715.5	16637.5	19037.5	21777.5	21851.5
Load - MW	10021	10877	11744	12702	13742	14867	16088	17411	18855
Reserve - MW	1733	1275	2318.5	2279.5	1973.5	1770.5	2949.5	4366.5	2996
- %	17.29	11.72	19.74	17.94	14.36	11.90	18.33	25.07	15.88

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JUN 21 1985

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