

# NATURAL GAS REGULATION AND THE TRANS-ALASKA PIPELINE

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## HEARINGS BEFORE THE JOINT ECONOMIC COMMITTEE CONGRESS OF THE UNITED STATES NINETY-SECOND CONGRESS SECOND SESSION

—————  
JUNE 7, 8, 9, AND 22, 1972  
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Printed for the use of the Joint Economic Committee



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# NATURAL GAS REGULATION AND THE TRANS-ALASKA PIPELINE

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WEDNESDAY, JUNE 7, 1972

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

The committee met, pursuant to notice, at 10 a.m., in room 1202, New Senate Office Building, Hon. William Proxmire (chairman of the committee) presiding.

Present: Senators Proxmire and Bentsen; and Representative Blackburn.

Also present: John R. Stark, executive director; Loughlin F. McHugh, senior economist; Courtenay M. Slater, economist; Jerry J. Jasinowski, research economist; George D. Krumbhaar, Jr., and Walter B. Laessig, minority counsels.

## OPENING STATEMENT OF CHAIRMAN PROXMIRE

Chairman PROXMIRE. Today we open a series of hearings on supply, demand, and pricing conditions in the field of natural gas. That we are faced with a growing shortage of energy supplies is now an established fact. In an era also when the public is becoming increasingly concerned with cleaning up our environment, it is imperative that we make every effort to improve our supply of natural gas, which is one of the cleanest sources of energy, and thus also ease the overall energy situation.

In these hearings we hope to define the magnitude of the problems involved in increasing the supply of natural gas and the prospects for adequately solving these problems. Since the Federal Government regulates the interstate shipments of gas, it has played, and will obviously continue to play, a critical role in settling the basic issues at stake.

How has the Federal Government conducted its regulatory function in the past in this area? There are complaints that the Federal Power Commission (FPC) which plays a central role in the regulation of natural gas below the market rate. On the other hand, it is argued that the FPC, by granting continuing increases in price ceilings, has contributed to the gas shortage by holding out the prospect for higher price ceilings in the future. The industry under such circumstances, it is said, has reason to hold back production of new gas supplies.

Where does the truth lie? The price increases granted by the FPC do not appear to have increased research and development. Just what the existing and prospective supply of reserves is remains a mystery. There are no audited data in this area, and the Commission has to rely on questionable data handed to it by the producers.

Meanwhile the consumers have had to pay through the nose. As Lee White points out in his testimony today, for every penny increase in gas prices, the consumer pays over \$200 million annually in higher gas bills.

In this context we must explore the most recent proposed rule of the FPC, R-441, which in my view will lead to deregulation, and if adopted without other basic changes could lead to skyrocketing prices.

We shall also explore in these hearings other actions which the Federal Government might take to alleviate the gas shortage. As we all know, the Federal Government itself owns vast stores of actual and potential gas supplies. These sources are being tapped through leasing arrangements with private concerns. What about the possibilities of new leasing arrangements; or of the Federal Government entering directly into the mining of gas, such as along the lines of a new "TVA"?

We are also intending to study the recent administration announcement approving the Trans-Alaska pipeline. In the light of the existing and evolving natural gas and environmental problems, was this decision the one most appropriate to meeting our long-term goals?

These are but a few of the questions which we shall explore in the next few days. Today we shall first hear from Lee C. White, now in private law practice. Mr. White was Chairman of the Federal Power Commission from 1966 to 1969. He started his working career as a lawyer from the TVA and from 1950 until his resignation from the FPC in 1969 he served an illustrious career in public service, working closely under both Presidents Kennedy and Johnson.

Mr. White, it is a delight to have you appear before this committee to share with us your thoughts on how we can swiftly head off the mounting crisis in the energy field.

Let me say that we have a timing problem. We have adopted a policy in this committee of allowing 10 minutes for an opening statement. At the end of 10 minutes, the buzzer rings and you are taken off the podium. But I am sure that you are able to summarize this.

Your entire prepared statement will be printed in full in the record. I might say that at 11:30 Senator Gravel is going to appear and we are going to put him on briefly for a short statement in connection with the Trans-Alaskan pipeline, and I might also add at 10:20 we are scheduled to have a vote on the floor of the Senate, so it may be necessary to recess for a few moments.

The floor is yours, Mr. White.

#### **STATEMENT OF LEE C. WHITE, LAWYER, FORMER CHAIRMAN OF THE FEDERAL POWER COMMISSION**

Mr. WHITE. Thank you, Mr. Chairman. Customarily it takes me 10 minutes to say hello. Thus, I am pleased to hear you say the entire prepared statement will be incorporated in the record. I will try to hit the high spots and deal with the problems of the energy crisis.

I have enormous sympathy for the Federal Power Commission that has a responsibility for setting rates, but unlike the classic utility regulatory process, it cannot compel the producers to do anything. It can't say, gentlemen, you must use your money to invest for finding gas or finding gas in the lower 48 States or in Alaska or any-

where else, and I don't really propose that it should be that way. But it is a different ball game and it is very frustrating for the FPC to have only this one piece of the action; namely, the rate setting responsibility.

My prepared statement tries to focus on what I regard are a number of factors that have contributed to the shortage, and I hope that perhaps they can be explored in some of the discussion here if it seems helpful to understand how we got to where we are.

I think it is fair to say that there is a shortage. I don't believe that it is contrived in the sense that there are people sitting on gas somewhere, although there are responsible people who hold that view. More important to me are the symptoms.

People cannot today get all the gas that they want and that they need. I think that situation is going to persist for quite some time, and thus I believe we ought to be focusing, and the Commission ought to be focusing as well as the Congress, on means of inducing first of all, greater investment in the drilling process which is essential, and in the process of allocating a relatively scarce commodity. I can't quite use the word scarce yet, but when demand which, of course, has gone up enormously, outstrips supply, there simply isn't enough to go around and some allocation process has to be adopted.

In the free market economy it is price that does it. I don't think that price is sufficient in a field of this character. I think there has to be some allocation. As disagreeable, as wretched, as unsuccessful as many of our previous efforts have been, I know of no alternative other than some end use control mechanism.

As you suggested in your opening statement, one idea that is worthy of consideration, and I have offered it in my prepared statement, is the exploitation, if you will, the development of the gas and oil resources that we as citizens own in the public lands of this country, particularly in offshore areas. I don't think that we ought to necessarily take all of these resources, give them to a Government corporation, and tell it to go forward. I think what we ought to do, however, is to establish a Government owned corporation where it will be attempting to explore and to develop some of the resources that we do have, not solely on the basis of profit but on the basis also of the need to meet energy requirements.

I think that one of the most important suggestions that I can make to this committee is to focus on the distinction between interstate and intrastate gas. I don't believe that we can regard the fortuitous location of gas deposits as something that entitles a particular State to have it exclusively during a time when there is not enough to go around. I think all gas ought to be treated on the same basis. Either it should not be regulated by the Federal Government or all of the gas, including the intrastate market, should be regulated by the Federal Government.

We are going to come into a very difficult period where we will be using high priced gas, supplements, either liquified natural gas or synthetic natural gas, or perhaps some other processes that will be developed technologically. When that comes to pass we are going to find ourselves with a mixture of gas costing perhaps a dollar or a dollar and a quarter per thousand cubic feet, mixed or comingled

with gas that costs maybe 30 or 40 cents per cubic foot delivered at the markets. Traditionally this industry has had rolled in prices where everybody takes their share of it.

I think one of the techniques for allocating gas is to focus on a marginal pricing mechanism whereby the industrial users would be asked to share or pay the larger prices. We can't kid ourselves. If an industrial customer pays for the dollar gas at a dollar rather than the rolled in price, those increased costs in his production of goods or services will be passed on to the consumer. But I think as between the two options, I strongly prefer the rolled in basis only when the prices are roughly comparable. When they get way out of balance, I think a decision has to be made by the Congress, our policy making mechanism, and that it would be highly desirable to instruct the Power Commission or any other price setting body to make sure that the citizens of this country who are using gas for space heating, for water heating, for cooking, are given a preference over the industrial users, recognizing that the industrial users are going to recoup their increased cost. Simply as a public policy issue it seems to me that we have come to the point in time where a decision must be reached and I have indicated how I think it ought to be handled.

Insofar as the FPC's proposed rule 441 is concerned, I think that as well intended as it may be, it misses the mark. I do not believe that the Congress has given the Power Commission the authority by statute to, in effect, deregulate new gas—decontrol, if you will, and I think it is inappropriate for the Power Commission to have assumed that responsibility.

Worse, I don't think that it will necessarily work and the responses from the industry indicate that they don't think it will work, primarily because they believe that the Commission has put a hooker into the rule. The proposed rule says that if this rule goes into effect as initially offered to the public, gas producers will not be able to take advantage of any increases in the area rates. This proposed rule is a so called operational procedure and the producers have said to the Commission you would require us to forego rate increases in the area rates if we take this option. The producers have said to the Power Commission we like what your rule says about decontrol of new gas but we think it is a mistake for you to keep from us the money that is necessary for the investment that is necessary to go forward in finding new gas reserves.

I don't think it ought to go that way and I certainly hope that if the Commission goes forward—and I strongly urge that it not do so—but if it should, I hope that it will not yield on that very important point because we are talking about an enormous amount of money. The area rates have been established so as to provide quite a handsome return on the investment, assuming that costs are what the Commission has found them to be. Incidentally, on the question of cost, one of the factors that it most important is the dearth of reliable information. This committee, I think, can help in trying to find out a great deal more about cost. To suggest as the FPC does in its proposed rule that the important thing is what the market will bring for that gas simply means no control, no regulatory process. The conventional orthodox regulatory process says that somebody in the monopoly business is entitled to receive his costs plus a reasonable return

on his investment. There is nothing wrong with that. It is very difficult to apply in this particular field primarily because of the dearth of good solid information.

Congress has had pending before it for about 14 or 15 years legislation which would give the FPC the authority to secure that data. I hope that this shortage situation will have some beneficial fall-outs and one of them would be the ability of the Government to get more data and to know upon what its policies should be based. That data would be forthcoming. There are, however, a number of suggestions that can be considered by the Congress and I have set forth many of them in my prepared statement.

I have touched on a few here right now. One is the creation of a Government-owned corporation. One is the elimination of the distinction between interstate and intrastate markets. Another is the development of the most effective possible end use controls.

I don't know whether my time has expired—I haven't heard a bell go off yet, Mr. Chairman, but I have summarized the high spots of my prepared statement.

Chairman PROXMIRE. Thank you very much, Mr. White. Your timing couldn't be better.

It is better timing than an admiral had the other day and I thought he was the best because he was military but you did him a—

Mr. WHITE. May I say that thing is fairly inhibitive, you know, Senator.

Chairman PROXMIRE. Well, you show by your brilliant summary—you did a fine job.

(The prepared statement of Mr. White follows:)

#### PREPARED STATEMENT OF LEE C. WHITE

Mr. Chairman and Members of the Committee, I appreciate the opportunity to appear before this Committee in connection with the Committee's efforts to understand and focus attention on some of the economic factors that have given rise to, and hopefully can provide solutions to, the shortage of natural gas that currently exists in the United States.

The increasing attention paid by Congress and its various committees, by the Executive Branch and by the General press to the overall energy situation, and in particular the problems involved in the natural gas segment of the total energy picture, is most encouraging. Traditionally, it has been difficult to secure the attention of national policymakers to energy problems until they assume near-crisis proportions. This is most regrettable because of the long lead times required to implement any policy changes. To put it another way, if everybody could agree today on what should be done, it would still be 3 or 4 years before the implementation of such decisions would be felt in any significant way. I would hope, therefore, Congressional interest would continue at a high level and that some basic decisions could be reached, and, in my view, this need not await the development of a complete comprehensive and new "national energy policy".

#### HISTORICAL BACKGROUND

It may be helpful to an understanding of the situation to spend a little time on a brief background of the natural gas industry in this country. Although manufactured gas was used in a number of cities in the early twentieth century, it was not until the late 20's and 30's that considerable quantities of natural gas were discovered in connection with the discovery of oil in major oil producing areas, particularly in the southwest. At that time, gas was a disagreeable by-product that was burned off—or flared—simply to get rid of it as part of the process of extracting oil from the ground. Its use as a fuel, however, soon became sufficiently important for it to be piped into areas where it could be used. During the 1930's, the Congress recognized that the spread of pipeline networks across

the United States made it necessary to protect the consumers of natural gas against their becoming captives of the industry in light of the enormous investments in pipelines and in the equipment purchased by consumers to use gas for space heating, water heating and cooking, as well as for commercial and industrial purposes. Thus, in 1938, the Natural Gas Act was enacted, with the administration of the Act being assigned to the Federal Power Commission which was then administering the Federal Power Act.

The initial determination of the FPC was that the Act did not give it jurisdiction over the prices at which gas was sold at the wellhead into interstate commerce. The U.S. Supreme Court, in the landmark *Phillips* case in 1954, brought by the Public Service Commission of the State of Wisconsin, held that the Natural Gas Act did cover such sales. From that time until August 1960, the FPC undertook to establish well-head rates on a company-by-company basis. In August 1960, it concluded that the traditional or classic form of public utility regulation was simply not workable insofar as wellhead prices were concerned and embarked on an area rate basis. By this process, the Commission undertook to divide the producing areas of the nation into separate major areas and to establish rates for each of those areas on the basis of the average costs of producing gas in the area plus a reasonable return. This approach was ultimately confirmed as appropriate and legal by the Supreme Court in 1968.

In late 1968 and early 1969, it became apparent that an imbalance between supply and demand was developing, not in the sense that there was no gas left or that reserves could not supply existing loads, but in the sense that the proven gas reserves being added annually were less than the volumes of gas being consumed nationally. We were using more than we were finding.

Most industry officials and many observers blame the shortage on "artificially low" prices set by the FPC during the 1960's. What is "artificially" and what is "genuinely" low is, of course, an extraordinarily difficult question. The statutory assignment to the FPC is to set "just and reasonable rates" which has been interpreted to mean those rates that are the lowest possible which will provide the necessary incentive for adequate supplies of gas to be produced. I believe the simple statement of the requirement is sufficient to indicate its inherent difficulty of implementation. In any event, even if one accepts the premise that higher rates would have produced more gas, I believe that is not very helpful and, indeed, there are numerous other factors that have contributed to the current situation in which there is a gas shortage. Briefly, I would like simply to list a number of those that I think are among the most important, recognizing the virtual impossibility of assigning a qualitative weight to any one or any group of these factors.

*Inadequate industry data.*—For over 15 years, different memberships on the FPC have unanimously and continuously sought statutory authority to permit it to acquire greater information and data on reserves, costs and other aspects of the natural gas industry. These efforts have thus far been in vain, although there is reason to be somewhat optimistic that Congress may now enact such legislation. Additionally, the producing segment of the industry, at least until 1970, refused to submit any data on intrastate operations. One factor contributing to the long drawn out area rate proceedings was the difficulty of securing from the industry adequate information upon which to determine the cost of producing gas. According to those better schooled in accounting principles than I, the accounting practices used by the producers left a great deal to be desired.

*The National Gas Survey.*—The FPC, recognizing the need for a study and survey of gas reserves, demand and other important factors relating to the nation's natural gas industry, requested Congressional approval and funds for a National Gas Survey starting in 1966. Each year for 4 or 5 years, the Congress expressly disapproved the idea and provided that no FPC funds could be used for that purpose. The survey is now underway, and although there has been some controversy about the composition of the advisory committees working on it, at least work is proceeding. It is, of course, late, but we cannot turn the clock back.

*The role of the pipeline industry.*—As the middle man in the operation, the pipelines held themselves aloof from the area rate cases in the 1960's refusing to antagonize their suppliers on the one hand and customers on the other. Perhaps their situation is understandable, but their criticism of the regulatory process and in the results of that process came mighty late. During the era of plentiful gas, their concern was to keep their pipelines full, not necessarily the spreading out or the most efficient use of what is a finite and, therefore, limited resource.

*The role of distribution companies.*—The natural tension that exists between

buyer and seller led the distributors generally to seek the lowest price, and today we find them in the somewhat awkward position of urging that the sellers be permitted to raise rates, or, indeed, to have no regulatory control of those rates at all.

*Offshore leasing policies.*—A great deal has already been said about the fact that the Federal Government established—and continues to employ—its oil and gas leasing policies in connection with federal offshore areas on national budgetary considerations, rather than on the basis of wise and efficient use of a natural resource.

*The decline in oil discoveries.*—To those who ascribe the gas shortage either to the fact that gas rates are regulated or that they were set too low, the question must be asked, "How do you explain the fact that exploration for oil and discoveries of new oil reserves also declined during that period without any Federal or state control over the price of oil?"

*The failure to anticipate the dramatic increase in consumption.*—In my view, the FPC, as well as all segments of the industry, were at fault in not anticipating the fact that an industry, which had been increasing in consumption at the rate of about 4% or 5% annually, jumped in 1968 to nearly a 9% increase over the preceding year and these higher levels of increase persisted until this past year. One will never know whether a national gas survey undertaken on a timely basis might have enabled this type of forecast to have been made, but it must be evident that this sharp increase in demand was one of the critical factors contributing to today's shortage.

*Settlement proposals offered by the industry.*—Recognizing the long time delays involved in the area rate proceedings, elements of the industry entered into settlement discussions with the thought that they could offer the FPC agreed upon rates which, if adopted by the Commission, could save a great deal of time and expensive litigation. Because of the nature of the industry, with numerous producers in any single area and numerous customers at the end of the pipeline networks, 100% agreement was regarded as an almost impossible goal. Nevertheless, 85% of the producers in Southern Louisiana, measured by the volume of gas produced and roughly 85% of the distribution companies again by volume, agreed upon a proposed rate schedule and offered it to the FPC in 1968. The FPC did not accept the precise schedule offered, but in the view of most observers, came somewhat close to the agreed schedule. Rates set by FPC were lower, but not by much. Subsequently, in the same proceeding, the industry reached substantial agreement on a much higher rate schedule, increasing the rates by more than 30%; since these rates were agreed to by the producers, the assumption followed that they would provide adequate incentive for producers to explore for gas in the Southern Louisiana area. If, then, the only factor was rates, it is difficult to understand why there would not be increased drilling and new gas discoveries. Perhaps the producers, in their own requests, had not asked for "enough" during the 1960's.

*Alternative investment opportunities.*—Of great significance, in my view, has been the fact that so long as there are attractive alternative investments that petroleum companies can make, either in petroleum efforts around the world, or in nonpetroleum fields (for example, the acquisition of coal companies, uranium companies and nonenergy business opportunities), there is no heavy pressure on them to invest in natural gas drilling, especially at a time when rates are rising.

Certainly one cannot contend that the area-rate proceedings have been models of administrative practice or that their results were necessarily "right", but I trust that the listed factors will indicate the complex character of the problem that faces this Committee and the nation as efforts are made to remedy the gas supply situation.

#### THE FEDERAL REGULATORY SCHEME

The Natural Gas Act requires the FPC to regulate wellhead prices for gas moving into interstate commerce, rates pipelines charge for transportation service, and rates at which they sell gas to local distribution companies. State regulatory bodies fix the rates at which gas is sold to the ultimate consumer.

Although the characteristics of monopoly which gave rise to the Natural Gas Act, in my view, still justify regulation, the regulatory process does not follow the classic regulatory scheme insofar as it relates to the producing segment of the industry. The basic difference is that the FPC must fix the rates at which producers sell gas, but there is no obligation on the part of the producers—or authority

on the part of the FPC to compel them—to drill a single well, produce a single cubic foot of gas, or, if the producers have gas, to sell it to the interstate market. By contrast, an electric utility which is given a franchise in a geographical area undertakes to provide service in return for that franchise, and regulatory bodies have the authority, within limits, to compel the necessary investment to provide that service.

One can readily sympathize, therefore, with the FPC which, under the existing framework, can only try as best it knows how to induce the petroleum industry (and for the most part, we are talking about a relative handful of major companies that produce the great bulk of the nation's natural gas) to make the necessary investments.

Econometricians have struggled to produce econometric models of the natural gas industry so that they can tell the regulators how much additional gas will be produced if they, the regulators, increase the price of gas 1 cent, 2 cents, 3 cents, 25 cents, 40 cents, 75 cents. So far, this has proven to be a fruitless and frustrating effort.

In focusing on policy changes that ought to be considered, including both legislative and regulatory, it may be useful to refer to the overwhelming disbalance now existing between buyers and sellers. Until the late 1960's, the distribution companies, or the buyers, were in a favorable position, but now that the situation has shifted, pipelines and distribution companies are almost imploring the producers to sell them gas. It is understandable that anyone in the gas distribution business today would believe there is no alternative to accepting the producers' viewpoint and to agree to almost any inducement to get them to make the necessary investments and then sell the gas to the interstate market so the distributors can meet existing and future demands. This is obviously not a very comfortable background, but though somewhat oversimplified and overstated, in my view, it is about the way it appears to be.

Another factor to bear in mind in evaluating the existing situation and proposed solutions is the finite character of our nation's gas supply. Thus, we must focus on how strenuous our effort should be to discover and use our own gas reserves in light of our sharply increased attention to alternatives, namely, the manufacture of the equivalent of natural gas from coal and the importation of liquefied natural gas from North Africa, Venezuela and elsewhere. Additionally, there must be folded into the analysis the possibilities of increasing Canadian gas imports, both short term and perhaps longer term. Similarly, the major role that nuclear energy will play 25 years from now enters into the assessment.

Setting out these questions does not, of course, answer them. But they are pertinent and provide the background for considering possible approaches to the gas shortage problem.

#### FPC PROPOSED RULEMAKING—DOCKET NO. R-441

I have been requested to comment expressly on the Rule proposed to be promulgated by the FPC which would provide a so-called "optional procedure" for fixing prices for which natural gas can be sold by producers at the wellhead.

Basically, the "optional procedure" provides that whatever price for gas is arrived at between the producer and the purchaser (primarily pipeline companies) will be considered by the FPC and presumably adopted. Since any contract with agreed upon prices submitted for FPC approval will obviously be conditioned to the gas volumes being withheld from the interstate market if not approved, the FPC will, practically speaking, have no real option. The effect of the Rule is summed up in the April 15 issue of *Business Week* by the headline, "The Cap Comes Off Natural Gas Prices."

As indicated above, I have considerable sympathy for the plight in which the FPC finds itself with respect to gas supply. It would be most frustrating to believe that the only available recourse is to continue to increase prices and ultimately to abandon regulation because there do not appear to be any other effective approaches under the existing statutory framework to induce greater gas discoveries in this country. Nevertheless, in my view, the Commission's proposal is an outrageous attempt by the Commission to ignore the Congress and, in effect, to accomplish deregulation with respect to new gas by administrative fiat. The effort is probably illegal in the sense that there is no apparent statutory basis for the Rule. It is, on the basis of past experience, not likely to produce the intended results. And, most surprisingly, the proposed Rule comes at a time when the Congressional committee with jurisdiction over the Natural Gas Act

and the energy situation generally are engaged in serious reviews of these very issues and are considering legislative changes.

The most distressing aspect of the proposal, is that it provides no assurance that additional gas will be made available for the consumers of the country; it only assures that they will pay greatly increased prices for gas. During the past two years, as a result of FPC decisions, total gas prices have increased markedly, and during that time decreasing reserves have been discovered, and a decreasing percentage of gas has been made available to the interstate market.

According to FPC figures, the price paid at the wellhead for gas in interstate commerce (approximately three quarters of all gas produced) has increased from 17.75 cents per 1,000 cubic feet in 1969 to 19.75 cents in 1971. Even more meaningful to users of natural gas in consuming areas is the increase in the prices received by pipelines from local distribution companies. In two years, the average price has increased from 36 cents to 43 cents per 1,000 cubic feet, an increase of nearly 20%. The figures for the past three years show that the increase has been 9 cents or from 34 cents to 43 cents, an increase of over 25%.

Although in terms of pennies, these increases do not seem meaningful, they take on a totally different character when applied to the tremendous volumes of gas that are involved. For example, the total U.S. consumption in 1971 was approximately 22 trillion cubic feet. Assuming that the same price factors applied (and it is a very fair assumption) to intrastate gas which is a part of that 22 trillion total, the American consumer will pay over \$200 million annually for each penny of increase. Thus, applying the 7 cents increase for the pipeline sales (and limiting it to interstate gas) for 13 trillion cubic feet, American consumers paid over \$900 million more for gas in 1971 than in 1969. If the figure relates to the total volume of gas including intrastate, we are talking about \$1-1/2 billion. Despite this greater price paid by consumers, the volumes of gas discovered have continued to decline.

There are vast discovered (and undiscovered) reserves not yet dedicated to the interstate market and until they are, the price is open. Thus, any increase in rates automatically increases the value of those reserves. If we take 1,000 trillion cubic feet as a base figure, a very low and conservative base, a one cent increase per 1,000 cubic feet lifts the value of those reserves by \$10 billion.

Of special concern is the fact that, as proposed, the Rule could go into effect immediately and six months after submission of agreed upon rates if the Commission has not acted, the prices agreed to by the producers and the purchasers (basically the pipelines of this country) will be in effect. Worse, they will not be subject to refunds in the event the prices are ultimately disapproved or perhaps even if the courts conclude there is no statutory authority for the proposed Rule. Furthermore, the Commission attempts to bind all future Commissions by providing in the Rule that once approved, the rates cannot be changed, which most observers thought the "Sanctity of Contract" bill, now pending before the Commerce Committees in the House and Senate, was supposed to provide the FPC with authority to do.

This Committee is, of course, most concerned about the inflationary consequences of rate increases. So is the Administration and so is the Federal Price Commission. When one examines the criteria adopted by the Price Commission in its guideline instructions to Federal and state regulatory bodies, the proposed Rule apparently is based on the assumption that the Price Commission was only kidding. The Price Commission has set forth six general criteria for public utility price increases which it has summarized as follows:

- (1) The increase must be cost-justified, and should not reflect future inflationary expectations.
- (2) The increase is the minimum required to assure continued, adequate and safe service to provide for necessary expansion to meet future requirements.
- (3) Price increases may not be more than will achieve the minimum rate of return needed to attract capital at reasonable cost and not to impair the credit of the public utility.
- (4) The increase does not reflect labor costs in excess of those allowed by Price Commission policies.
- (5) The increase takes into account expected and obtainable productivity gains, as determined under Price Commission policies.
- (6) The procedures of the regulatory agency must provide for reasonable opportunity for participation by all interested persons, or their representatives, in its proceedings.

I might add that it is not necessary for one to be opposed to any increases in natural gas prices in order to be opposed to the proposed Rule. Evidence for this can be found in the fact that among the comments received by the FPC are many from producers (and some pipeline and distribution companies) who, although indicating enthusiasm for the Commission's approach, believe it will not work because one of the provisions requires the producers to waive rights to contingent price escalations on old gas under area rate decisions, both past and future. To the extent the Commission has included this requirement in its proposal. It should be commended and although I sincerely hope the Commission will not adopt the Rule, certainly should it do so, it would be regrettable were it to accept the suggestion that it eliminate this proviso.

#### SUGGESTED LEGISLATIVE AND REGULATORY POLICY APPROACHES

Having criticized the "optional procedure" rule proposed by the FPC, it is only fair to indicate approval of some of the actions it has taken. It has tried to encourage the expensive, deep drilling in existing fields; it has tried to encourage pipelines to invest in exploration and development of new fields; and it has attempted to key refunds to future investment by producers.

It seems to me, however, that more fundamental changes are required to meet the situation that exists today and, according to most predictions, will be even more difficult during the next few years. First, it should be pointed out that there is no direct assurance that even a significant increase in the investment in drilling for new gas will produce significant discoveries. In many areas the easier and less expensive discoveries have been accomplished. Nevertheless, it is fundamental that major and significant discoveries are not going to occur unless there is increased investment in drilling.

In any event, I believe that even though existing and new policies ought to focus on increasing the supply of new gas reserves, during the short term—and perhaps for some time into the future—we must also learn to live with the fact that we are not likely to have enough natural gas to meet all of the demands for that very desirable and very flexible fuel. As uncomfortable and distasteful as the prospect may be, some form of end-use control must be developed to ensure that natural gas will be used for the highest and best purposes for which it is suited.

The following are a number of specific suggestions that, in my view, merit the attention of the Congress. Some could be accomplished with relatively little dislocation; others are certainly far-reaching and even controversial in character.

1. *The creation of a national Energy Resources Corporation.*—Although there are some exceptions, basically our energy resources industry in this country, and this is particularly true of natural gas, is in private ownership with government, both Federal and state, playing some regulatory roles. A number of gas distribution systems are municipally owned and operated, but most production of gas is performed by privately owned corporations. There is, of course, nothing inherently wrong with the system, and it has served this nation quite well, particularly if the basis for judging its success is our standard of living and the degree of industrialization of our nation. Where the profit incentive proves to be inadequate, either on a continuing basis or an intermittent crisis basis, consideration should be given to alternatives that do not rest solely on the profit motive. I do not believe it would be in the best interest of the nation to recommend nationalizing the petroleum industry or the natural gas segment of the industry. I do not believe it would be in the overall public interest to grant to governmental agencies the authority to require private investors to make the necessary investment to explore for and develop oil and gas reserves in this country. I do think, however, the time has come to consider arrangements whereby the oil and gas deposits owned by the American public, through its ownership of public lands, including the Federal portion of the Outer Continental Shelf, can be discovered and made available to meet national needs in times of crisis.

I am unaware of any petroleum company executive who has stated that the need for natural gas to meet increasing demands is so great that his company is willing to invest X percent of their annual exploration budget or a specified dollar limit to ensure that the requisite volumes of gas will be discovered. And I can understand why this is the case. It would be very difficult for one who must report to his stockholders and where profit is the basic, if not the sole, criteria in evaluating investment alternatives. But I don't believe this is good enough

for a nation dependent upon energy and which today has a gas shortage and which sees no immediate relief in sight.

The electric utility industry has demonstrated that there is no single ownership form that is required in order to meet our national electric energy requirements. In fact, there are those who believe that the competition among privately-owned utilities, those that are Federally owned (TVA and the Bonneville Power Administration), the 1,000 cooperatively owned rural electric utilities, and the nearly 3,000 municipally-owned utilities has been beneficial for all elements of that pluralistic industry.

A government-owned corporation to explore for and develop petroleum resources on publicly-owned lands could serve to supplement the privately-owned segment of the petroleum industry and, although it should manage the nation's resources in an efficient manner and on a profit-making basis, it would also be expected to be strongly motivated by the need to meet national energy requirements. One of the recurring problems faced by the FPC and the government generally has been the reluctance of the natural gas industry to make available data relating to their gas operations. This has made even more difficult the FPC's job of establishing area rates, and although I continue to believe the Congress should enact legislation (sponsored by the FPC for at least 12 years and through 4 different Administrations), the existence of a National Energy Resources Corporation operating in these areas would be extremely useful in supplying information and data on actual costs and operations in a field that has proved to be most difficult to regulate. This nation has been willing to use its wealth and its resources in a proprietary manner when convinced that such an approach was the best solution to a national problem—stockpiling of strategic goods, development and ownership of nuclear devices, and operation of the Alaska railroad, to name a very few.

Dozens of questions immediately spring to mind as to how such a corporation should be set up and how it would operate. It seems to me, however, that the first step is for the Committee to consider the basic desirability of such a proposal.

2. *Acquisition of independent geological data by governmental agencies.*—Disputes over geological data and over the sources of those data are bound to continue and to plague government policy-makers until there is an independent source of information. Governmental agencies should, if it is necessary, be given legislative authorization and adequate funding to enable them to conduct independent test drilling to provide a body of data essential to evaluation of various aspects of the natural gas supply situation. Whether their efforts should be on a total basis or a spot-check basis, or some combination, is not as important as the fact that this effort should be undertaken and with taxpayer funds financing the effort.

The Natural Gas Survey, currently being undertaken by the FPC—a proposal which I supported while at the Commission—is apparently already suffering from lack of public acceptance because of criticisms leveled at the membership of the Advisory Committees and some of the ground rules. I do not know whether these criticisms are valid, but this manner of credibility with the public is vital. Congress should take steps necessary to assure the public that these issues are being investigated comprehensively and fairly.

3. *Modification of the Federal tax structure to discourage American petroleum investment in foreign countries.*—Federal tax policies have encouraged American petroleum companies to invest vast sums of money in exploring for oil and gas in areas outside the United States. Obviously, there are some national interests that are served by such efforts, and yet when one examines our need today for investment funds in the United States to discover and develop petroleum deposits, it seems evident that our tax policies should be modified to reduce incentives for overseas investments and correspondingly to make investments in this country more attractive. As noted above, I do not believe the Congress should compel privately-owned companies to take any particular course of action. However, Congress, as the policy-making mechanism in our society, should adapt and modify the rules to achieve national objectives. If, therefore, there is a desire and a need to stimulate greater investment in this country, it is appropriate, if not essential, to "tilt" the tax factors in a fashion that will achieve that objective.

4. *Our oil import policies should be changed.*—The oil import program first established by President Eisenhower has been much studied, criticized and commented upon. Recommendations for its abolition or modification are not difficult to find. If the President would act on the recommendations made by

his Cabinet Task Force on Oil Import Control, chaired by the then Secretary of Labor Schultz, or if the Congress would legislate a policy along those lines, there would be a reduction in the price of oil in this country, thereby easing some of the pressure on natural gas demand. Although this would not increase the volume of natural gas, it could help the shortage situation by having a beneficial impact on the demand side of the equation. The national security foundation upon which the oil import program is supposed to rest has been thoroughly shattered, and I urge the Congress to concern itself with this problem from the viewpoint of ameliorating the natural gas supply situation, among others.

5. *Encouragement of individual field pricing outside of the area rate system.*—The area rate concept of regulating gas moving in interstate commerce at the wellhead was substituted for the traditional utility approach initially undertaken by the FPC following the Supreme Court *Phillips* decision in 1954 which was found to be unworkable. Fundamental to the area rate is the principle that averaging the costs will provide a rate that will be generally satisfactory to all operating within that area. Perfectly consistent with that approach is the option available to individual producers to demonstrate that the area rate is not satisfactory and, thereby to seek a rate keyed to the particular circumstances of the applicant. I do not know that legislative action is required to permit this concept to operate, but when there are purchasers willing and able to pay higher rates simply to be able to meet their own supply problems as is the case today, it is consistent with the regulatory scheme and, indeed, with the balancing of consumer and investor interests to permit special rates, provided that the gas producer is willing to make available to the FPC all pertinent data about the particular field. Although I have not attempted to confirm the facts, I am advised that some recent discoveries of highly prolific gas wells were so costly because of the deep drilling involved that simple arithmetic will disclose that at the prevailing area rate for that particular basin, the investors cannot even recover their actual costs. If that is correct, there should be some opportunity for those willing to make all of their data available and to permit complete scrutiny to sell their product at a rate which will return them a fair and reasonable profit.

6. *Modification of policies governing offshore leasing.*—Here, too, the suggestion has been made in numerous ways and on numerous occasions that a shift to a "royalty" basis should stimulate the interest of investors in discovering deposits in the Outer Continental Shelf. Additionally, there should be tougher requirements on production schedules. I do not necessarily accept the thesis that the gas shortage is artificial or that it is the result of actions by leaseholders sitting on gas reserves that have already been discovered and proved. Nevertheless, policies which require early production should have a beneficial impact on the short range gas supply problem.

7. *Impact of State conservation practices.*—Conservation practices implemented by gas-producing states have a considerable impact on the supply picture. If natural gas is a premium fuel, currently in short supply, and if this shortage has an adverse impact on national well-being and industrial development, the Federal Government should control this activity insofar as it relates to natural gas to ensure that there are no state policies operating to diminish the flow of gas for any improper purpose. Sound conservation practices are, of course, to be encouraged. But when state interests, particularly in the case of tax revenues and other interests, such as state-received royalties, are permitted to influence state agency decisions on the volume of gas that can flow, there is an obvious conflict with the national interest. Such action which is undesirable at any time becomes intolerable in times of gas shortage.

8. *Distinction between interstate and intrastate gas.*—In 1938, one could understand why the Congress would distinguish between gas moving in interstate commerce and gas produced and consumed within a single state. Today that distinction has created a situation which serves to exacerbate the gas supply problem. Both interstate and intrastate gas should, in my view, be treated alike. Neither category should be subject to Federal regulation, or both should. I recognize and sympathize with the view of the gas-producing states that they should have the benefit of a natural resource that fortuitously is located within their boundaries. And they should have the natural advantage of very cheap transportation costs to move the gas from where it is to where it is to be consumed. I do not believe a premium fuel should be priced in such a fashion as to be available for the most inferior uses within the state where natural

phenomena happened to place it. Rules that were tolerable and even practical at one point in time should not be continued when circumstances are so altered that the same rules subsequently result in policies and practices contrary to the broad public interest. I believe that the distinction between interstate and intrastate gas meets that description and the distinction between them should no longer exist.

9. *End-use controls.*—As implied in the point regarding the distinction between interstate and intrastate gas, I believe we have come to that point in time in the development of the natural gas industry where there must be distinctions made on the purposes for which gas is to be used. Undeniably, it will be one of the most difficult, complex and controversial assignments that could be handed to any regulatory body, and yet I believe the Congress must impose that responsibility on some regulatory authority if we are to use more wisely and effectively the finite amount of gas which is available to us in this country. In a free market economy, pricing techniques develop priorities. Other techniques of allocation are required, however, where, as in the natural gas industry, monopolistic characteristics require some form of regulation to supplant, in a most imperfect fashion, the dynamics, restraints and forces normally supplied by competition. The use of gas for residential purposes—space heating, water heating, cooking—must have priority. And yet, when gas shortages result in industrial stoppages, there can be severe economic disruption and dislocation. Thus, we have to create priorities and arrangements which will make it possible for alternative fuels to be used. It is apparent that larger and industrial users will be better able to use alternative fuels and in a way that will be acceptable environmentally. The magnitude of the assignment is obvious, and one must sympathize with any agency assigned the burden of implementing such policies. But, frankly, I think we have no acceptable alternative.

10. *Liquefied natural gas, synthetic natural gas, and marginal pricing.*—The Committee will hear a great deal about the extraordinarily difficult problem of natural gas selling for 25 cents per 1,000 cubic feet at the wellhead, at about 50 cents per 1,000 cubic feet to the distribution company on the east and west coasts, and the \$1.25 price for 1,000 cubic feet of liquefied natural gas, and perhaps \$1.50 for 1,000 cubic feet of synthetic natural gas. Because the gas industry operates on the "rolled in" basis, it will be claimed that relatively small percentages of the very highly priced LNG and SNG will have very little initial impact on rates paid by the ultimate consumer. It is in this area where the concept of distinguishing among the uses to which gas will be put will be a most significant consideration. Residential consumers, especially those that are already using gas, are not able to convert to other fuels on a very convenient or economical basis. Accordingly, the Congress should consider a policy which would place the primary burden of the higher costs of liquefied and synthetic gas on industrial users which, by the nature of their activities, are better able to adapt to alternative fuels. To the extent that this takes place, there will be a greater burden on them which will inevitably be passed on in the form of higher costs for products and services they provide. Nevertheless, this is more likely to be the least undesirable handling of what we must be prepared to accept in our nation: namely, increased costs for energy. The marginal price at which gas will be abandoned for alternative fuels will obviously be reached more readily by industrial users, and thus the burden of the higher priced natural gas products ought to be weighed toward them.

11. *Program to stimulate the more efficient use of natural gas.*—It is universally accepted that natural gas is an especially desirable and useful source of energy. It is almost as universally accepted that we are now in an era in which we must re-examine the manner in which we have been using all of our energy resources in this nation. Although there have been some minor exceptions, our nation historically has experienced no serious energy shortages. Now the energy problems appear to be with us as far as one can see in the future, it makes sense to devote some of our efforts and talent to developing the most efficient methods of using our available energy resources. Much has already been written about the need for research and development to maximize the conversion of various energy sources to usable energy forms. There is growing discussion about how our buildings and energy-using equipment can be better designed to the end that our energy will be more efficiently put to constructive use. It is not easy to change national habits that have been acquired over generations, and yet we must begin to do so; and the Congress can play a leading role in this effort.

12. *Exploration and discovery of gas by pipelines and distribution companies.*—The transportation and distribution segments of the industry are under far greater economic pressure than are the producers to discover increased supplies of gas. Consideration should be given to additional methods to encourage and make possible their involvement in the crucial producing role. As noted above, the FPC has tried to stimulate such activity, and there have been joint ventures and other arrangements entered into. I would hope that combinations of pipelines and/or distribution companies would expand their efforts in this direction. Clearly antitrust implications might well require such activities to be carefully monitored and controlled, but it seems to me this control can be accomplished satisfactorily. The pipelines and distribution companies in this country are major industries, and they should be able to obtain the financial resources required for extensive investment in exploratory drilling and in the development of gas reserves in the United States. A shift in the Federal Government's policies in leasing offshore tracts to a royalty basis, discussed above, would be helpful in this regard.

13. *Increased Canadian gas imports.*—Efforts to establish a continental energy policy have not met with a great deal of success. Despite this, some significant contracts have been negotiated for transporting Canadian gas into the United States. It is certainly no easy matter, but to the extent that the Congress and the Executive Branch can offer encouragement in government-to-government efforts, they will supplement industry-to-industry approaches to develop both short-term and moderate-term arrangements. Canada is understandably unwilling to commit its wealth of natural resources if such commitments would create shortage problems for Canada over the long term. Yet, it may well be that during the next 4 or 5 years, while progress is being made in the technological fields referred to elsewhere in this statement, it would be in the mutual interest of both countries to increase significantly gas imports into the United States.

#### CONCLUSION

If my statement has demonstrated anything, it is that the shortage of natural gas facing the nation has no easy or simple solution. The causes for the shortage are complex and numerous. The impact on citizens throughout the country can be significant in terms of both gas service and the family budget. In short, we as a nation have some very difficult decisions to make. Because of the long lead times required to implement policy changes in the field of natural resources, it is imperative that we make those decisions at the earliest possible time. This Committee can be helpful in developing the economic analyses and other policy considerations to support those determinations. Additionally, the Committee can be influential in achieving broad public understanding of the issues and support for whatever actions the Congress ultimately takes.

Chairman PROXMIRE. We also have with us today two specialists in the study of energy problems. Charles H. Frazier is a public utility consultant with National Economic Research Associates. Prior to his present experience in the study of energy economics, he worked with public utility concerns, and has appeared frequently before the FPC in proceedings concerning natural gas output and prices.

Appearing after Mr. Frazier is Michael V. Posner, a visitor to our shores from England. From 1967-71, he served as Economic Adviser to the British Treasury and in 1966-67 was Director of the Ministry of Power, England.

Welcome gentlemen.

Go ahead in any way you see fit and we will run the time the same way. Mr. Frazier, go right ahead.

#### STATEMENT OF CHARLES H. FRAZIER, PUBLIC UTILITY CONSULTANT, NATIONAL ECONOMIC RESEARCH ASSOCIATES

Mr. FRAZIER. Senator Proxmire, I have a very brief prepared statement which I tried to time to take ten minutes.

Chairman PROXMIRE. All right. Go right ahead.

Mr. FRAZIER. But in view of what Lee White has said, with much of which I agree, I will try not to repeat that; and file this prepared statement with the committee.

In the first place, I think it is important to recognize that a shortage is composed of two factors. One is the supply side, the other is the demand side, and if you are going to cure a shortage, you have to pay attention to both sides.

The demand side Mr. White touched on when he spoke about the need for end-use control, I would like to elaborate a little bit further on that. First, it is the tremendous surge in gas demand which is at least one of the factors of why we are here, and this surge in gas demand came about principally because several years ago this country started to pay much more attention to the environment. It was the imposition of air-quality controls which made it almost obligatory for the utility companies and the big industries to turn to either gas or low-sulphur oil.

Now, there was not only a surge in actual demand for low-sulphur fuels, but the price situation changed completely. It used to be that only in the areas near the producing regions was natural gas competitive. In other regions, in the East, in the West, in the North, the transportation of natural gas made it noncompetitive with coal and oil.

Now, with the requirement that low-sulphur fuel be used and a relative scarcity of low-sulphur fuel, the prices of that fuel increased by, let us say, 100 percent in a very few years, like perhaps from 1969 to 1971 there was virtually a 100 percent increase. Now, this put gas in a completely different situation, where it is today, in that because the gas prices have lagged behind the market, you might say, because of regulation. Among other things, it is now the cheapest way, in most situations, of an industry or a utility getting low-sulphur fuel. So you have a demand which is virtually infinite; and in that situation you would either have to have very drastic increases in prices, something like double or 300 percent, let us say, at the wellhead, in order to seriously affect that demand, to dry up demand, if you will; or you have to have end-use control. There are only two choices on that side.

There is, of course, a continuing increase in other demands, but presumably this could be coped with if it were not for this tremendous increase in the volume of gas demand above described. I want to stress that because I think it is important in analyzing the situation.

Now, on the supply side there are several factors which have led to the shortage. One is that I think you can say that FPC procedures have caused or allowed prices to rise less rapidly than costs have gone up. These procedures are interminable, it seems when you are involved in them, and I think this has certainly been a factor. But in terms of supply to the interstate market, the other thing that Mr. White mentioned is important here, and that is that when you have a relatively limited supply, that is, limited in terms of the demand, the intrastate market, that is, the market in Louisiana and Texas, for example, has been able to absorb an increasing proportion of new supplies because they are there and they can bid anything for the gas, whereas the interstate pipelines have been limited by what the FPC has allowed them to pay.

Now, the final factor I would like to mention on the supply side, which is, it seems to me, one that we keep overlooking, is that the decline in effort on the part of the oil companies has been a decline in

effort to find oil and gas, and the reason—the basic reason presumably why efforts in the United States have declined on the oil side is because it has been much more profitable to find oil in other parts of the world—Alaska, if you will, but also all over the world. So that you find the oil industry as a whole, and gas is only a very small part of it. let us say, 20 percent of the oil industry, some kind of a fraction like that, turning its efforts elsewhere, and you cannot turn that around by a simple manipulation of the gas price. It would be terribly expensive in my judgment to try and redirect the efforts of the entire oil industry into the United States by manipulating the gas price.

Now, I am not suggesting that you also increase the oil price. I am not an expert on that. But I simply say that gas price won't do it.

Now, let me return very quickly to the alternatives before us. End-use control is certainly one of them. It has to be accompanied by attention to prices, at least so we are not diminishing the return which the oil companies now have, and the leasing policies of the Department of Interior are also quite important here. However, I am concerned with allocation and end-use controls by the Federal Government as a mechanism. I do not know how flexibly this can be administered. As I go through the streets of Washington, and see the enormous office buildings going up and see the bureaucracy of the Government expanding in size, I just wonder whether we can cope with our problems. I have suggested in my prepared statement that maybe we can affect the demand side in an alternative fashion, which is to set up something similar to the highway trust fund whereby a very large proportion of the price of gasoline goes into financing improvements for the gasoline user, and I think if you apply that analogy here, you could have a tax imposed on the production of gas which would raise the price and the proceeds of which would go into this gas supply trust fund, gas improvement trust fund. You could also have a directive tax which would be imposed on the last sale of gas, an excise tax which would steer the gas in directions that the Government decided it could best be steered into. And I am suggesting, for instance, that that tax might be zero on what Mr. White referred to as preferred uses and perhaps 10 cents per M c.f. or something fairly substantial on the other uses.

I believe that in this way you could price gas reasonably on a parity with the prices of other low-sulphur fuels and dry up demand, or balance supply and demand in that way; and provide this trust fund which could then be used for discovering ways of making synthetic gas, furthering the core gasification process, experimenting with making of gas from crude oil—it is not really experimenting. It is really developing the proper plans, because the techniques are all fairly well understood. And bringing gas from the North—these Arctic pipelines will be tremendously expensive but this gas is going to be needed. We do not know how to get gas off the Arctic Islands if the Canadian Government lets us bring that gas down, but those islands could be similar in size of reserves to the Siberian reserves and could be a tremendous factor. We have to recognize that whatever we do in terms of price and whatever we do in terms of end-use control, we do not have the resource base here to go happily on using gas in very large quantities without putting tremendous emphasis on the supplemental resources we need, gas from coal, gas from crude, gas from the Arctic, LNG.

Perhaps we may be able to get the Russians to share some of their gas with us, although that is certainly not going to be any bargain. So I say then that you have these three alternatives, really, to bringing demand and supply into balance. You can let the price system do it which has been suggested—R 441 is perhaps a step in that direction. In that case the prices are going to go through the roof.

Second, you can do it by strict Government controls; or third, you can perhaps do it by a combination, which is the concept that I have advanced to you of a gas supply improvement trust fund—and maybe I would lend Mr. White some of that money to set up a corporation for the offshore exploration for gas in order to provide a kind of a yardstick.

I myself would like to rely on the pipelines and the distributors to boost that effort. They are the ones that have a real stake in this, although Mr. White's corporation representing the consumers, of course, might also be a device to be used. Thank you very much.

(The prepared statement of Mr. Frazier follows:)

PREPARED STATEMENT OF CHARLES H. FRAZIER

My name is Charles H. Frazier, my residence Downingtown R.D. 2, Pennsylvania. I am an independent public utility consultant, associated with National Economic Research Associates. My connection with the gas business goes back to 1927, though my consulting activities only began eight years ago.

The topic before the Committee, broadly stated, is the oil and gas aspects of the Energy Crisis. However, my expertise is in the gas field and I will confine my testimony to that—though the oil-gas relationship will have to be considered.

First of all, there *is* a gas shortage. It is not just a numbers game being played by the industry. Gas demand and supply are in serious imbalance. It is important, in suggesting remedies, to consider the reason.

The principal reason on the demand side is the surge in popularity which gas has enjoyed since approximately 1968 as a sulfur-free fuel. Absent this great surge, principally in the industrial boiler fuel demand for gas, but also in substitution for oil and coal in heating large buildings, the situation would be much more manageable, and since gas couldn't fill the sudden surge in demand, it was transferred to low-sulfur oil and coal. The result—a doubling of the price of those fuels and a complete change in the competitive situation. At the new higher competitive price level, gas became not only the preferred fuel, but on the basis of largely regulated prices, the *cheaper* fuel, a brand new situation for much of the country.

On the supply side two factors complicated the situation. Regulatory lag delayed gas price adjustments to higher cost levels; and perhaps more important, the search for oil was increasingly concentrated elsewhere; and in important part the search is still an indifferentiated search for hydrocarbons.

Finally this is not an imbalance which can be quickly corrected, but will be with us for a long time; the balance when achieved, will be accomplished by increasing the supply of supplementary expensive gas. Moreover, at *no* visible production rate can the surge in boiler fuel demand be met. The resource base is just not adequate.

There have been two general courses advocated to meet the current gas shortage: (1) decontrol of prices (S. 2467 and S. 2505 go far toward accomplishing this), and (2) the course advocated by Chairman Swidler of the New York Public Service Commission (among others) of giving the FPC *greater* control over the *use* of gas and so achieve a demand-supply balance in this way. A word as to the first course. It is obvious that given a free market (and no regulation) end-use and intra-state problems would in the long run be cured by the pricing system. Theoretically, the price of gas in the field would rise to the point where demand would shrink to the somewhat expanded supply level which the new price level would permit. However, as I indicated, shortage conditions would still prevail since the resource base for indigenous supplies is limited. In effect, therefore, these relatively scarce supplies would be auctioned off, under an uncontrolled

pricing system. For a substantial period of time, as prices were adjusting themselves, the *intra-state* market would be satisfied first, since gas's competitive position is there superior. At what point and for which parts of the country the *inter-state* market would begin to be satisfied is difficult to forecast. However, it may safely be presumed that the "gas shortage" in the inter-state market would get more severe before improvement set in; and some parts of the country (the east and west coasts perhaps) might see the city-gate price for the gas go beyond the point where any but the captive customers would still be served.<sup>1</sup>

The economist has to satisfy himself by seeking the answer to the question "what's wrong with that"? The gas customers who would suffer have benefited by the use of economical gas supplies for a long time now and public policy need not preserve their preferential position forever. The answer to this question is a simple one. There is *not* a "free market" for low-sulfur fuels, due to a long list of institutional and governmental factors. Consider only the most important. Coal is virtually precluded from competing, in most of the country, because of EPA and other environmental restrictions. Electricity is, or will soon be, in scarce supply for a variety of reasons, again largely centering on the environment. Oil is produced and sold by those who produce and sell natural gas, seriously weakening the competitive urge in an industry where the relatively few majors dominate the free supplies; and the supply is restricted by oil import controls imposed by the government.

Then there is the further factor of the capital-intensive nature of gas-use, with the cost of gas utilization equipment many times the annual bill for gas. In consequence the vulnerable part of the market—that influenced by price—is largely the *new* market, and the response to price increases, in terms of total demand, will lag far behind price movement. The prevalence of long-term contracts often compounds this problem. Moreover the sluggishness of this response is likely to be increased by the regulatory practice of averaging, for rate-making purposes, the new high cost increments with the old, lower cost supplies, the so-called rolled-in rate phenomenon.

The absence of a free market is of course the reason why the phrase "market clearing price" has little meaning. Once one "market clearing" level has been reached—at well over double current prices—the weak competitive situation above-described will permit prices of alternate fuel supplies to increase and gas prices will then have to find new higher levels. The end to that process is not in sight, and the cost to the consumer tremendous—and, as noted before, not compensated for in major supply improvement. In this situation, the "market clearing price" concept becomes chimeric.

This situation—i.e., the absence of a free market—is indeed the basis for the greater part of the regulatory system we have; and the very existence of the system is a reason, in equity if not in economics, why key elements should not be abandoned. Thus if reliance on the system has encouraged the expenditure of billions of dollars in facilities and equipment, it is violative of the implicit covenant between the government which set the system up, and the governed, to make abrupt changes in it.

I would conclude from this set of conditions that one alternative set of solutions—simply to let prices take care of things—is really not available. Supplies would continue short, prices would spiral, and the market would be severely disrupted without regard to either equities or economics. This being the case, a good look at the alternative is required.

The other general course which has been advocated is to expand governmental powers, as suggested by Chairman Swidler, in effect to ration and allocate the scarce supplies; though production would be encouraged to an appropriate extent by prompt promulgation of such field prices as would offer a reasonable profit potential. The essence of such a program would be (1) to establish a national system of end-use priorities, applied first as to new usage, and only if necessary, to existing sales. The uses at the low-end of the scale would be proscribed to the extent needed to balance sales with deliverable supplies. (2) FPC regulation would have to be extended<sup>2</sup> to cover regulation of *intrastate* pipelines, at least in terms of its Section 7 powers; and its powers over gas supplies on the outer continental shelf could be used to assist it in its allocative function.

<sup>1</sup> The mere fact that faced with critical, immediate shortages, distributors will pay high prices for supplemental supplies does not establish a new value level, a subject discussed in the next paragraphs.

<sup>2</sup> Probably by statute, though it may be argued that in the present emergency, FPC has as yet unutilized powers to cope with the end-use problem.

This is one way out. Even with full FPC powers this course would involve the severe problems implicit in pricing and allocation by fiat in a situation where there was often a very substantial gap between the price so fixed and competitive values. Moreover, it would take an all-wise, highly efficient FPC to make it work. Standards would have to be nationally applied, but the myriad variations in local conditions would be bound to produce hardships. To those concerned with the effective functioning of regulatory agencies under far easier circumstances, the prospect is not a particularly encouraging one. Moreover with most gas still produced by the oil companies,<sup>3</sup> whose *functioning* is not regulated, how direct their findings into the preferred markets?

If it is judged that this essentially "big government" approach does not offer promise there is, potentially, an alternative course, which seeks to use the price mechanism to do much of this job, within the overall regulatory framework. Such a course would have three facets: (1) rational and effective regulation of new gas prices, to permit and encourage adequate resource development (an immediate and material price increase and no change for five years?); (2) a national tax progressively imposed on the first sale of gas, to reach an effective target level in, say, three years, payable into a "gas supply trust fund"; the function of which tax would be to make gas too expensive to be wasted as a raw fuel; and (3) a national, selectively-imposed excise tax on the ultimate sale, heavier on the less preferred uses, zero on the "highest" uses, to finish the job of guiding supplies into the uses determined to be the most appropriate. This tax would also be phased in; and receipts from these taxes would also be paid into the trust fund.

The uses to which the trust fund could be put are numerous; expanding R&D programs on gas manufacture, on nuclear fracturing, and on Arctic pipelining; offshore Atlantic exploration; and providing a source for financing the expensive facilities required for the needed supplemental sources of gas—all are possibilities. Others will occur to the reader. The *objective* would be supply-expanding—and easing the transition to an era of more expensive supplies.

Note that this alternative requires the establishment of a broadly conceived national fuels policy, wherein the place of gas, and particularly the indigenous supply thereof, would be determined in the light of its greatest utility to society. This would have to be the foundation of and yardstick for the taxation system suggested. Most agree that either the Congress, the Administration or both will have to address themselves to this as an early priority.

Another important feature of this alternative would be that the recent substantial increase in value of sulfur-free fuel would not be treated as an economic rent, payable to the present producers of gas under a free price system—a payment which could amount to some ten billion dollars a year, only a small part of which would end up expanding gas supply; but rather, in contrast, be directed to uses which would specifically benefit the consumers of gas who would be paying the bill.

In essence, then, there are perhaps three broad courses, (1) basic freedom of prices, the substantial cost of which would seem to far outrun any possible benefit; (2) the expansion of governmental (FPC) powers to ration short supplies (while expanding them to the greatest extent the resources base will permit) and to direct such supplies into preferred markets; and (3) a third course which would retain overall governmental guidance, but allow a combination of prices, and taxes from which the gas consumer would benefit, to perform the directive and rationing function.

I hope this analysis of possible courses of action will be a useful supplement to the record as accumulated, and offer it in that spirit.

Chairman PROXMIRE. Thank you very much, Mr. Frazier. We are going to have to recess the hearing for a few minutes while Senator Bentsen and I go to the floor to vote. There is a rollcall. We will be back in the next few minutes to carry on.

(Recess.)

Chairman PROXMIRE. The committee will come to order. Mr. Posner, you have 10 minutes.

<sup>3</sup> The solution to this problem, basically, is to use all available means to encourage and goad gas pipelines and distributing companies to pick up a substantial fraction of the production function. This partial step toward restoring a free market would in itself permit the relaxation of regulatory controls.

**STATEMENT OF MICHAEL V. POSNER, SENIOR FELLOW, THE  
BROOKINGS INSTITUTION**

Mr. POSNER. Thank you, Mr. Chairman.

Last time I was in your country discussing natural gas problems I was here to learn. There is a process of circular imitation which seems to be going on in this trade in that we tried to learn from you in the 1960's and now you very kindly suggest that there conceivably could be something which you could learn from us.

I hope that these circles do not go round and round with ever diminishing radius because that would be most unfortunate.

There are three reasons to which I would draw your attention why our experience is not really relevant to yours, and I think you should remember those reasons.

The first is we do have a monopoly organization, the Gas Council, who virtually buys all the natural gas which is available and sells it all. Fond though I am of that system in my own country, I would not suggest to you for a moment that for a host of reasons, geographical, historical, political, that you should wish to go along that particular route.

Nevertheless, I think there are aspects of the Gas Council's activities which are worth your knowing about and I will mention those in a moment.

Secondly, we are a new user of natural gas. We have been using the exploring rigs which it would have been nicer for you to have in offshore Louisiana. We are a new province being opened by the oil and gas industry and the prospects are good and, therefore, we are at the same state of euphoria about hydrocarbon supplies as you were perhaps 20 years ago. In that sense we are behind you.

And lastly, a major difference from you, natural gas is still a small fuel among the total fuels used. It will not amount to more than about 15 percent of total fuel in the middle of this decade. Your percentage is well over double that. And that means we essentially still use natural gas for premium purposes and not for bulk steam-raising.

Nevertheless, I think there are some lessons or some aspects of our experience which are of interest to you, and I will take three aspects, if I have time.

I have asked myself, first, how we might react, if there were big changes such as those which you have recently experienced, in the relative cost of different fuels, the availability of gas compared with the final demand for it. We would tend to approach these problems by asking, what is the resource cost of different fuels and what is the best allocation of resources between those fuels?

Faced with LNG imports at around 70 or 80 cents per M c.f., perhaps even ranging up as high as a dollar, I think we would wish to find alternative ways of substituting for that LNG.

First of all, we would give strong consideration, I am sure, to using fuels other than expensive gas for such purposes as steam-raising, for burning under electricity power stations, and so on. I cannot conceive of us using LNG at that sort of price. We would be using coal or imported oil.

Now, I am aware of the environmental considerations leading you to avoid high sulfur fuel. We seem either more neglectful of these

considerations or more successful in avoiding them. So, secondly, if we could not get away with substituting other fuels for natural gas we would consider manufacturing natural gas, and certainly our experience in the late 1950's when all our gas was manufactured suggested that at prices then considerably below the LNG prices now being approached, we could make gas from high distillates of oil—from naphtha. We would see this supply of naphtha being generated through an increase in the amount of oil being refined over and above what otherwise would have happened. We would expect some of the extra heavy fuel oils going for steam-raising purposes and the lighter refractions being available as a fuel for making gas.

The last way we would try to top up our supplies of gas rather than pay what we would regard as very heavy import prices would be to find new sources at home, and here we come directly to that second main aspect of the problem in which you are particularly interested at the moment—the cost of natural gas at the wellhead.

We have been buying in ways which we learned essentially from the FPC in the old days, in a “regulated” manner. We have been asking ourselves what is the cost of getting our gas and what bonus profit margin inducements over and above the cost is it reasonable for us to pay to get further exploration?

So far, we have done that job successfully. We have bought at a relatively cheap price, below market price, and yet a lot of exploration and a lot of gas production is going on.

We have asked ourselves how can we induce people to produce? How can we induce people to explore? And there are two or three aspects of our experience there which I draw attention to in my prepared statement.

One aspect is the supply of information. I have been rather amazed to find since I have been here that people wonder whether the FPC or other organs of government or the Congress have the information which is necessary to assess the availability of natural gas in this country. We have both on a statutory basis and on a sort of more familiar “old-boy” network basis pretty high availability of information to all parties to the bargaining process. Oil companies doing the exploring and production are bound to give information to the appropriate Government department.

More than that, we have a public interest in exploration, not a single corporation which goes out and explores, but two or three of our public corporations associated in partnership with international oil companies—the best known partnership is between our Gas Council and the Amoco Company—for the exploration and production of gas in the North Sea. The Gas Council, therefore, has a role as a producer and presumably takes, like any other 50-50 owner of a corporation, information from the operating officers of that corporation sufficient to check on other published information.

Moreover, we find (perhaps I speak here more for myself than for other people who have looked at this problem in my country) the existence of this sort of competition from the public sector in oil exploration and production acts as an incentive both to rapid exploration and to rapid production of such hydrocarbons as are found, because the producers know that if one of them does not sell, then another public producer could sell. We find this mixture of public and

private enterprise, therefore, in the exploitation of natural gas supplies, productive and useful.

We cannot, of course, say whether it will see us through the next two or three decades. We are still at the early beginning stages of the curve, of using and finding natural gas, but so far it has worked well.

Now, if I can comment finally on the question of the future—supposing that you do need more gas. Supposing that my various routes for evading the necessity for paying the high import prices do not entirely work. You still need to ration out your gas amongst final users and this would imply—I would agree with the other two witnesses this morning—some element of marginal cost pricing in the final market, which means high revenues for the one or other of the people in the chain of production from those who find the gas to those who ultimately sell it. I would agree that these revenues need to be extracted from those to whom they have accrued and devoted to the public good, because they partake of the nature of accidental economic rent.

Now, I would be perfectly prepared to see a situation in which we paid a pretty high price to induce new exploration, but I can see no justification myself for spreading that high price to the people who are producing gas which was found many years ago. If indeed new funds are required for exploration, there is something called a “capital market” which I believe is quite well developed in your country, and I would expect companies who were faced with the prospect of being paid something around 50 or 60 cents per M c.f. for gas found even offshore, would have little difficulty now in raising funds for that exploration one way or another through the New York capital market.

And so it is the prospect of a good price for new discoveries, which seem to be more important in the incentive process than a high price paid for gas which already is available. But I would emphasize I see all of these problems as highly interrelated, and it is not possible either for a foreigner just sitting here or indeed for any other individual to keep all the complex juggler’s balls of the hydrocarbon business in the air at the same time. If I may, with diffidence, suggest it to you. I suspect that you need a formal apparatus of energy policy making and even more of energy policy discussion in your country in one or another branch of government so that you can be sure and the public can be sure and the various users of fuel can be sure that the various considerations are fitted together in a reasonably rational way. The object of the exercise would be the best use of your available resources, treating the prices which you are required to pay for different resources as something which come out of this exercise, rather than seeking what I would regard as the chimera of a hypothetical market solution which would determine prices for you.

Chairman PROXMIRE. Thank you very much, Mr. Posner. We very much appreciate your testimony, too.

(The prepared statement of Mr. Posner follows:)

#### PREPARED STATEMENT OF MICHAEL V. POSNER

Mr. Chairman. Thank you for your invitation to participate in this hearing. In doing so, you will understand, I speak only for myself and not for the Brookings Institution where I am at present working, nor for the departments of the British Government with which I have been associated in the past.

I am of course not expert on U.S. energy policies as such, nor in particular about any specific pipelining or regulatory decision. I have recently completed a

book on (British) *Fuel Policy*, and have worked, both as a government official and as an academic economist, on problems of natural gas exploration and use in Britain. It seems that I could be of most use to the Committee if I analyzed briefly those aspects of the organization and regulation of the industry in Britain which I judge to be of most relevance to your present concerns.

#### ECONOMIC BACKGROUND AND "PLANNING"

Natural gas is a new fuel for Britain. Until 1965, our only supplies were a trickle of liquified gas imported from Algeria; towns' gas, used mainly for household cooking and heating, was made mainly from "reformed" petroleum products, and more traditionally from coal. Discoveries on-shore in Holland led to the international division of the North Sea between the riparian states, and exploration in the British sector began in 1963; to date, probable reserve of 50 trillion cubic feet have been found, and production will be running at 4,000 million cubic feet per day in the mid 1970s, around 15 percent of Britain's total fuel use.

All petroleum is still imported in the United Kingdom, but recent finds in the North Sea should mean that by 1975 20 percent of U.K. crude oil comes from British sources; but since the oil companies treat the whole of Western Europe as a "common market," and no significant finds have yet been made in the area, the United Kingdom will still be overwhelmingly an importer of petroleum, for which it will rely for nearly half its total energy use.

"Energy policy" in Britain—and I understand this is becoming true also for the U.S.A., at the margin—must be internationally orientated; and economists' attempts to calculate the "lowest social cost" mix of fuels will always stumble over the great difficulties of measuring and predicting the avoidable marginal costs of imported products. Moreover, energy "policy" can only be meaningful if the public authorities have some influence on outcomes, so as to control production, importation, or use: a move toward complete decontrol, toward the abolition of regulation, is as much an act of policy as any other move. In Britain, policy is exercised partly through taxation (a hydrocarbon duty on heavy oils); partly through financial control—and sometimes subsidization—of the publicly owned coal industry; partly through decisions on nuclear energy; partly through control of gas exploration and production. This sounds fairly grand, but in my book I argue that market forces (in particular, changing technologies and real costs) determine the *direction* of change in the mix of primary fuel use, while policy influences more the *pace* of change and hence the relative outputs of different fuel industries at a point of time. No one in his senses would wish to resist clear, loud and confident market signals; the object of policy analysis is to tune into the signals, correct them for obvious distortions, and smooth the transitions that seem to be required. Both a framework of policy and readiness to respond to market signals are required. Amongst the many signals that have required careful analysis in my country in recent years are: the future path of coal mining productivity; the future path of nuclear engineering development, and its reflection in financial costs of electricity generation; the likely success of petroleum exporters in forcing up their effective prices; the present and future resource cost of natural gas. The remainder of my remarks will be directed toward this last issue.

Two comments before I leave this background section. Because, perhaps, of our excessive caution and bureaucratization, the prospect of an absolute shortage of any one fuel in the future has never seemed worrying in recent years; we have our power cuts and supply failures like everyone else, but, e.g., the Gas Council is at this time planning its purchases, sales, and pipelining for the 1980s. They may, of course, get their sums wrong, and it may prove necessary in five or ten years time to consider new ways of manufacturing gas, with corresponding increases in price to final customers; but with all the inadequacies of forecasting, we ought to foresee this sort of event at least five years in advance, and to react accordingly. Perhaps one source of our confidence on this score, not without its disadvantages, is our role as a large importer of petroleum.

Secondly, while different British governments differ in their degree of affection for "planning," in practice the necessity for energy policymaking has seldom been denied. The Ministry of Power (now part of a larger Department of Trade and Industry), in cooperation with the nationalized gas, coal, and electricity industries, and at least with the advice of the larger oil companies, has performed this role to some degree, ever since the war. They have made some mistakes,

and have perhaps erred on the side of protectionism, but it would be hard to argue that my country would have been better off if no government department had ever employed officials in this sort of job.

#### INSTITUTIONS

The "Gas Council" has monopoly powers over the transmission and distribution of the public supply of gas in Britain. Until now, the industry has been split into a dozen regional corporations loosely federated; but the Council is now to be a monolithic public corporation. It is wholly owned by the government, which appoints all members of its Board. It has statutory duties and obligations, and successive governments have clarified the financial rules under which it operates. The rules include the achievement of a target surplus or profit, struck after meeting interest charges on the book value of its assets. All new investment funds come from the public purse or from its own ploughed-back profits.

Exploration in the North Sea for gas (and oil) is governed by licenses, issued by the government; although there has been some experiment with auctioning the licenses, along Canadian or Alaskan lines, for the most part they have been "allocated" against commitments to explore rapidly (and to pay a very modest royalty on any eventual sales). "British" companies have received some degree of favorable treatment in license allocation, and so have "foreign" companies who already do a lot of British business. The Gas Council itself, in partnership with Amoco, are operations in one large field, and so is the (nationalized) Coal Board. But many other companies, mostly banded together in consortia, have received licenses and discovered gas. Both exploration and production have been fast and successful.

Companies who find gas are legally bound to offer it to the Gas Council, unless they themselves can use it as a petro-chemical feedstock. By a procedure rather unusual in British industry-government relations, the responsible Minister has to determine whether the Gas Council has offered a "reasonable price;" only if the Council did *not* do so could the explorers sell the gas elsewhere. In effect, unsurprisingly, the gas has, almost entirely, been sold to the Gas Council. The prices varied from contract to contract, but were dominated by a 1968 settlement at a level equivalent in American terms to about 29 cents per M.C.F. at the beach. Exploration has continued, in part directed mainly toward petroleum, in part still searching for unassociated gas: new fields have been found, fairly steadily in the last few years, although the best prospects seem to have been picked first.

Data reported by exploration wells are made available, not exclusively on a statutory basis, to government departments, in confidence. Production costs are not reported in any way, but the Gas Council as a co-owner of an operating company in a large field presumably receives both technical and cost data from the operators. Seismic surveys, extensively used in the early days of exploration, were often arranged collaboratively by oil companies and the information obtained was spread around fairly widely. I have heard it suggested that "proved reserves" were underestimated while price negotiations were under way, and there is no manner in which a skilled reservoir engineer can be forced to declare his hunches to outsiders; but the network of public "listening posts" in the exploration and production business is so extensive that I believe there may be more information available in the governmental sector as a whole than in the hands of any one oil company, even the biggest. There are fairly strict rules of the game about exchange of information between the Gas Council and the Government Department, and I am sure these rules are observed; but we do enjoy a situation in which the government, the Gas Council as buyer, and the individual oil companies as producers, have access to information which will give cross checks on the assertions of other parties. An irreducible minimum of geological doubt of course remains.

#### HOW ANNUAL CONSUMPTION IS DETERMINED

The rate of output from the proved fields is decided in the course of bargaining over price and other contract terms. When in 1967-68 it appeared likely that the volume of gas available would be large compared with annual consumption of manufactured gas in the 1960s, and that the price would be low compared with the cost of alternative fuels, it was simple to show that "rapid depletion" of the reserves was the best policy; the rate of growth of the premium market would not be sufficient to absorb the available gas for many years, and it was

therefore desirable to sell gas in the early 1970s to the general market, in competition with coal or fuel oils. A fairly open "*relative* profit maximization" approach by the Gas Council, selling the gas to markets where the net return is relatively great, satisfies most relevant optimization rules, although there are exceptions.

For instance, too high a profit for the Gas Council would effectively appropriate to the Council, and hence only indirectly to the British taxpayer, most of the windfall gains from the North Sea discoveries; we can be sure that the normal political wish to keep public sector selling prices as low as possible will ensure that the consumer gets (more than) his fair share. And the government (as well as the healthy expansionist instincts of the industry itself) will see that final prices are kept low enough to sell all cheap gas that becomes available. Again, in the absence of a large air conditioning load, most British fuel plants—oil refineries, power stations, even coal mines (where the cost of inventory servicing is high)—have spare summer capacity, and therefore low load factors. "Summer gas" can be made available very cheaply, at the margin, and could readily displace other fuels, reducing their annual load factors further. It is possible to conceive of price mechanisms that would solve this problem "correctly," but I would guess that in both my country and some others a spot of institutional coordination in the public interest, supported by detailed technical assessment, will be an easier route.

#### THE BUYING PRICE OF GAS

I have just been discussing prices to the final consumer. The Committee may be more interested in the manner in which we settle the price for sales from the North Sea producing companies to the Gas Council. From the oil companies' point of view, the market situation is severely adverse; the sellers are many (and inhibited by both British and other anti-trust laws); and the buyer is a monopsonist, aided and abetted by the monopsonist's sole shareholder—the British government. Nevertheless, the oil companies have not seriously argued that they have been robbed; they have continued to explore fairly eagerly. Partly, no doubt, this is because the Gas Council is run by fair and honorable men, who wish the oil companies to earn a decent return; and partly also the government, under successive administrations, is aware that it may be against our interests to give overseas oil producers too much open instruction in hard bargaining with oil companies. But the main reason is that all concerned on the buying side of the table wanted to give sufficient incentive to further exploration. The art was to seek to set the price so that the typical producer, with a typical set of North Sea license blocks, and a reasonable hope of making a strike in one or other of his blocks, would calculate that his likely return was sufficient to make his investment a good risk.

I hope I understand American experience sufficiently to say that this will, to U.S. experts, sound remarkably like the justification advanced for the Permian basin decision, and no doubt many others: it was, from the point of view of the buyers, a cost related price. But the calculation of the "cost" was much swayed by guesses about the future cost of exploration, about the dry-hole ratio that would characterize the North Sea, about the geological structures. No information on the prospective (or experienced) rate of profit has ever been published, but I think most observers would guess that the early finders of gas in the North Sea will do better than will Permian basin producers; they were, after all, taking great risks.

Nevertheless, the gas sold in the early contracts was certainly well below the price of competing fuels (or the cost of manufacturing gas by competing routes): I estimate in my book that the actual buying price may have been  $\frac{1}{2}$  below the "market clearing price," and that is a conservative estimate. But I do not regard the question of what the price *might* have been in a hypothetically perfect market (such as does not exist in my country and perhaps not in the United States of America) as of very great importance; the issue here is the division of a (windfall) economic rent, of little importance to resource allocation, and hence the magical aura of the "market solution" is absent.

I would deduce from this limited British experience that "regulation" (in the sense of setting prices differently from what would happen in the absence of regulation) can work, without choking off exploration or stopping further discoveries. If I may venture the opinion, it seems to me that American views on

this question have veered too sharply over the last five years. When I was interested in the Federal Power Commission's activities in the mid-1960s, it was conventional in some circles to say that the attempts at regulation merely achieved, with an excess of legal proceedings, what the market would in any case have done. Today, there are apparently many who say that regulation has kept prices far too low and restricted exploration. While it is just conceivable that both these views were correct at the time they were stated, the "market" whose existence is hypothesized seems rather a myopic institution. Perhaps (and here I speak as a student seeking to apply your long experience to my own country—it is only seven years since we started using natural gas in any quantity) your prices have been a little too sticky, discouraging producers, in light of other investment opportunities open to them, from proving or selling their products until prices moved as expected.

There is an analogy here with the prices of different currencies in the foreign exchange market: I am a supporter of "regulating" these prices, but I agree that a shrewd regulatory authority should attempt to analyze and predict future movements in demand and supply, and move his regulated prices accordingly. (To do this job properly he needs much information and some staff.) Just so I would not be surprised if there were some edging up of gas prices in some British contracts struck in the mid-1970s (although there need be no necessary change in the terms of our existing contracts, usually made for about 15–20 years), largely because of changes in the world demand and supply of fossil fuels; this would be additional to any increases caused by "inflation" as such.

#### RESOURCE ALLOCATION

I hope this background analysis, and such oral extensions as your Committee allows me to make, will be of some relevance to your problems. More important, it seems to me, than the precise set of transfer prices at which your various fuels are sold in one particular year to consumers who are in any case "locked in" to specific fuel-use for many years). are the changes which occur, at the margin, through "choice of technique" decisions. These decisions are made in light of future expected prices, shortages, and so on; and it is these expectations which, all over the world at the present time, are hard to form on a rational basis. This is a bad time for economists to be making predictions about the future, but a good time for legislators and bureaucrats to organize their analysis to handle new information and estimates as they become available. Changes in the relative prices of different fuels may turn out to be necessary and in judging these issues we must have cast an eye to the international as well as to the domestic market. I am no better equipped than the next man to peer into the crystal globe of geo-politics, which has so great an influence on petroleum and gas prices. But, for the affairs of my own country, I would delineate the ball park of prices in which incremental supplies of gas might be bought in the next five years as lying between 30 cents per M.C.F. (based on our recent contracts) and a theoretical outer limit of 70 cents per M.C.F. (based on our 1963 contracts for liquified Algerian gas and more recent Algerian sales). These figures refer to the general price level of 1970, and would need upward revision for "inflation." I should certainly expect to buy some additional offshore North Sea gas at the lower end of the scale, because of our cost-related approach to pricing of indigenous fuels: but for future resource allocation decisions it is the long-run marginal resource cost which is at issue, and here the international price is important if significant quantities are expected to be traded (either imports or exports).

In my country, where natural gas is less than 15 percent of total fuel use, high international prices are of limited importance—we would probably import very little, even in the early 1980s, if landed prices (net of inflation) were much above 40 cents. But in the United States, where natural gas is of far larger importance, small changes in relative resource costs may have sharp effects on resource allocation. As your economy becomes more open to imports, the relationships between the international costs of petroleum and gas, and the domestic costs of coal and nuclear energy are almost bound to change, and to have important consequences. I would emphasize that my country is comfortably small, and gas can be transmitted from one coast to another for around 5 cents per M.C.F.; so my prices must be expected to look low compared with delivered eastern seaboard prices in the U.S.A.

## SUMMARY

It is for your Committee to draw its own conclusions from my testimony, written and oral; you will appreciate that I am necessarily reluctant to venture policy judgments on your affairs drawn from our still limited experience in Britain. But a few points, positive and negative, do seem to me of potential interest to you.

First, on the negative side, the special position of the Gas Council as the single ("monopsonistic") buyer and distributor of natural gas arises from special historical and geographic factors in Great Britain. While governments formed by both major political parties in my country have so far seemed happy with this arrangement, and I would judge that it works reasonably well in our public interest, I cannot believe that such a set-up will be possible or desirable for you.

More positively, it does seem to me that, for a host of reasons, governments in Europe and America will need over the next few years to take a view on their national energy requirements and the ways in which these requirements might be met. The apparatus of "fuel policy" analysis which has been developed in the British government in the last decade has been useful, and has led to the general acceptance of change and development that could be said to be consistent with the trend of market forces. I would expect that most experts on energy would welcome the systematic public presentation of policy considerations, whatever their own views; at the very least, public acquiescence in market changes will be greater if the public interest has been fully represented in policy discussion.

Thirdly, it is important to stress that resource allocation—between imports and home production, between the production of one fuel and another—is the main public interest to be furthered. Prices, in this context, play the secondary role of inducing changes in resource allocation; in face of any proposed change of price an economist will ask, "What *real* changes will be induced by the move in prices?" and "Are these changes desirable?"

Fourth, both as a way of ensuring rapid and orderly development in natural gas production, and as a way of providing proper incentives to exploration, the "regulated" manner in which we have set prices in Britain seems to have worked tolerably well. An essential feature of this system has been the spread of knowledge (of costs, markets, geological conditions) amongst the several parties at the bargaining table. The fact that one or two public corporations have themselves engaged in exploration, with private sector partners and in competition with purely private concerns, has certainly contributed to this spread of knowledge. And it may be that competition from these public sector producers has usefully added to the incentive for prompt exploration for and exploitation of reserves.

Lastly, and here I would be more tentative, it is conceivable that our insistence on rapid "work programs" from successful applicants for licenses is a more successful way of asserting the public interest than is the extraction of large "entrance fees" by way of initial auctions. My confidence in this assertion would be the stronger, the more it was possible to "regulate" ultimate prices.

Chairman PROXMIER. Now, there has been another rollcall and this time Senator Bentsen and I will leave but I am going to turn over the Committee to Congressman Blackburn. We will be back in 10 or 15 minutes.

Representative BLACKBURN. Thank you, Mr. Posner, for your statement, and I think you have made a valid point that perhaps some mixture of private as well as some government-sponsored exploration could act as an incentive to private producers who today are not as actively exploring as they could be.

Mr. White, let me ask you this. In your prepared statement you refer to inadequate industry data. You have suggested the accounting practices followed by gas producers have left a great deal to be desired.

Can you be somewhat more specific?

Mr. WHITE. I will try, Mr. Congressman.

As the prepared statement suggests, however, I do have a bit of a qualifier there. I note that I am not an accountant and that I am rely-

ing primarily on the basis of others whose judgment I respect who are accountants, but the Federal Power Commission in 1960 launched a series of major area rate cases. The first one was the Permian Basin in Western Texas and New Mexico. And the whole effort of the hearing was to discover how much it cost to produce the gas on an average basis in that particular area, not taking the least efficient or the most efficient, but trying as best the Commission could through its hearing examiner and through the adversary process to develop a body of data that would enable it to have some idea of what it cost to produce a thousand cubic feet of gas. And in that proceeding it was extremely difficult for the hearing examiner and for all of the parties to even understand how some of these elements that constituted the total cost were to be accounted for.

For example, one of the items, and this may not be a particularly felicitous choice, had to do with Federal income tax. To the extent that a producer pays Federal income tax, that is a cost of doing business and it is a cost of producing the gas and should be considered as an element that piles up with all of the other ingredients and elements to make the total cost of producing gas. And there was no way that that data could be supplied.

The producers, perhaps for valid and good corporate reasons, concluded that Federal income tax returns are privileged and they were not about to indicate what the cost was. The Commission then was bothered. It would like to include that as an element but it had not any body of data upon which it could include that ingredient.

Representative BLACKBURN. As I understand it, the producers take the position that the income taxes they pay are a part of doing business?

Mr. WHITE. Part of the cost of producing the gas.

Representative BLACKBURN. Of producing gas?

Mr. WHITE. Yes.

Representative BLACKBURN. I find myself a little baffled by that. And then they say since their income tax returns are confidential, then you really do not know what they paid in income taxes.

Mr. WHITE. That is correct, and under those circumstances the Commission—this occurred before I was at the Commission—had the belief, and it did not have quite the same trouble you did, Congressman, with the thought that that should not be a part of the cost. They were willing to concede that to be a part of the cost, but you cannot ascribe a value to it if there is no data upon which you can base such a decision.

Representative BLACKBURN. The thing that baffles me is that taxes are something you pay on a profit. You cannot compute your profit until you know what your cost is. So at least that is sort of begging the question there.

Mr. WHITE. I can understand why you would regard it as somewhat circular, but since the concept was to find the cost and then on top of that add an element that would go into the final price to be paid for the gas by the purchaser, it would be a return on the investment made by the producer in order to obtain that gas. But that, I think—I understand your question, and yet there was some problem with that at the Power Commission.

Representative BLACKBURN. The Power Commission just accepted that as being a valid way of accounting for gas producers? This is a

new field for me, so I have to ask the question, otherwise I may never get an answer.

Mr. FRAZIER. Well, there would be two ways in which you could handle this. One is that you could allow a higher rate of profit before tax and then consider the whole thing before tax. The other one to include it simply as a cost of doing business. But since the FPC did not know what the tax was, they just put zero in, which was the rates finally came out.

I would like to add one thing to what Mr. White said. The problem really was not the adequacy of the accounting data but the staleness of it and the slow process of getting it in. If once every 5 or 10 years you send out a massive questionnaire and swamp the agency with all these numbers, you are bound to produce a stale cost when you get it, and in my mind the thing that has happened in recent years is that the costing information simply has not caught up with the cost trends.

The FPC has been quite reluctant to ask for this information on a regular basis, and yet the only way that they will ever know whether their rates are keeping up with costs is to have it regularly and promptly.

This has been the problem, I think, rather than what Mr. White calls "accounting practices leaving something to be desired." It is the getting of the accounting results to the price-making agency which leaves an enormous amount to be desired.

Representative BLACKBURN. Well, now, I am going to try to put myself in the position of a producer right now. Let us say that I have some wells that are operating. I already have my investment in it, and if I can get a rate increase that applies to the existing discoveries, then I in effect have been given a bonanza, have I not?

Mr. WHITE. You have, although in the very first area rate case the Commission recognized that concept and developed the so-called two-tier price levels so that it recognized that incentive can hardly be applied retroactively to get people to do things in the past. But indeed, it should have a higher price if that additional incentive were required for new gas that is discovered in the future.

You as a producer, I think, would very quickly, however, come to a different argument which is, yes, but it takes a great deal of money these days to explore, and not that we are broke, but unless you will give us some additional benefit from our old gas, we will not have the financial resources required for this enormous investment in drilling today.

This is the argument that is offered by the producers and to some extent I think the Commission has—the Federal Power Commission—has bought that.

When I say to some extent, it is very difficult to be precise in these areas, but one of the big problems is what Mr. Frazier talked about—the way time unfolds. These proceedings have taken 4, 5, 6 years from the time they were initiated until the time they actually concluded by the Commission, and in the case of the first one, an additional nearly 3 years for judicial review, ultimately by the Supreme Court.

So that there is the problem of the stale information. There is the problem of how to separate on a basis that will encourage or induce these large investments that are required.

I think my own attitude is that there has been a considerable amount of profit involved in the gas producing business and as Mr. Posner says, the need for new capital is something that occurs rather regularly in our commercial and industrial world and here and there are people who would be willing to invest in oil and gas exploration if they believed that they are going to have some inducement for the future. But to pay a higher price for past gas that has been found in order to provide that money strikes me as not a very sound public policy position.

Representative BLACKBURN. Well, I am impressed along this line somewhat, that the producers are the ones who gather the data. They are the ones who are trying to get higher prices. They must not be too unhappy with this time lag between the time they make their applications and they gather the data because they are the ones who are going to be rewarded if the data is made more promptly, it seems. So there must be some reason why they do not feel any particular pressure to come up with data at an early date.

Do you have any comments on that, Mr. Frazier?

Mr. FRAZIER. Well, in the first place, one producer cannot volunteer the data very well. He would feel he was at a competitive disadvantage with his colleagues if he revealed his data. I think you would—

Representative BLACKBURN. Why would that be so? Would not the techniques for all exploration be pretty well standardized among the companies?

Mr. FRAZIER. I am sure that each company thinks it is a little better than the other companies. I think this information would have to be submitted by a regular procedure in order to be useful. It might be that only the highest cost ones would volunteer the information, you see. So that the FPC should have a rather thorough knowledge of it and it can only obtain that by some, as I see it, standardized practice of reporting.

Representative BLACKBURN. You understand, I am a great private enterprise man, although I am not talking like it right now. We are talking about something as basic as the needs for energy in this country and according to the statements here, there are not a great number of producers. I mean, certainly I am not an oil expert. I do not think a man in my position could go out and start digging holes and find oil and gas. So you have just a few major producers who really are controlling the exploration for new energy sources in this country. And if they can go to the FPC and get a rate increase, and they have existing stocks, I see no pressure on them to go out and produce more gas or to invest.

Are they under pressure financially to make explorations because they have heavy investments in exploring equipment that they must use?

Mr. FRAZIER. They can use their depletion allowances, their equipment, their know-how in other countries and in other areas. This is what has been happening and while the U.S. industry has been moving along, it has been moving along at a slower and slower pace. You will find the number of wells drilled has been going down for something like 20 years.

Representative BLACKBURN. Well, are they taking the equivalents that they were using, say, in this country to explore in other countries?

Mr. FRAZIER. They are finding gas and oil in the North Sea.

Mr. POSNER. May I make two comments on this, Congressman, very briefly?

First of all, the profit point is one which we have encountered as well. If you could assume that all exploring companies under all circumstances would pay  $x$  percent, say 25 percent of their profit in some sort of normal corporate taxes, then it is fine. You can do your sum net of tax on gross of tax, and come up with the same answer.

The point is in your country like in mine, different companies are in different tax positions and this is the reason why the FPC has often wanted after tax figures. But I do think that some of this discussion is perhaps not quite relevant to your present problems.

If you have a lot of relatively small producers on shore searching for gas, they go on digging holes and they find gas in more or less the way they found it in the past. It is the cost record of the past which is important. But if you need now, as Mr. Frazier was telling you, very much more gas pretty quickly, then what you are going to be searching for, I would guess, would be very much like our North Sea case—off-shore exploration to find large reserves under very chancy conditions. In this case the actual costs of getting the stuff out of the ground when you find it are much less important than the question of the dry hole ratio, how many holes you have to dig, how much exploration you will have to do before you find usable reserves, what depth are you going to find it at when you actually do start digging, and there I suspect for the future it will be more important for your regulators to take a view on the amount of incentive to be given to the man rather than what his costs might be when he actually finds it.

Representative BLACKBURN. My time has expired, Mr. Chairman.

Chairman PROXMIRE. Mr. White, your evaluation of FPC Rule R-441 is not at all favorable. You say in your prepared statement, "The Commission's proposal is an outrageous attempt by the Commission to ignore the Congress and, in effect, to accomplish deregulation with respect to new gas by administrative fiat. The effort is probably illegal in the sense that there is no statutory basis for the rule. It is, on the basis of past experience, not likely to produce the intended results." In other words, you are saying it is misconceived, illegal, and will not work.

What I find most distressing, however, is the impact of this deregulation on gas prices paid by consumers. You estimate that between 1969 and 1971 gas prices received by pipelines increased by 7 cents per 1,000 cubic feet, which translates to between about \$1 billion and \$1.5 billion of increased gas cost to consumers. This is a very dramatic illustration of how penny increases total billions of additional consumer cost. What would you estimate would be the additional cost to consumers if deregulation were followed under rule 441?

Mr. WHITE. I have made no such estimate and I think it would be extraordinarily difficult to make one because it would be in a vacuum and we do not live in a vacuum. Too many other factors would come into it.

I do not have any magic figure.

Chairman PROXMIRE. Well, could it be as much as \$10 billion or \$15 billion?

Mr. WHITE. Over a period of time, yes.

Chairman PROXMIRE. All right. Could it be as much as \$2 billion or \$3 billion a year?

Mr. WHITE. Well, part of it would depend upon decisions that are reached. If we are using rolled-in prices—

Chairman PROXMIRE. By rolled in, you mean—

Mr. WHITE. Averaged, taking into account the highest price, yes.

Chairman PROXMIRE. This is a technical term I find a lot of us do not understand.

Mr. WHITE. All right. Let me take a minute and respond to that question, Mr. Chairman.

If the gas from south Louisiana cost 25 cents per thousand cubic feet and it is sold to a distribution company in the Washington, D.C., area at, say, 35 cents per thousand cubic feet because of the transportation cost of bringing it from where it is to where it is to be used, and that is not enough gas and the local distribution company, the Washington Gas Light Co., must supplement that by using liquified natural gas brought here from Algeria and put in a plant on the Chesapeake Bay and permitted to be fed into its system, that gas from Algeria can cost as much as a dollar per thousand cubic feet. So we have got gas that cost 35 cents mixed with gas that cost a dollar.

That gas is indistinguishable. It burns the same way and you do not know which it is.

Now, the question is, does the regulatory process conclude that the average price of the 35 cents plus whatever amounts of \$1 gas come together be borne equally by all? This is the rolled-in concept and it is the concept that has been used.

Chairman PROXMIRE. Are you saying the difficulty is that there would not be much difference in price but the difference is that the consumer, that is, the household user of gas, would pay more and the industrial user would pay less?

Mr. WHITE. No; what I am suggesting is that this is a policy decision that the Congress ought to be focusing on pretty soon and that is how to do it. Unless there is some congressional guidance, my expectation would be that the regulatory bodies would continue to live with the rolled in concept. I am suggesting that there is a public policy issue that ought to be faced now that we know we are going to be relying upon gas that costs a much higher amount.

Chairman PROXMIRE. We should face it, among other reasons, because the consumers are going to be paying billions of dollars a year more than we do now, that is right.

Mr. WHITE. I think the consumer is going to be paying more anyhow.

Chairman PROXMIRE. Will he pay more if this regulation, this rule, is followed?

Mr. WHITE. I do not think there is any doubt about that. If this rule is adopted what it means is, and we are now talking only about the gas that is produced domestically, not the liquified gas that is brought in, in effect what the rule says is that the producer and its customers, the pipelines should reach an agreement as to what the price ought to be. Those prices, and this is an optional procedure, will be offered to the Commission and the Commission still retains the right to change it. But if the Commission does not accept the offered contract, the producer has the option of selling that gas in the intrastate market and not dedicating it to the interstate market under today's statutory

scheme. I do not see how a Commission would be in a position to say no or to reduce the price because the producer is in this situation that we have today, where it is thoroughly a seller's market—there was a long time when the producers were suffering under the reverse situation, it was a buyer's market. Now the situation has turned in large measure because of the steep increase in the demand for this very attractive fuel. And I am prepared to say that the product has been underpriced and it is more valuable on a market basis.

I have no built-in reluctance ever to increase the price of natural gas. What I am suggesting is that when you take the lid off and say that there shall be no control, which in my view this proposed rule would in effect accomplish, then we have gotten ourselves into the awkward spot where we are not even sure that after soaking the consumers—not soaking, after charging the consumers billions of dollars more, that it will necessarily solve the shortage problem.

As Mr. Frazier suggested we would have to triple or perhaps quadruple the price of gas if we are going to use only the market basis for determining who will have the gas.

Chairman PROXMIRE. Do we have any idea what the elasticity of demand is for natural gas? Do we know what effect it would have to double or triple the price to consumers if we should concentrate on price but talk about demand? An increase in price would have an effect of reducing demands and bring these more closely into balance.

Of course, one difficulty is that if that is true and it is something we always learned in the economic textbooks but it means the consumer pays through the nose. If it is higher prices, there is more inflation, which means on the other hand, enormous windfall profits unless you have the kind of system that Mr. Frazier suggested, an ingenious notion of taxing the profit and putting it into some kind of a trust fund. But even there you still have higher prices for the consumers, both the industrial consumer and the household consumer.

Mr. WHITE. A short answer to that question is no. There is not any way to know. Very sophisticated econometric models have been offered which say if you increase the price of gas in south Louisiana by a nickel, how much more gas would be produced.

Chairman PROXMIRE. We have not had enough experience to tell.

Mr. WHITE. We may have had enough experience. We do not have enough wisdom or we do not have enough understanding of all the other factors that pour into it and I am fearful that what we are going to see is—

Chairman PROXMIRE. The new factor is an environmental factor which you all have mentioned.

Mr. WHITE. Absolutely.

Chairman PROXMIRE. You also mention that major new price increases would increase the value of uncommitted gas reserves by about \$10 billion. Is the possibility of such large windfall gains a major reason producers are holding back reserves from the interstate market?

Mr. WHITE. Well, on that figure, there is a simple arithmetical calculation which says that whatever gas there is today in the ground, which is a finite amount—nobody can tell you exactly what that finite amount is but whatever it is, we are not really producing natural gas

in the ground at a very rapid rate. So to the extent prices go up, and we are in a period of rising prices, each penny—and again this is simple arithmetic, raising prices does not increase the value of that base. But it also may be more expensive to produce.

The purpose for using those figures, if you think we are talking about pennies, you really have to understand the great volumes of gas involved and how quickly those pennies add up—

Chairman PROXMIRE. My question is, is the possibility of large wind-fall gains a major reason producers are holding back reserves, in your view?

Mr. WHITE. That is a complicated question because it depends on the alternatives as to where that investment dollar can go. I think the worst time in the world—

Chairman PROXMIRE. If they think prices are going up, why should they not hold it back? They are going to make enormous gains. Otherwise they deplete it and sell it at a lower price.

Mr. WHITE. Absolutely, and particularly when you talk—the answer is yes and I think I would add to—

Chairman PROXMIRE. I would certainly do that if I were in this position.

Mr. WHITE. I think I would, too.

Mr. FRAZIER. I think it is only fair to the producer to suggest that they do not have this gas. This gas is there in the ground and the only thing that they are withholding, if you will, is effort and capital to find it.

Now, they may find it desirable to withhold the effort and the capital because they may expect greater gains in the future.

Chairman PROXMIRE. Exactly.

Mr. FRAZIER. But I do not think we should—I think we are—

Chairman PROXMIRE. Let me describe it better. I think Mr. White and I were discussing kind of a shorthand and skipping over an important step.

Is there any justification in not requiring refunds when prices were set so high?

Mr. WHITE. While you were out Congressman Blackburn and we here were discussing that and the producers say refunds are kind of redressing past problems. It may be good theoretically but it does not give us the money we need to make these enormous investments today.

Mr. Posner suggests, and I certainly agree with him, that insofar as future exploration and development, it does take money but we have a capital market in this country and I think it can be done.

The whole concept of these regulatory processes is to find out what the rates should be, just and reasonable rates, and once they are determined I think that the refunds ought to be passed on to the consumer.

Chairman PROXMIRE. Before I yield to Senator Bentsen, let me ask you one other question.

I take it that all these factors that we have discussed cause you to conclude that deregulation under rule 441 should be rejected by the Congress. Is that true? Would that be your recommendation?

Mr. WHITE. That is my conclusion.

Chairman PROXMIRE. We should reject it?

Mr. WHITE. Yes, sir.

Chairman PROXMIRE. Would you, Mr. Frazier, and Mr. Posner, comment on that?

Mr. FRAZIER. I think that it will set up a kind of an auction market and if you do not do anything to curb demand, either by end-use control or by any of the devices that I have suggested, it will have a very inflationary effect on prices without a commensurate effect on supply.

The problem is that it is only one step in one direction without taking the four or five or six steps that all should be taken simultaneously. Something has to be done probably to increase the incentive, but if it is only taken by itself, all you are going to produce is this bidding for the short supply which will continue in short supply as long as I can look into the future. We just do not have the resources to fuel all of our industry on natural gas. By definition short supply is going to continue.

If that is the case, we cannot have an auctioning process, unfettered, you might say, by FPC regulation, between the interstate and intrastate market, without seeing the price go to 75 cents, a dollar, something like that.

Chairman PROXMIRE. Mr. Posner.

Mr. POSNER. Mr. Chairman, I agree with the conclusion. I would stress in particular the long time lags in all these processes.

You asked about elasticity of demand. You have heard comments on elasticity of supply. This is not a market making television sets. There is a great deal of uncertainty, a great long time of response. Consumers are locked into equipment which burns gas. Producers take a long time to assemble their equipment and their know-how to explore.

The function of a regulatory agency in this sort of market, as I see it, is to take a view on long-term trends of demand and supply, not just for natural gas but for all fuels, and to try to pitch its regulated prices at levels which over a decade, taking into account inflation, and so on, will produce the right allocation of resources, so it makes no sense to me to deregulate completely.

But I do believe that it is the job of a regulatory agency somehow to keep these long-term trends in mind. It would have to add, for instance, the prospect of nuclear energy as an acceptable way of generating electricity instead of using oil products or gas to do that job. And that means that the purview of the regulation is much wider and has a much longer time span than perhaps has so far been true in your country.

Chairman PROXMIRE. So you gentlemen unanimously agree that deregulation under rule 441 should be rejected by the Congress.

Senator BENTSEN.

Senator BENTSEN. Thank you, Mr. Chairman.

Mr. Frazier, I appreciate your statement where you say first of all, there is a gas shortage and it is not just a numbers game being played by the industry.

I share the chairman's deep concern over the price of gas to the consumer. But I am concerned even more about his not having gas and

not having fuel available to him and possible serious brownouts throughout our country.

I am reminded of the story of the lady who was trying to buy a bunch of bananas from a suburban store. She finally told the store owner she could buy the bananas for half the price down the street at another store. He said why do you not do that? She said, well, because they are out of bananas. And he said, well when we are out of bananas we sell them for half price, too.

That is the problem that we are facing in this country. We are saying the consumer must pay over three times as much per LNG that was brought in from foreign countries as he will pay a domestic producer in this country. That is the kind of imbalance that we have seen arrived at in our price structure, and it does lead to serious problems.

Now, to deal with this question of great amounts of gas being withheld from the market that have already been discovered, Mr. Frazier, is it correct that it is an unregulated market in intrastate sales?

Mr. FRAZIER. The intrastate market is unregulated.

Senator BENTSEN. So the man who has the large reserves could sell it for whatever price it will bring in the intrastate market.

Mr. FRAZIER. Much of it, of course.

Senator BENTSEN. Yes. All right.

I was interested, Mr. White, in your saying, I believe, that gas has been under-priced in this country for a good deal of the time. Did I understand you to say that?

Mr. WHITE. Not quite, Senator. What I suggested was that conceivably it could have been, and it might well be—to some extent I am defensive because of my own role in this, but I would rather turn your question around, if I may, and say that I do not know that if the price were any higher than we would have any more gas.

When I was at the Power Commission there was a settlement proposal offered by the producers, not in Texas but in south Louisiana, agreed to by 85 percent of the distribution companies. They came in and said your process is so long, so expensive, and so unsatisfactory, would you be willing to listen to a settlement proposal and we said, certainly. Offer it and we will be glad to take it into account.

The Commission in 1968 came very close to what the parties offered by way of their judgment as to what was required, and this represented 85 percent of the producers in the most prolific area in the country, south Louisiana, including the offshore area.

I dare say that had the Commission taken that decision offered to it by both the buyer and the seller, we would still have the same shortage and there would not have been any more gas produced—the difference ultimately in the rates set by the Commission and the settlement proposal was very, very close. So that even there we had the producer believing that this was what was required, that that would be an adequate incentive for them to make the investment to find all the gas that would be necessary.

It just did not work that way and that is the reason I am so cautious about the underpricing.

Senator BENTSEN. The problem here, Mr. White, is that as some of you have stated, the easy-to-find fields have been found.

Mr. WHITE. Surely.

Senator BENTSEN. And we are having to dig deeper.

Mr. WHITE. Correct.

Senator BENTSEN. And they are more expensive to bring in. The cost of production has increased substantially, not just by the inflation and the tools that they use and the labor that is utilized but because the reserves are more difficult to find than they were in the past.

In your prepared statement, concerning rule 441, Mr. White, you say:

The most distressing aspect of the proposal is that it provides no assurance that additional gas will be made available to the consumers of the country. It only assures that they they will pay greatly increased prices for gas.

Well, is it not true that they only pay that price if they receive those reserves and that gas? One is contingent on the other. It only applies to gas committed to the interstate market after April 6, 1972.

Mr. WHITE. Right.

Senator BENTSEN. So the point being, you said it provides no assurance that additional gas will be made available.

Mr. WHITE. Yes; more gas.

Senator BENTSEN. At that price—they do not pay that price unless it is available.

Mr. WHITE. Perhaps there is an ambiguity. The word "additional" there I am talking about is that extra increment hoped to be achieved through this process. I assume we are still going to be exploring for gas whether rule 441 is adopted or not and I am talking about the increments on top of what is going to be discovered.

Senator BENTSEN. Let me say this: Today you have less rigs operating in this country than we have had in 25 years and we have seen this come at a time when we have decreased the depletion allowance. For example, we brought it down from 27½ to 22 percent. I believe that that has taken away some of the incentives in the way of exploration for gas and this is one of the things Mr. Posner was talking about. Incentives are needed, part of it being price and I assume part being taxes.

I was interested in your figures, Mr. White, in your prepared statement, which indicate that between 1969 and 1972, the average price paid producers increased 2 cents a thousand while the average price paid the pipelines increased 7 cents per thousand. It looks like most of the additional cost which the consumers have been asked to pay did not work its way down to the producer.

Mr. WHITE. Well, there is no question in my mind but what the transportation costs permitted by the FPC have gone up. As to whether or not those were justifiable increases I am not prepared to say, but I certainly agree that a great part of the expense is in the transportation costs, but do not forget, when we are talking about the 7-cent increase, we are talking about all gas. When we are talking about the 2-cent increase, we are only talking about new gas. And gas that was discovered 15 years ago is still coming through those pipes. So I hope you follow me, Senator.

Senator BENTSEN. I do.

Mr. WHITE. We are talking about different volumes of gas that come out of the ends of the pipeline and the new gas that is discovered that goes up at 2 cents.

Senator BENTSEN. You describe in your prepared statement, and the chairman referred to it, the FPC's proposed rulemaking on optional prices, rule 441, is an outrageous attempt by the Commission to ignore the Congress, that there is no apparent statutory basis for the rule.

Now, Congress never said anything about setting producer prices by the area rate method either. The only thing that Congress said in the Natural Gas Act about producers is that the Commission's jurisdiction did not extend to them. The jurisdiction clause of the Natural Gas Act goes as follows :

The provision of this chapter shall apply to the transportation of natural gas in interstate commerce, to the sale in interstate commerce of natural gas for resale, for ultimate public consumption, for domestic, commercial, industrial or any other use, and to natural gas companies engaged in such transportation or sale, but shall not apply to any other transportation or sale of natural gas or to the facilities used for distribution or to the production and gathering of natural gas.

Now, I do not want to infer at all that I disagree with everything you said in your prepared statement because——

Mr. WHITE. Excuse me. Was that a question, Senator, you wanted me to respond to?

Senator BENTSEN. No. That is more of a statement in answer to your prepared statement, really. I think we have to take a hard look at the end use of gas. I think that we have to consider the residential use. We have to look at the problems of cities like Washington that cannot have gas for new apartments. I think we have made an inefficient use of gas to a lot of large industry. I think the rate structures of some of the pipelines have been such as to favor the usage of large customers, and this is of concern to me.

This is one of the things that I think we should direct our attention to, the proper utilization of this very valuable fuel.

So there are a number of things in your prepared statement that I do concur with.

But one of the problems that I find very difficult to accept is the inequity in the prices that we will pay foreign producers as compared to what we will pay domestic producers. If I would look at any other industry, if I would look at the manufacturer of shoes, for example, or shirts that the people down in my State buy from producers in New England, and I felt that the producers in New England had to accept one-third the price that we would pay foreign producers, I find it very difficult to see the equity in that type of thing.

Mr. FRAZIER. Senator, the amount that we will be paying the producers in Algeria if we get this gas on the Chesapeake Bay is around two cents per M c.f. The reason that it is going to cost 75 cents in the Chesapeake Bay is because it costs so much to liquify it, costs so much to transport it by ship, and it costs so much to regasify it in the United States. It is the processing costs and the producers are not getting it. The producer in Algeria, which is the state, of course, is not better off, in fact, is worse off than the producer here. They happen to have a very cheap source of gas supply. My guess is——

Senator BENTSEN. But the end price paid by the consumer in this country for the product he receives from abroad is approximately three times what he pays for the domestic product received, and I am using——

Mr. FRAZIER. That is right.

Senator BENTSEN. And I am using the price that is paid to our local producers compared to what consumers have to pay when they receive it in this country, whether it is transportation, liquification—

Mr. FRAZIER. You have to get used to the fact that we are going to be paying a dollar for a great deal of—a great percentage of our gas supply and an increasing percentage as the years go on.

Now, all this means is that we have got to recognize that we can pay the domestic producers whatever is needed to provide them with an adequate incentive, and it is a regulatory function to attempt to determine what that is.

I am also saying, and I emphasize this, that it is important to realize that gas price alone is not going to cause the producers to increase their exploratory effort back to where it was in the fifties. Something has to be done on the oil side.

Senator BENTSEN. Mr. Frazier, I think I would agree with you on that. These things are complementary. This is an accretion thing. One thing by itself does not resolve the problem and I do not believe, whatever we may do, that we will solve the problem solely through price or even the utilization of gas at the end of the pipeline. But I think we can make a contribution toward the solution. I think we can assist.

We are going to have a terrible problem in this country in our balance of payments as we depend more and more on importation of energy supplies from outside of our country. So what we are all striving for is that while we know we cannot find the ultimate solution here within our country in the way of finding reserves but we are trying to ease the pain if we can and ease the balance of payments problem if we can.

Mr. FRAZIER. I think we should, Senator. The real thing that I am urging strongly is that perhaps under the leadership of your Committee, we try and take a comprehensive approach. Just as you have said, no one step is going to accomplish this. There are ten steps that we need to take and it will be really wasteful if we only take them one at a time but do not try and see the picture whole, the longer run picture as Mr. Posner has said, and put these things together in a useful package of tools rather than one, and one tool will be higher prices. There is no question about that.

Senator BENTSEN. Thank you, Mr. Chairman.

Mr. WHITE. If I may, Mr. Chairman, I would like to, if I could, focus on what Senator Bentsen has suggested, and the very obvious type of problem involved. It has to be disturbing to an awful lot of people, particularly those who produce gas, when they think of the price they are receiving for their gas in Texas and Louisiana and they compare it to the dollar gas or dollar and a quarter gas that is indistinguishable in physical characteristics. It burns the same way.

Let me offer a couple of points on that, if I might. Part of it is simply that the pricing mechanism of any energy looks at peaks. It costs a great deal more to generate electricity at 5 o'clock at night than it does right now (the late morning) simply because the loads are greater. We have electric utilities that are at this very minute using energy to pump water uphill so that at 5 o'clock when the peaks go up, that water

will come down and generate electricity. Something like maybe 60 percent of the energy used to get it up the hill will be realized when it comes down. Because that energy is so valuable in terms of the peaking requirements it is worth doing. So you have to be terribly careful about this.

The second consideration is—and I know this bugs the industry—they think natural gas is just like oil and coal. You burn the darn stuff and it generates heat and it generates energy. But a long time ago Congress, with the assistance of the Supreme Court, concluded that natural gas is different because of its monopolistic characteristics. Congress has said as a matter of public policy which can only be changed where Congress changes it, as far as natural gas is concerned, it is going to be regarded as a natural monopoly and as such, the people who are in that business will be entitled to recover their costs plus a reasonable rate of return on their investment, and that is the job that the Federal Power Commission has been charged with.

It is a very difficult job and nobody that I know of has thought they have done a beautiful job of it. That is really the difference.

So I think you have to be terribly careful about that quarter versus a dollar.

Senator BENTSEN. Let me further comment, then, on just one of these points, the question of the monopolistic character of this industry on the part of the producers. That has been said a number of times here.

A study has been presented showing that the largest producer in any major area produces 37 percent of the supply in that area. No. It is 35 percent of the supply. The four largest producers in any producing area average about 37 percent of the supply sold to that interstate market. I just wish the automobile industry was that competitive.

The largest average producer in any one area that sells to the interstate market has 16 percent. So there is some competition.

Mr. WHITE. Right, and I am only suggesting that the reason that I—I believe the reason—I was not here in 1938 but I believe the reason that the Congress concluded this is not because oil and gas are different when they burn. It is because of that enormous investment in pipelines and the fact that you cannot move it like coal and oil. At least today we can't—maybe we are going to have a whole revolution when we can liquify the gas and move it around. Under those conditions, perhaps we will not have the pipelines so structured that they have people as sort of prisoners or captives at the end of the line including the people who have made investments in their own burning equipment. So that we may be in a period, and I hope this will not be startling, Senator, but one of my theses when I was questioned about this is that interstate and intrastate gas ought to be treated the same and perhaps they ought to be deregulated.

When I was at the Power Commission a study was commissioned by the Executive Office of the President, the Office of Science and Technology, asking Resources for the Future to do a study. The question was, "Is there any reason not to focus on the question whether there ought to be deregulation of wellhead prices." And I had to give the answer, of course, it ought to be studied and there may indeed come a time when it will be desirable and indeed necessary to de-

control. But I cannot believe that that time is now, when there is a shortage.

So that the idea of not controlling it has never absolutely frightened me. I think we may one day find the circumstances such where we will come to that public policy decision. If the question is put to me now, do I believe this is the time to decontrol? The answer is, no.

Senator BENTSEN. One of the things I am certainly prepared to concur on is we ought to have the availability of the information from the industry and where we have not had cooperation we should have.

Chairman PROXMIRE. Congressman Blackburn.

Representative BLACKBURN. Thank you, Mr. Chairman. You know, this discussion reminds me of the story of the visiting preacher whose theme of the sermon was that religion was free, the blessings of the Lord were free to everybody.

He got through with the sermon, passed the hat, and they did not give him much money and he complained to one of the deacons about the lack of return for his efforts, and the deacon said, "Preacher, you said religion was free like the water." He said, "That is right, but you have got to pay to get it piped to you."

When you talk about the gas in the ground it is really not worth very much to me as a consumer but I have got to have it piped to me before it is worth anything to me.

Is there a financial connection between producer and the pipelines?

Mr. WHITE. Yes. One is a buyer and the other is a seller, and Mr. Frazier has suggested—and I would like to push on his point a little bit; I think this will be responsive—the pipelines are there. They have got hundreds of—tens of billions of dollars invested in pipe and they are very efficient transporters of this gas. They really need that gas. They really want to see it, and right now as I said, the tables are turned. There is no longer the type of market where they could do some shopping. Now they are begging for gas to be sold to them and they want it.

I would hope that there is some way to channel that force, logic dictates that the pipelines have a greater interest, greater pressure, greater incentive to find that gas. Let us let them do some investing even if it means—

Representative BLACKBURN. The pipeline people themselves.

Mr. WHITE. And the gas distribution companies.

Representative BLACKBURN. It is worthless if they do not have something going in the pipe.

Mr. WHITE. It is not very valuable to have an empty pipe.

Representative BLACKBURN. You mentioned the cost of liquifying and shipments and regasifying the natural gas from Algeria, and that is what runs the cost up from 2 cents per thousand up to 75 cents is the estimated cost.

Mr. FRAZIER. Yes, sir.

Representative BLACKBURN. Is there any promise of technological breakthrough that will greatly reduce that cost of liquifying and regasifying?

Mr. FRAZIER. I do not think so, Mr. Blackburn. There seems to be a general feeling that we have about pushed the limits of the economies of scale at the size of the plants now. The ships are frightfully expensive.

Representative BLACKBURN. It has to be very cold, does it not?

Mr. FRAZIER. It has to be at like 273 minus and it costs so much more to ship that very cold stuff in tankers than it does to ship oil that we have to consider the alternative, the probable reasonable alternative, of bringing the oil over here and gasifying it. It is a function of distance. Once you get out a certain distance, it is probably cheaper to bring oil here than it is to go to all this expensive processing of LNG abroad, and turn the oil into gas in this country.

Representative BLACKBURN. Thank you. I have no further questions, Mr. Chairman.

Chairman PROXMIRE. Mr. White, of course, the price increases we have been talking about, and can anticipate under rule No. 441, seem to completely disregard the price stabilization program. As you point out, it violates the criteria of the Price Commission for public utility price increases. I would like to go through the Price Commission's criteria now and ask you to comment to what extent rule 441 would violate each.

One, the increase must be cost-justified, and should not reflect future inflationary expectations.

Mr. WHITE. Well, that is one that I think very clearly is disregarded if you accept my interpretation of the proposed rule 441 and its logical impact; we will no longer be using a cost basis. We will be using a market basis. And the Price Commission has said to the regulatory bodies if you are going to approve or act on requests, and we are hereby delegating to you some of this responsibility, although you are going to have to clear it with us, here is what you have to certify to us. I must say I do not see how in the world rule 441 can live with that first principle.

Chairman PROXMIRE. Two, the increase is the minimum required to assure continued, adequate and safe service to provide for necessary expansion to meet future requirements.

Mr. WHITE. Well, again, you see, Mr. Chairman, the difficulty is that all of these criteria announced by the Price Commission for regulatory bodies in the public utility world rest on the classic concept of cost, and as I understand the rule, proposed rule 441, cost is no longer the basic element. In fact, it is not an element at all. It is what the parties agree to. So that I think they just plain do not match. They do not fit. They do not hit.

Chairman PROXMIRE. Well, the third point is price increases may not be more than will achieve the minimum rate of return needed to attract capital at reasonable cost and not to impair the credit of the public utility.

Mr. WHITE. Well, it is the same point in a different fashion. I do not know, maybe the Commission, the FPC, if it has before it a proposal between a producer and a pipeline will say, if this is what the pipeline is willing to pay, this is what the producer is willing to sell for, in this interstate as distinguished from intrastate market, perhaps that is what is required by the producer. It is far fetched to me.

Chairman PROXMIRE. That is a pretty far out interpretation, is it not?

Mr. WHITE. Yes, sir. I do not happen to be for rule 441, so maybe these questions ought to be addressed to someone who is.

Chairman PROXMIRE. Well, now, the fourth point is the increase does not reflect labor costs in excess of those allowed by Price Commission policies.

Mr. WHITE. The same response.

Chairman PROXMIRE. Fifth, the increase takes into account expected and obtainable productivity gains as determined under Price Commission policies.

That relates to cost, too.

Mr. WHITE. Yes, that is also cost-based.

Chairman PROXMIRE. Sixth, the procedures of the regulatory agency must provide for reasonable opportunity for participation by all interested persons, or their representatives, in its proceedings.

Mr. WHITE. I would expect on that point that rule 441 would meet the requirement. It does provide for any proposal that comes to the Commission to be considered by all interested parties. It does not quite, however, go to some of these other elements about suspension periods and when these rates go into effect and about refunds.

Chairman PROXMIRE. So it does seem in general, I think it is fair to say, to disregard the price stabilization program.

Mr. WHITE. So it seems to me, Mr. Chairman.

Chairman PROXMIRE. What are appropriate rates of return? Any of you gentlemen can comment on this. There is considerable controversy over what constitutes appropriate rates of return to both producing and pipeline firms. What is a reasonable rate of return for the producers?

Mr. WHITE. Charlie Frazier is an expert. He testifies before the Commission all the time.

Mr. FRAZIER. I do not think I have ever testified in that field, sir. I really think that this is not a terribly important factor. If you varied the rates of return from—it used to be 12, now it is around 15 percent, to, let us say, 16, 17, 18—

Chairman PROXMIRE. Now, wait a minute, Mr. Frazier. Why is that not the essence of it? After all, the only way you can justify, it seems to me, a price increase is that the rate of return should be sufficient to secure the kind of investments, the kind of exploration, the kind of development that you need to secure greater supplies of natural gas. Is that not right? Is that not the heart of it? The rate of return could be very high. I presume you would get a big influx of capital and you would get a big incentive.

Mr. FRAZIER. Perhaps I answered your question too narrowly. The rate of return I was speaking of was the rate of return in the sense the FPC uses on what they call productive investment. The real joker in this cost calculation is how much you allow the producers not to find gas—the dry hole cost. You can speculate that they will find gas in one out of nine wells or find one out of five or find one out of 20 and wherever you fix that ratio in pricing, you are going to fix the profit. The actual profit on the productive investment is the thing that is relatively minor.

Chairman PROXMIRE. What I am getting at is the real problem we have here is to develop somehow greater reserves of natural gas. This is a vital problem for our country for many, many reasons and the question is whether or not a rate of return can be conceived that would achieve that. Is it that simple?

Maybe it is a lot more than that. Maybe even if you had an unlimited rate of return you could not show very well that you would get greater development of reserves because of the other problems involved, is that right?

Mr. FRAZIER. Well, let us think of 25 cents as what the FPC now allows, approximately, for new gas. Of that 25 cents, I suspect that something like a third of it is the allowance for exploration and development, for dry holes. Now, that does not go to return. The companies spend it.

Chairman PROXMIRE. I see.

Mr. FRAZIER. If you really want to increase the amount, you might double that because then they would drill riskier prospects and drill deeper, drill further afield.

The actual return on the productive investment in my 25 cents might be something like, let us say, 5 cents of the 25 cents, so if you boosted that by a penny or two you would not be making too much difference in the exploratory efforts.

You see, it is the exploration allowance, the factor that you put in there for that is going to produce the kind of gearing needed to produce greater effort.

Chairman PROXMIRE. Let me ask, Is there a need for the FPC to conduct a surveillance program to determine whether regulated companies earn more than the rate of return fixed by the Commission? I am asking that in connection with another question which is, Should the FPC then negotiate rate decreases in those cases where the companies earn more than the allowable rates?

Mr. FRAZIER. Well, you have to distinguish between pipelines and producers. I think with respect to the pipelines, the Congress has said the answer is yes. With respect to producers the problem of distinguishing oil from gas gets so complicated that I do not think a surveillance program would be particularly helpful, and I certainly do not think they can negotiate decreases.

Chairman PROXMIRE. It would not be helpful because you could not tell?

Mr. FRAZIER. Could not tell. Could not tell where the money is being made. It is a judgment figure. It is very subjective.

Chairman PROXMIRE. Well, if the rate of return were very high, there would be a high presumption, would there not, or would that be unfair?

Mr. FRAZIER. Well, in the oil industry as a whole, the problem of finding rates of return on one particular segment gets to be very difficult. They sell their own oil to their own refineries from which they then turn and sell the products and the rate of return of Standard Oil of New Jersey is one overall global figure. I do not think it would be particularly fruitful to decide—to try and watch whether they make more out of their production arm because they can jigger that by artificial pricing between production and refining.

Chairman PROXMIRE. Would you agree, Mr. White, this would be an exercise in futility, too complicated, that you cannot separate out the natural gas and oil?

Mr. WHITE. It kind of bothers me to agree that everything ought to be ignored because it is too complicated. Having lived for 3½ years at the FPC where that is all we did, things that were impossible to

accomplish and the factors were so numerous and so difficult, I think I would be a little less willing than Mr. Frazier to say that this would be a totally fruitless effort. I think more important, however, is the thrust of your question which is how to get the investment made in finding the gas. I can tell that Senator Bentsen and many of the people from the State of Texas, who are producers, look at this dollar gas, 75 cents LNG, and say we have got to be able to see our way clear. They have yet to really accept the notion that the price of gas ought to be regulated at the wellhead and that it ought to be on a cost plus a reasonable rate of return so you can jiggle that, and I do not know that you will have much impact on the supply side which is what you are focusing on. The best illustration is that the same major petroleum producers who were in the business of finding oil have not—and there is no control on the price at which oil sells in this country—been willing to make the investment, the continuing great investment in finding oil.

So that it goes back to what I told you earlier, Mr. Chairman, about the frustration of the process where all the Federal Government talks about is the rates and it has nothing other than inducements or incentives to get the necessary investment.

That is the reason I was so happy to hear Mr. Posner talk about the way the British Government in partnership with American oil companies has found the funds to go down into the North Sea and find gas. They know how much it costs. They are partners. And I am not suggesting that the Federal Government ought to go into partnership with all the oil companies but I believe we would get a great deal of information and that we would be better in terms of making those investment decisions—where shall we put our money—if the Federal Government is involved in trying as a partner or on a limited basis to find gas and oil because we need it, not because the profit incentive is all that paramount.

Mr. POSNER. Mr. Chairman, if I could just comment on that. I naturally agree with what Mr. White said and I understand the burden of your suggestion, that it might be desirable to “claw-back” excess profits. But if I may say so, sir, insofar as you are using the price mechanism and asking what sort of price would call forth the extra exploration, I think you should resist being put into the position where you try to turn these exploring companies into public utilities with regulated profits. For better or for ill they are not that sort of animal.

Chairman PROXMIRE. Not what?

Mr. POSNER. Not that sort of animal. They are not public utility sort of people. They are piratical people, if I can put it in colloquial terms, who want to make a big killing when they find a lot of gas, when they find a lot of oil.

Chairman PROXMIRE. I wonder if you have been seeing too many John Wayne movies?

Mr. POSNER. I think it is important to distinguish between different sorts of industrial entities; oil companies, I do put it to you, are not public utilities. But that does not mean you have to go to the opposite extreme and say the short-term pressures of supply and demand, whatever they happen to be, must be reflected in this particular month or year in a market clearing price. I would suspect myself that a combi-

nation of a number of pressures is needed, several of which have been put forward by Mr. White and Mr. Frazier in this discussion, plus perhaps a bit of public corporation competition, plus a substantial rise in the regulated price (decided by the FPC or whatever the appropriate agency is) designed to last for a number of years. For the next few years the FPC should say, we are prepared to approve agreements between pipeline companies and successful explorers at prices considerably above the present one—in my opinion something in the ball park of 30 to 40 cents per thousand cubic feet would be the sort of number you might be playing with—and then you should wait and see what happens.

Now, I do not think—

Chairman PROXMIRE. I would agree with you that it is just impracticable to talk about Government ownership or Government operations. For one thing, as Senator Bentsen knows far better than I do, and as all you gentlemen do, this is just part of the oil industry. We are not going to nationalize the oil industry and we should not do it. So we just can dismiss that notion, it seems to me, for that reason because it is a byproduct, is it not, still, very largely?

Mr. POSNER. Sorry.

Chairman PROXMIRE. Natural gas is a byproduct of the oil industry. People do not go out—natural gas operation is a part of the oil—

Mr. POSNER. I do not think that is so true as it used to be.

Mr. WHITE. Not exclusively. Roughly, Senator, 25 percent of the gas that is discovered in this country is associated with oil. But the concept of directional drilling, I think, is now established and companies do drill for gas and are not always successful but they can find it.

Mr. FRAZIER. They may find oil or they may find gas. If you had a joint corporation, they would also be in the oil business because in the process of trying to find gas, they would find a great deal of oil. That is one of the difficulties with a kind of gas TVA.

Chairman PROXMIRE. My time is up. Senator Bentsen.

Senator BENTSEN. Thank you, Mr. Chairman.

I share Mr. Posner's comments very much. I agree with you gentlemen that I do not see how you could regulate effectively, for example, the independent producers. Mr. Frazier—we were not talking about the major oil companies, and I am not. I am talking about small independent producers. In a highly speculative business, the thing that keeps him going is the fact that he thinks some day he is going to hit the daily double. He does not make any headlines to read about all those torn up ticket stubs at the race track. But the guy he keeps looking at is the one that hit it and that keeps him going.

But we have found, I think, that the incentives have not been sufficient to meet the increased cost of production and more difficult job of finding large reserves and have not been sufficient to keep him in the business. He is declining in numbers and substantially so.

I am concerned also because in the State that I represent, we have our valves open all the way now. We are producing all we can produce. We have passed the peak or are passing the production in our State.

Our school system is very dependent on the taxes we collect from oil. Two hundred twenty one of our school districts receive over 50 percent of their revenues from this area. So we would like to see more reserves found if possible. We want this result for the people of our

State and the schoolchildren of our State and we would be delighted to see it for the consumers of this country.

The only way I think you will do it is if you see more incentives for that producer to try to find that gas and oil. And again, I do not think that is the total answer but I think that is a contribution in trying to find more reserves and trying to take care of balance of payments in this country by producing more of this energy here.

Would you care to comment on that?

Mr. WHITE. Well, it will probably sound like a rehash, Senator, but if we can distinguish between gas and oil, for example, what is the limiting factor today on the independent or the major producer in the State of Texas in terms of his seeking the money to go out and drop another well and find some more oil as distinguished from gas?

So far as I know, if he has found that and we are in a tightening oil supply situation, the price of oil is going up and he is going to do well. It is, therefore, just what the market will bring for the product that he discovers, and if he is lucky and he makes that big strike, he is in great shape because he can sell that oil.

I wonder, therefore—if you accept the concept just for purposes of discussion that there ought to be regulation of gas—if you let that incentive go very high, I have a hard time seeing how it will produce the result that we want even though I think the incentive ought to go up. I am not suggesting that there is a God-given price that natural gas ought to be sold for and that it should never be changed. It probably should rise.

Costs are going up. And I found myself voting for rate increases for natural gas. But if the concept is there should not be any limit, that the greater the incentive, the greater the dollar return, the more gas there is going to be, that is not really good enough, I think.

Senator BENTSEN. You reach a point of diminishing return obviously.

Mr. WHITE. And that is the difficult problem, Senator, to know where that is, because if we are only going to increase the price to the consumer without any benefit in terms of additional supply, then we have not served them well. This is a tough time to be on the Federal Power Commission, by the way, and you know I am very critical of what they have done in this proposed rule. I also note in my prepared statement that a few of the decisions that the Commission has taken that I would approve and agree with. I hope it does not turn around on them because of that, but I think really it is a tough, tough time and it is always tougher to be a regulator when prices are going up than when they are level or going down.

We used to turn out press releases saying how much money was being saved by electric and gas customers across the country. Well, now, I think we have all recognized that energy is going to cost more and we have got to do something about it.

Senator BENTSEN. I am privy to studies which have shown for a period of 5 years for one company in particular, and a very substantial one, that on their domestic production, what they have found in that period of time and what they can get for it has been at a net loss. They have not in effect been able to get their investment back. So these companies are being urged more and more to go overseas where large reserves are being found.

My concern is that we try to do what we can to encourage the finding of those reserves in this country. And I do not for a minute think that we are going to find enough reserves to fully balance the needs, energy requirements, of this country. I just want to see it eased to the extent we can.

Mr. WHITE. Well, I do not know if I can interpret that to mean that you are somewhat sympathetic to the idea of controlling the use to which the gas is put. I happened to advocate that as I think Mr. Frazier has and Mr. Posner has suggested, that there is something terribly uncomfortable, Senator, about a Texas utility burning natural gas to generate electricity when there are people in Michigan and even perhaps Wisconsin and New York—

Chairman PROXMIRE. Especially Wisconsin.

Mr. WHITE (continuing). And New Jersey—especially Wisconsin—who are not able to build homes today knowing that they cannot attach to a pipeline or to a distribution pipeline and get natural gas.

Senator BENTSEN. Mr. White, would it be all right if I used the example of a large industry in Wisconsin that was using gas instead of a residence in Wisconsin and instead of that Texas utility.

Mr. WHITE. Oh, yes.

Chairman PROXMIRE. That is fine. I think that is what Mr. White is advocating. That is what we want to do.

Mr. WHITE. Exactly, and I think not only are we going to see some people—

Chairman PROXMIRE. If the Senator would yield, as I understand it, what you suggest is that you require instead of this rolled in or averaging system, that you have an increment for the industry so they would pay more.

Mr. WHITE. Correct.

Chairman PROXMIRE. So the industry in Wisconsin would pay more.

Mr. WHITE. If they wanted to use natural gas as distinguished from oil or coal or some other fuel, yes.

Chairman PROXMIRE. Wisconsin corporations have no more votes than the Texas corporations, householders have a lot.

Senator BENTSEN. Is this not the case, Mr. White, that the rate structure has given a beneficial rate to large volume use? Is that not part of the problem?

Mr. WHITE. Certainly, that is true in electricity, and to some extent it is true and in my view, it should have been true when we were trying to develop pipelines accross the country. There are some communities in Wisconsin that would never have been able to have the benefit of gas if there were not industrial customers to make that load adequate to bring it there.

Senator BENTSEN. That is a point.

Mr. WHITE. We have got to keep these time frames in mind, too. Things do change quite a bit and sometimes very rapidly.

Mr. POSNER. May I say a quick word on the balance of payments? For a number of years in my country we were doing things to protect the balance of payments and I think I am aware of the strengths of the arguments about that. But since last August 15, I think it has been shown that the U.S. balance of payments can yield to other means of solution than protection, and I think it will always be the job of whatever Federal agency is looking at energy policy to ask up to

what limits is it correct to direct resource use at home as a means of limiting imports. And I would hope that, although I am in general in favor of a rise in wellhead natural gas prices in this country, and I can see strong arguments for that, I would not with respect suggest that you put the balance of payments as a main reason for taking that line of—

Chairman PROXMIRE. That reminds me, Mr. Posner, of a remark attributed to a former Chancellor of the Exchequer who when he came to this country, was asked why the balance of payments problems was worse than in the last century and he said because we had no balance of payments statistics in the last century.

In your prepared statement, Mr. White, you mentioned the need to modify our tax structure to "discourage" foreign investment by American petroleum companies.

In our hearings on oil last January, we learned that our tax structure actually subsidizes this foreign investment by classifying royalties paid to foreign governments as "taxes." Royalties paid domestically get no such treatment. We had persuasive testimony that most royalties should be treated as business deductions, rather than tax credits.

Is this the type of tax reform you had in mind?

Mr. WHITE. Yes. It is just illustrative and I think as Senator Bentzen suggested, when a major producing company sits down to make its annual budget, it has got some choices in front of it and right now so long as our Federal tax policies encourage and stimulate and induce the company to be drilling in the North Sea in partnership with the British Government, or in Indonesia or off the coast of Ecuador or elsewhere, that is where those rigs are going to go. I think to some extent we are capable of dealing with that so we have more of those rigs operating here.

Chairman PROXMIRE. I could never understand why we had the depletion allowance applied to foreign exploration. After all, the incentive for depletion, as I understand it, is to develop our own reserves in this country. And it is so ridiculous. What we do is provide the depletion allowance to American companies that explore abroad and then we put up a quota limiting the amount that can come in and increasing the price that the consumer has to pay. So it is a double sock to the consumer. It is very advantageous for the oil companies.

Mr. POSNER. Very advantageous for the foreigners. One of the things we get away with is relatively low prices because of your generous depletion allowance.

Chairman PROXMIRE. Did you have any other reforms in mind? Did any of you gentlemen have any other reforms in mind so far as taxes are concerned that could be helpful?

Mr. FRAZIER. I was just suggesting that I think the two principal ones have been mentioned but I would not want to let that list be exhaustive. I do not think either Mr. White or I are very ingenious in the matter of taxation, but it does seem to me if the Government wants to direct exploration in this country, it can do so in part at least by the use of taxation and it certainly has the experts in its employ who could devise the procedures by which this would be made possible.

Chairman PROXMIRE. I just have one more question before we have Senator Gravel, who has arrived. I would like each of you gentlemen to comment if you would briefly, on this point.

We have covered many aspects of the natural gas problem and solutions to the problem. At times you commented on the quality of the FPC policy in particular areas. You gentlemen have had various experience with the Federal Power Commission and Mr. White has been its Chairman for years, and a very distinguished Chairman.

Mr. FRAZIER. He is a producer and I am a consumer.

Chairman PROXMIRE. Well, you testified before it and are very familiar with its operations. I would like to ask you to give the Committee your overall evaluation of the performance of the Federal Power Commission in recent years. Has it been doing a good job? Should we maintain it as it is or should Congress alter it?

Mr. White, why do you not start off?

Mr. WHITE. Mr. Chairman, truly that is an impossible question for me to respond to. I have not followed all of the actions of the Commission and as I suggested to you, in all candor, they have a very, very tough job.

Chairman PROXMIRE. I can recall very vividly in a couple of months in 1960, before John F. Kennedy, after he was elected, before he took office, he asked Dean Landis, the Dean of Harvard Law School, to make an evaluation of regulatory commissions and he made what I thought was an extraordinarily perceptive evaluation. He said these commissions start off on a high level with experts and then they tend to become—I do not mean to be invidious on this—the captives of the industry they regulate. These are the people they see, the people they work with, the people whose problems they best understand, and they become soft on the industry, in effect, and tougher on the consumer. And this—it seems to me he felt they ought to either be abolished and recreated or you ought to have new approaches or something of the kind to give them a continued vitality so the consumer would continue to have a real representative fighting for him and asking the tough questions and coming down evenly and firmly on the side of fairness between the consumer and the industry.

Would this apply to the FPC now or not?

Mr. WHITE. Beg pardon?

Chairman PROXMIRE. Would this apply to the FPC?

Mr. WHITE. It certainly applies now and always has applied to it and I say, while I was there. It is very difficult to be concerned about an industry and not begin to worry about some of the problems they worry about. But, you see, the difficulty I have, Senator, and I have spoken about this in some seminars, is what is the standard by which you judge whether a commission has done a good job or not? It is very difficult to find objective criteria against which you can check off and say, that is the best darn commission you ever had.

One of the criteria is the rate increases but we know full well that so many of these rate increases are from factors over which a regulatory body has no control. It is like the ant on that log going down the Potomac. He has got a little bit more to say about it, a little bit more than the ant not steering it, but not much.

I think in some instances the judgments of the people in the Congress and in the general press kind of go on style. It would be very tempting to me to criticize FPC and I have criticized them on the basis of this one proposal which I think is outrageous, but I am mindful of the fact of how difficult their assignment is and I am not prepared to

say that you ought to throw all the rascals out and put in some new rascals, although when you come to November, I might be for a fellow who would be appointing different—

Chairman PROXMIRE. Rascals.

Mr. WHITE (continuing). Regulators. And there is a difference, of course. But I think it would be most inappropriate for me to comment.

As inappropriate as it would be for me, poor Mr. Frazier has got to go before that Commission, so you better be easy on him.

Mr. FRAZIER. I would like to say one thing. The FPC has an almost impossible task at the present time to do anything about this situation because it does not have its hands on levers of power. I think if you want to improve the effectiveness of an FPC, it needs general guidance with respect to a national energy policy.

It cannot make these decisions because a lot of the decisions are out of its control. The Department of the Interior says when and how fast you are going to allow gas to be made available offshore. A very critical item. The Department of the Interior has control of the rate of development of the offshore reserves once they have been leased. The Congress, of course, has control over the policy of taxation. The Natural Gas Act does limit the FPC, I suspect, in terms of this intrastate problem.

I do not think the FPC has the power to determine end-use by allocation processes. So that if we put the best men in the world on the Commission and you had the most competent engineers on the Commission staff, they still could not do the job.

So I think the way Congress can help them the most is to put them in a position to execute a policy which has been largely determined elsewhere in the Federal Government, and not give them a perfectly impossible task. The reason that they are floundering now is because it is an impossible task.

Chairman PROXMIRE. Mr. Frazier, that is a very, very interesting response and I wish you would expand on it when you correct your remarks for the record because I think you can be a little more specific in telling us how to go about it. I think it is most constructive and helpful.

(The following information was subsequently supplied for the record:)

NATIONAL ECONOMIC RESEARCH ASSOCIATES, INC.,  
CONSULTING ECONOMISTS,  
Philadelphia, Pa., July 10, 1972.

Senator WILLIAM PROXMIRE,  
Chairman, Joint Economic Committee,  
New Senate Office Building, Washington, D.C.

DEAR SENATOR PROXMIRE: At Transcript Page 84 relating to the hearing before your Committee on June 7, you asked that I elaborate on my remarks in the immediately preceding two pages, in which I said that with the most able commissioners and most competent staff, the Federal Power Commission had well-nigh insuperable obstacles to solving the problem of the demand-supply imbalance in natural gas. As noted, in the preceding page or so, I outlined why this was so, and alluded to other facets of the situation in my basic testimony. The following is an expansion of these thoughts.

My premise is that on the demand side, the Federal Power Commission has very little ability to reduce the burgeoning demand for gas. This excess of demand was created, in the first instance, by the passage of national, state, and local legislation upgrading the quality of fuels to be used in various industrial and other processes; to the point where in some communities this legislation almost required the use of natural gas whatever its price or availability. Under

these circumstances, with the statutory charge to see to it that the consumer only pays a fair price, demand control is virtually *ultra vires* for the Commission.

Moreover, you have here a situation where not only is the demand for gas virtually beyond the control of the Commission, but the alternatives available to the various power companies and other industrial groups are also circumscribed by law and regulations governing other fuels. Oil imports controls restrict the supply of residual oil, EPA controls limit what residual oil does come in to a given sulfur content, NEPA and AEC's administration of it have seriously delayed the introduction of atomic power, and it is almost impossible to construct coal plants now which meet various air quality control regulations. All the FPC can do under such circumstances, and in a shortage condition, is "to lock the barn door after the horse is stolen" by curtailing gas for electric uses to a greater degree than gas for the homeowner; and even this is challenged in some jurisdictions. Furthermore, in the Southeast where, in proportion, much more gas is used than in any other area, much of the gas is sold intrastate, over which sales the FPC has virtually no control.

On the supply side, the most promising areas in which gas is likely to be discovered in the next decade or so are the offshore areas, and here it is the Department of the Interior which sets the pace. Not only is the timing of these sales under its control, but so also are the terms of the lease sales; and were, for instance, it to be the FPC's desire to encourage competition among the independent producers, the best they can do is offer the suggestions. Nor are there indications that the long-standing policies of the Department would be changed.

As for onshore discoveries, many of these discoveries are in Texas, Louisiana, and Oklahoma, and the hungry intrastate market in those states, in a period of shortage, can always outbid the interstate market because there is no control, even at the state level, as to what may be paid for gas. In such an auction market even the alternative fuel cost may not be a complete stopping point to the price spiral, since some purchases, such as the local gas companies, cannot readily substitute any other type of fuel; and for many industrial plants the cost of conversion is such that least in the short-run they can pay a premium price for gas (in contrast to the price of low-sulfur fuel oil) in order to be able to avoid the cost of conversion.

Another problem confronting the FPC in attempting to enhance the supply of gas is the probable low degree of direct responsiveness of gas supply to price changes. This arises from the fact that the principal incentive which the oil companies have to explore for hydrocarbons in the United States is in the discovery of economical supplies of *liquids*. Some exploration can be conducted with the *probability* of finding gas as against oil, but much of the research is undifferentiated as between the two. The price of oil, therefore, is a far more effective tool than is the price of gas, in redirecting the exploratory activity of the oil companies to the United States from the other areas of the globe where, in recent years, they have been spending their exploratory dollars. The gas price is a very imperfect lever to accomplish this end. Contrary to some of the testimony which you have heard, in my judgment, the Commission has ample power, given it by the courts under the Natural Gas Act, to establish incentive prices to encourage gas supply. The problem, as I indicated, is not the power but the economic circumstances under which gas is found. If, as I have indicated, the oil prices are the principal lever, this then is a matter far beyond the control of the Federal Power Commission.

Under these circumstances, it would seem that the only actions available to the Commission are ameliorative in nature and do not go to the basic problem. This is not to say that there are not many steps which the Commission can take: Prompt response to the need to review prices; the use of rate regulatory authority in re the pipelines to discourage certain types of uses; and, where the producing segment of the industry is not responding to the challenge, the encouragement—and perhaps goading—of pipelines, and indeed distributors, to commit their own resources to exploration for gas and to the manufacture of synthetic gases. After all, it is these two segments of the industry which have the real incentive to expand supply.

However, these steps *can* only be ameliorative, in the absence of a clear and cohesive national energy policy in which all elements of the Government act in concert. This has been called for by almost every witness who has appeared before you, and it is hoped that by using one or another legislative vehicle, the Congress will take the lead in instituting the discussion which will lead to the adoption of such a policy.

Sincerely,

CHARLES H. FRAZIER.

Chairman PROXMIRE. Now, Mr. Posner, you are kind of the man from Mars. You come here from a foreign country. You do not have to worry about appearing before the Federal Power Commission. You can give us your views on it and you do know a lot about it. Maybe you can give us a more biting and hard-hitting comment.

Mr. POSNER. Mr. Chairman, I have those advantages but I have the disadvantage that I am not learned enough about the proceedings. As an outsider, what is surprising about the FPC is that it spends, what I see of its activities, an awful lot of time engaged in, not mincing my words, legal tomfoolery, about precisely what should go into a price determination, down to microscopic levels of the odd cents per thousand cubic feet; whereas along this table and in the press currently we are talking about very big changes both in the relative prices of different fuel, and about the eventual end uses of different fuel, about United States strategic considerations, balance of payments consideration, and so on. And so the tenor of my remarks would be to go along with Mr. Frazier. I would, however, like to add some additional points.

It seems to me that there should be a body somewhere in the city which has the job of formulating an energy policy.

Now, I would say that there are two aspects of energy policy formulation. One is grand policy decisions in which I have no doubt the Congress or the executive branch of Government would wish to be directly involved. The other is a very large amount of difficult analytical spadework, statistical projections, the assembly of the underlying arguments, the assembly of the facts, the fitting together of the different facts into a cohesive framework of analysis. Perhaps it may seem a good idea to product new organizations to do this sort of job. We have a rash in my country of constantly changing the framework of government because each new administration imagines that the errors of the past were due to the inadequacies of the bureaucracy. I do not go along with that myself. I feel if you have an existing organization which is a going concern, which has flourished, it ought to be cherished and allowed to go on, and I would like to see the FPC re-jigged, re-tooled, with the obligation to produce every two or three years a forward look in energy policies, in the energy outlook for your country, with a list of questions that seem to arise. It would be its function not to produce an answer but a list of questions, which other organs of government would then try to answer. They could present a menu for choice, if you like, a list of the possibilities open to your country, with the different factors to be borne in mind and the different facts which bear upon these choices properly displayed.

Now, I think that an FPC which did that sort of job as well as being concerned with regulation would be a better and more useful organization than perhaps it is at the moment. But I repeat, I speak from ignorance, being the man from Mars.

Chairman PROXMIRE. I think you make an excellent suggestion. Would you give us, when you correct your remarks, the kind of questions that you have in mind the FPC could ask of other agencies?

Mr. POSNER. Yes.

(The following information was subsequently supplied for the record:)

Amongst the relevant questions which would be thrown up by an analysis conducted this year might be the following :

(i) What degree of risk of power shortages, or of buying high-priced marginal supplies from abroad, should the U.S. economy be taking for 1980? (When this question was answered, a total primary fuel use for, say 1980, could be estimated.)

(ii) What extra cost should the economy be prepared to pay for indigenous fuel in order to avoid the political or balance-of-payments cost of buying from abroad? (When this question was answered, both the implied level of import restrictions and the implied contribution of imports to total primary fuel use could be calculated.)

(iii) Is it possible and fair to treat new finders of gas differently from owners of existing committed reserves? If so, which of the following strategies for regulating new gas discoveries should be followed: pay a price sufficient to equalize the East Coast delivered prices of imported (re-gasified) LNG with pipelined U.S. gas from Alaska or Louisiana; or pay a cost related price with a Permian Basin type of profit margin; or choose a price level for new gas somewhere between this ceiling and floor, bearing in mind the risks involved?

(iv) What bets should be made on the availability of new gas, at *any* price level?

(v) How should the increment in primary fuel use be supplied, given the answers to questions (ii) and (iv)? The FPC would provide background information on cost trends for coal production and nuclear energy, and the constraints imposed by current environmental and safety policies respectively on the use of these two fuels. It would be for the Congress or the Executive Branch, bearing in mind its answers to questions (iii) and (iv) and the arithmetic provided by the FPC, to consider what modifications in safety, environmental, or import restrictions would be required.

Chairman PROXMIRE. Well, gentlemen, thank you very, very much. You have been most helpful and enlightening. We do appreciate your testimony.

We will now hear from Senator Gravel of Alaska. We are delighted and honored to have Senator Gravel here. He is an expert in this area and has given it a great deal of thought. He represents the State, of course, that has a great interest in the Alaskan pipeline.

Senator Gravel is going to testify not on natural gas but on the Alaskan pipeline controversy on which we are going to have other experts appear later on.

#### STATEMENT OF HON. MIKE GRAVEL, A U.S. SENATOR FROM THE STATE OF ALASKA

Senator GRAVEL. Mr. Chairman, I want to thank you, first off, for going far afield at this hearing to develop the entire situation very orderly and as you stated, I am appearing sort of out of order in your hearing topics and I appreciate your doing this to accommodate my schedule.

First, let me say I have a prepared statement that I would like included in the record.

Chairman PROXMIRE. Yes. Without objection, that will be included in full at the end of your oral statement.

Senator GRAVEL. I will outline it most briefly. But I first want to say more broadly that the information that you were developing with these previous fine witnesses will be really beneficial to the hearings record.

We in Alaska, and I for one, when we heard that these hearings were to be held, took it as an invasion upon our right to develop ourselves and to be party to a—

Chairman PROXMIRE. Senator Gravel, please bring the mike closer. It is hard to hear you.

Senator GRAVEL. We are concerned about the nature of these hearings because we are overly sensitive about the issue at this point. But in reflecting upon it, I cannot see how any Alaskan, including myself, could have anything but praise and compliments for the hearings you have undertaken for the very simple reason that we have, with the pipeline, probably the first and most historic study of its kind in an industrial society.

It is a very complete study, not a perfect study. I do not think anybody would represent it to be a perfect study. I do not think a perfect study is obtainable but what we have done is to define the problem and cast up the options.

Now we face the problem of pursuing a decisionmaking process of implementing the best possible choice. That choice and method right now is in the hands of the Secretary of the Interior. He has notified the courts and the courts now take the decisionmaking process through the adjudatory process for those who object to the construction of the line at this time. There is no direct way at this point in time for Congress to involve itself in this decisionmaking process and I do not know if that is good or bad.

I do know, however, that there can be nothing bad achieved by a broader and larger input by experts into an evaluation of NEPA, into an evaluation of all of the alternatives, and offering this evaluation for public scrutiny. I do not think anybody living in a democracy could object to that process and for that reason I do want to compliment you for these hearings because I think they will be beneficial to the dialogue that is taking place in this country in an area that is so vital to mankind's intelligent survival—satisfying our energy needs.

With respect to the Alaskan situation, I think it will come out very well. I think the decision by now has been closely analyzed. I think the Secretary will give a good account of himself when he comes forward in response to your letter in which you posed very specific questions.

I think it should be borne in mind that the Interior Department has before it no other application than the one that presently exists, so that we can remonstrate and we can be concerned and talk speculatively of alternatives, but those alternatives only exist if the private area is willing to implement some of these alternatives. Otherwise we have no choice but for government to go do it itself because I know of no way we can force the industrial society to do certain things if they choose not to do it. Our pattern has often been if industry chooses not to do it, we, government, will do it ourselves.

That is one important consideration.

Mr. Chairman, I have never been one to take an unthinking pipeline position and say as an Alaskan we should have it at all costs. I can assure you, Mr. Chairman, that those of us who are pro-pipeline were pro-pipeline with the proviso that a pipeline be built safely and intelligently without undue damage to the environment while at the same time satisfying our economic aspirations within the State and those economic aspirations of all Americans.

I would hope that view would be attributed to the Alaskan community because I think it is certainly a much more deliberate one than

some emotionalism that has exhibited itself in the past. I think we, the Secretary, and the courts should, that is, the time element involved because though we do not have an application right now for any other alternative other than the Alyeska alternative, we do have a time delay of from two to three, maybe as much as five years.

I am not prepared to say this necessarily will be deleterious to the nation. It will be deleterious to Alaska, but what effect it has nationally I do not know. I question whether anybody can make that judgment for certain except there is the fact that a certain security goes with having more product on the line than can be satisfied by our own flag carriers, and I think that security in itself is worthwhile to pursue.

I think there is another conclusion that most oil people and most people who followed the developments on the North Slope have come to. If the finds are every bit as large as everybody anticipates, then we are not only talking about an oil pipeline through Alaska and going the rest of the way by tanker but we are also talking about a gas line through Alaska tying into liquefaction plants either in Alaska or on the west coast, and we are also talking in terms of a pipeline down the McKenzie Delta into the big United States and also a gas line in that area down into the big United States.

That would be my projection, which I do not think is overly optimistic. I think it is a realistic view as to what seems to be the possibilities in that part of the world.

I would just like to speak a moment about the Canadian alternative which is admittedly a viable alternative. There is no question. There are only three ways to move the product from Alaska to the markets. At this point may I just digress for a moment, Mr. Chairman. I think anybody who understands the economy of the United States today recognizes that we have 6 percent of the world's population and we consume 40 percent of the world's energy. From this we must understand that as we raise our quality of life and as the rest of the world searches to raise its quality of life, the amount of fossil fuels we have available for our immediate use will be expended by the year 2000. Our problem is much more serious when viewed in this time frame and we should be looking to that course of events while not ignoring the short-term problems that should be solved now.

So I think any thought that we can just close the tap and leave the oil stored in Alaska is really a ridiculous one because we are talking about gargantuan needs and voracious appetites that exist not only for ourselves but the rest of the people of the world. In a global sense we have no more right to tap off that reservoir than does Saudi Arabia or Kuwait if they chose capriciously and arbitrarily to go back to being Bedouin tribesmen in a desert and saying we will not let anyone exploit our oil, just leave us alone and do not bother us at all.

I think we would face in the world unfavorable repercussions, by a lot of the countries that do want to enjoy a higher level of energy consumption. I think we can put that leave-Alaska-a-storehouse argument aside.

Moving to the analysis of the three possible choices, one is all land, which is the Canadian alternative.

Chairman PROXMIRE. One is what?

Senator GRAVEL. All land, the Canadian alternative for bringing the product to market. Three in all. All land through Canada, land and

water, which is the Alyeska proposal, and then all water which was the Northwest Passage proposal.

The Northwest Passage proposal was explored to the tune of \$60 million by private sectors of the economy, not primarily the Government. I cannot help but make a point that was made by the British gentleman sitting in the chair I am sitting in now, when he was trying to differentiate between the types of animals the oil people are and the other types we find in the utilities and energy industries. From my perspective I think the oil people are a cut above anybody else in the energy industry. We now demand more of these people in the oil industry, but they cannot do more because of their strategic position.

The investigation was made of the Northwest Passage alternative and it was determined uneconomical with respect to its present feasibility. This might be something your committee might want to explore further and acquire the data and evaluate this data. I think that would serve a good public function.

The choice now to be made is which remaining alternative do you take? We as Americans, in the interests of sovereignty, can only choose one. We can only use the Alyeska route. We can ask the Canadians if they want to entertain a proposal. They said publicly that they would entertain such a proposal. I have read Minister MacDonald's letter on that score. However, if the private sector does not want to come forward and implement such a proposal I do not know how you can affect that. Only time will tell.

At some future date I would hope to cosponsor a conference with Canadians in Canada for a continental energy policy. I must say I was taken aback by the way they reacted to my earlier pushing for a continental energy position. My parents are Canadians and I have great affection for Canadians. But I can say they exhibited no great perspicuity to me with respect to grappling with the totality of this problem. I think it is unfortunate. I think there are some people in Canada who want to see a continental energy policy. It is ridiculous to quarrel over the energy sources when they may not last the whole group of us for more than 30 years.

When it comes down to the present decision, we only have one course of action available. We have to finally make a determination, and ask ourselves, "Can we make that course of action as practicable and as efficient as possible?" I think we can. I think Government is sophisticated enough, our technology is sophisticated enough. I think where we may become derelict in our duty is in enforcing the right thing to be done. I think that typically regulatory bodies do become captive of the companies. I do not think we have a legitimate regulatory agency in the country that is doing the best job for the consumer but I think that is partly the fault of the consumer and not only of businesses in that particular area.

Let me just say I think the problem overall is one, and I think the gentleman stated before me, one of forming energy policy. This nation does not have an energy policy and this is an abysmal deficiency at a time when we are so dependent upon energy and we do not know where we are going. It is something that I have been deeply involved in with the AEC. I think this Nation is putting all its Government dollars in one energy basket, the nuclear reactor which I do not think will serve us well. If we spent the same amount of money trying to clean up our

fossil fuels and in developing other sources of power we would be getting more service and less amounts of pollution from our energy consumption.

In my book called "Citizen Power" I have a quote from a Nobel laureate who tells me if this Nation were willing to spend the same amount of money we have spent putting a man on the moon, we could come up with a cheap, clean, efficient power source in a decade to pierce this awful veil that seems to enshroud us prior to the year 2000 and I would hope your efforts, Senator Proxmire, would work in this direction.

I think a policy must be enunciated by representatives of the public. I do not think you can expect the oil companies to enunciate and develop a national policy or world policy. I think they are charged with only one thing in the economic area and that is to go develop sources of supply. They have done that very effectively and in their own self-interest, which they pursue. They have tax advantages which are there which you and I and the rest of the Members of Congress are guilty of providing. I think they pursue this—I think it is not wrong. I would only hope we have this intelligence to chuck our whole tax system and begin anew with something more intelligent and more equitable to all the people in this country.

I have one proposal in my presentation to you, Mr. Chairman, and that comes from the fact that I was just thunderstruck when I heard the amount and purpose of money requested by Admiral Zumwalt and I know you share my concern about the expenditures we make in the national defense area. So often we spend money in a national defense area that we can never recoup. We build an airplane that only has one job and that is to drop bombs. If it does not drop them it goes through its normal life and it becomes obsolete. Merely existing without having a benefit or payback to the people who paid for it. Perhaps that is the price of paying for protection in an immature world.

But we now have a new device here where we can provide ourselves with a greater degree of security in the energy field and let the consumer benefit for a change because it is very difficult for consumers in this country to go out and consume some degree of a destroyer or to consume some degree of an aircraft carrier. Yet we have the Navy coming up with its capital refurbishing program which it may well need. I do not quarrel with that necessarily, but this is being proposed in this era of peace that we are supposed to have been embarked upon under the present administration, in this era of peace we are now to embark upon a major capital improvement for our entire Navy. If some of this is needed, fine. But the rationale given by Admiral Zumwalt in his testimony for the reason for purchasing a fleet of frigates and sea lane control ships for our Navy was to protect the sea lanes so our tankers plying world trade could get to us with the oil we need to consume.

Well fine. We could find out what the alternative costs are if they are willing to put a figure on it but they do not. We have a lead-in figure starting with \$300 million and I suspect it will be into the billions and billions of dollars before it is completed, but let us say hypothetically, Mr. Chairman, the cost is \$10 billion to provide our Navy the necessary new ships to protect our oil tankers and our foreign oil supply.

Well, if we could develop a domestic oil supply and put it on line and it cost, let us say, \$3 billion, would it not make some sense to give the Navy \$7 billion, pay for the cost of building this line, lease the line to the private operators—I am not advocating the Government get into the operating business—and then the savings that accrue in the transportation of this product through cost avoidance would all be available to the consumers in this country.

So, one, you would have an increment of national defense that would be improved, and two, that increment would be consumable in the course of its existence which is something which in my mind is a lot more palatable to the taxpayers of this country than just simply building escort destroyers or patrol frigates.

I think we may need frigates and some missile ships, but I would hope we use some systems analysis and a great amount of judgment and see if we can not deflect some of these dollars in achieving the given goal—defense for our energy supply.

Mr. Chairman, again I want to thank you for affording me this opportunity to testify before your prestigious committee.

(The prepared statement of Senator Gravel follows:)

PREPARED STATEMENT OF HON. MIKE GRAVEL

Mr. Chairman, I very much appreciate the committee's generosity in accommodating to my schedule problems and allowing me time here today to talk about subjects that I understand are really reserved for later dates in your hearing calendar. For my part I have tailored my remarks to fit the ten minute format that I know you prefer.

My statement goes to the announced intention of the Secretary of the Interior to grant a permit for the Trans-Alaska pipeline. Obviously there are a lot of things to say on all sides of so complicated an issue, but today I am confining my remarks primarily to the economic implications for Alaska with a few observations about the national security aspects.

Mr. Chairman, I believe the Secretary's decision was a good one. I say this as one who has never pushed for the pipeline "at all costs" and indeed agreed that delay had been necessary for government and industry to really learn what it would be embarking on.

But in our system of major decision-making there comes a time when the necessary facts (or at least best estimates) are in. All interested parties have been heard, and a go/no-go judgment has to be rendered. Complexity of issues and intensity of feelings must not result in a paralysis of policy.

In short I am satisfied that the several government levels involved now have enough to go on to make good decisions on this issue and the industry knows enough to do it right.

Mine is a very practical approach based on where we are now and what we're faced with. I am not very interested in blame-laying, trying to calculate the incalculable, or wondering what might have been.

I start from the proposition that in a highly industrialized energy consuming society it is silly to have located 10 billion—perhaps 16 billion—barrels of oil and not proceed to exploit the resource. One can decry the need but not deny it. We don't have a pastoral society where a major oil find could be ignored.

Granted that we need to get the oil out, there aren't many ways to do it that are true alternatives. It gets down pretty fast to the specific Trans-Alaska route and an undefined Trans-Canada route. And we have only one application before us and that is for the Alaska route. It is easy to forget that no oil company has a proposal for Canada.

Personally, I have never been very sure that a Canadian route was ever a serious proposal in the near term. The Canadian Government for reasons of its own—economic and political—never seemed to have fully come to grips with the issue in a policy sense of deciding what it wanted to have happen.

Now the fact that there is no Canadian route application pending may be interior's fault or the industry's fault, or somebody else's fault—it doesn't much matter. As early as April 1971 in hearings before our interior and insular affairs

committee I called on Secretary Morton to make sure to fully analyze the Canadian alternative in preparing the required environmental impact statement, warning that to not do so would only serve to delay any pipeline at all.

I could even concede that theoretically it probably would make good sense to have a joint oil and gas pipeline corridor from the point of view of transport investments and perhaps the environment. But again we have no such application in existence. Further, in the case of the Prudhoe Bay Field my understanding is that the oil companies in the early years intend to use most of the gas for repressurizing the wells.

I am aware, of course, that the Canadian Government now says that it could be ready to handle any applications to build a Trans-Canada Pipeline from Prudhoe Bay in early 1973. That may be so, but remember that "processing" an application is not the same thing as deciding on one. We can all recall how far off estimates on our own side have been by Secretary Morton's predecessor on the subject of when a decision could be expected.

Furthermore, Canada has not settled its native claims, has no EPA legislation, does not know what its courts and environmental groups might do, and is faced with great engineering uncertainties because a route has ever really been delineated.

All this does not suggest to me a speedy resolution of the issue—if they should be faced with one. Indeed this is one of the attractions of the Canadian alternative, I fear, for those who see delay and obstruction as somehow advancing their own position.

I know too that some advocates feel that the Prudhoe Bay find ultimately will support several pipelines; I say, "Fine! Let's move ahead with the one we've got."

Mr. Chairman, in the course of this whole controversy inadequate attention and concern has been given to the State of Alaska's interests and aspirations. The tendency has been to glibly dismiss them as badly motivated and narrowly based. Too often persons joining the debate on the pipeline issue act as if it were *entirely* a national concern where the views of the citizens most affected by the outcome and in whose state the resource is located are to be given no weight at all.

Fortunately ours is not a single-government nation; we do have states with particular and important powers. A Federal system does not mean that the hopes and fears of the states are to be wantonly run over. Nationally we are in a period of doubt, frustration, guilt feelings, and atonement, and Alaska with its pipeline issue has become the arena and the "target of opportunity" where some of this can be acted out.

I take strong exception to any inference that a trans-Alaska pipeline doesn't mean much to Alaska economically or that the impact on the state would be the same whether it went through Alaska or Canada. That is neither my interpretation of interior's impact statement nor my reading of the Alaskan economy—an economy which last year grew only 1.5% per cent in real terms.

Turn to some numbers.

Until 1965, the value of "Alaska gross product" had never crossed one billion dollars. In that year the GNP of the United States was \$681 billion.

By 1970 Alaska gross product had climbed to about one and three-quarter billion dollars. This was a fairly dramatic increase, though inflation in Alaska over that period accounted for some part of this increase.

The leading sector of all was petroleum and natural gas with a 500% increase.

The petroleum sector powered the Alaska economy forward both in its direct activities and its induced demand on other sectors. It could do so again.

The Alaska economy continues to show strong growth in the services sector, as opposed, for example, to the manufacturing sector. This expansion continues to be associated with supporting government and oil-related activities.

In 1960, direct industry average annual employment was about 400 employees, with an annual payroll of 4 million dollars. For 1970, average annual employment exceeded 4,000, with a payroll in excess of 50 million dollars, or an increase of over 1,000 per cent.

I said last fall that for the five-year period beginning with the construction of the trans-Alaska pipeline I foresaw a fivefold increase in employment and incomes. Following the peak pipeline construction period I would expect the State's spending activities made possible by the petroleum revenue (in the order of \$1 million/day) to offset the decline of construction and field development activity. If other oil provinces should be brought in in the meantime, as is not

unlikely, there might well be no economic pause at all but rather a reinforced upward surge in Alaska's economy to still higher levels.

The precise magnitude of the income and employment multipliers are not yet known but I would say a conservative estimate is that for each 10 million dollars of direct industry income paid out, an additional 3 million dollars of indirect income (in retail trade, construction, transportation, etc.) is generated. Roughly the same order of magnitude is indicated for the employment multiplier.

Using these estimates of the income and employment multiplier, I find that direct and indirect industry related employment was in excess of 5,000 jobs in 1970, with a payroll of over 70 million dollars. So perhaps a fifth of the entire private sector payroll is either directly or indirectly related to petroleum industry activity, and these estimates are not likely overstatements of the economic impact. Taking direct and indirect effects together I see oil industry-related employment to number 25,000 by 1976 with personal income running perhaps \$350 million. Interior's impact statement sees 30,000 workers and some \$400 million in personal income at the height of the construction period.

While cause and effect relationships are sometimes difficult to prove, I think it is fair to say that actual and anticipated petroleum industry activity in Alaska, particularly since 1967 or 1968, is the major explanation for the substantial growth mentioned earlier in the State and local government sector. I just don't believe that the creation of the new programs and the expansion of existing ones would have happened to the same degree without the oil industry on the scene.

Conversely, of course, to the extent that State government levels of spending would have to be curtailed in the absence of petroleum-related revenue, then many jobs in Government are clearly dependent upon the petroleum industry. Based on the ratio of State government spending to State government payrolls, a good estimate is that industry payments to the State support at least 1,000 jobs.

On the question of employment and unemployment I believe we are smart enough in Alaska to make a significant dent in the unemployment problem with the coming of pipeline construction, and I believe we will do better than is predicted with regard to native participation in this work force. The recent Alaska native claims settlement can effect this in a favorable way.

And in any event, if, as is likely, there would be a substantial inflow of job-seekers from outside of Alaska, there's nothing the matter with helping relieve unemployment nationally: it's better than relieving Canadian unemployment. The transient nature of a part of the Alaskan population is not a new discovery—fully 40 per cent of the non-native Alaska population came to Alaska in the last five years.

On the question of the alleged boom and bust aspects of pipeline construction in Alaska two things should be said. One is that there is no inevitability to this, and the State has the opportunity to behave in a countercyclical fashion as necessary throughout the cycle. The other is that Alaskans are used to an uneven economy over time—good fishing seasons and bad, gold rushes and declines, military spending and retrenchment, oil and timber sales and court injunctions against their consumption.

In short, in a forced choice Alaskans would rather endure a bust after a boom than have no boom at all. To have employment at Fairbanks increase 65%; at Anchorage, 24%; at Valdez 50%; and overall construction employment in Alaska increase by 125% is very strong tonic indeed. And we want to see this happen. Done right, early construction is good for Alaska.

Of course there will be substantial "leakages" from the Alaska economy; we will not capture all the economic gains. But that's all right, and I'm convinced that plenty of the benefits of this new economic activity will stick with us in Alaska.

The other major economic aspect to the early creation of a trans-Alaska pipeline is the expected flow of revenues to the State, approaching a million per day. So much can be done for the citizens of our State in the way of needed services and public investments which are now largely unavailable but which could be provided with a healthy general fund. The State is presently deficit spending to keep its economy active and a minimum flow of services to its people.

Recall too that the native population of Alaska—some 20% of the total—have a great deal at stake here as well. \$500 million in shared royalties are riding on the production of North Slope (and other) oil.

I share the State's view that the chances are great that it is not a matter of indifference from the standpoint of the State treasury whether the pipeline goes

through Canada or Alaska. In the State's evaluation of the impact statement questions of ownership, throughput, wellhead pricing are persuasively set forth, and I am sure Governor Egan will ably elaborate these for the committee when he testifies later this month.

For myself, I have what the economists call a strong "time preference." I conclude that early production is good for Alaska and good for the Nation. Accordingly I believe we should proceed with the Alaska route.

Now Mr. Chairman, let me make just a few observations on the security aspects of the pipeline. The Department of Defense called it a draw in regard to the defense aspects, and I suppose they mean that it is as easy to destroy a terrestrial pipeline through Canada as it would be to knock out a line one third as long but with a marine transport segment as part of the total system.

I suspect, however, that there are other security considerations that are not very easy for us to talk about that might come into play in the case of the Canadian alternative. In a world where nation states are still the dominant forces and sovereignty is still jealously guarded it is a big step for a nation to locate a major energy transport system in someone else's country with all the dependency considerations that that implies.

Also I could imagine a circumstance—I don't say expert and surely not encourage—where the pipeline as a highly visible and highly vulnerable thing could become a hostage of sorts, a target of, say, "Free Quebec" extremists or even some northern natives disgruntled to the point of sabotaging the line to gain the attention of governments or industry. I mention these things not to in any way suggest bad faith or the likelihood of future bad relations with Canada; merely to point out again just how big and complicated the locational decision really is as we look to a 30-year time horizon.

Turning to the more traditional view of national security in oil supply matters I have only this to say, I don't know if there is any precise balance between dependence or foreign oil and national security. What I do know is that very senior people whose job it is to worry about such things—the Director of Emergency Preparedness, the Secretary of State, the Secretary of Defense, the Secretary of the Treasury—all agree that projected dependence on imported oil in the absence of North Slope oil is "unacceptable in terms of national security" and that "early completion of the Alaska pipeline must be considered an important national security objective."

What I have recently been saying is that if this is so, and if we currently have an energy shortage, and if the administration is serious about implementing the President's energy message of last year, then let's look first to getting Alaska's oil and gas to market and that means going ahead with the Trans-Alaska pipeline.

I have also made the point that somewhere in this Government—and maybe the Congress is the place—an evaluation must be made of the comparative economic efficiency of putting the Nation's wealth into building a fleet of patrol frigates and surface control ships, as requested by the Navy, to keep the oil sealanes of the world open to ensure the reliability of U.S. crude oil supplies versus investing a like or lesser amount in building the Alaska pipeline to achieve the same goal.

Mr. Chairman, I thank you for your attention to my views and would be pleased to respond to any questions. We all share an interest in the widest dialogue on this important subject and I'm sure your hearing record will reflect this at the conclusion of your sessions.

Chairman PROXMIER. Senator, I want to consider your last suggestion very carefully, but with respect to the Alaskan pipeline versus the trans-Canadian pipeline, of course, the way you put it, how could anybody deny your position if all your assumptions are correct? I question the assumptions. Assumption No. 1 is that there is only one alternative, you have got to build a pipeline approved by the Secretary of the Interior.

Assumption 2 is, it can be environmentally safe, will not seriously damage or significantly damage the environment.

I have not had a chance to study as carefully as many have, as I am sure you have, the second part, whether or not this can be done from

the standpoint of preserving our environment. I understand some very, very able, competent, dedicated conservationists have very serious questions about this and are deeply opposed to the Alaskan pipeline. They have less opposition as I understand it, to the trans-Canadian pipeline.

I deeply sympathize with your position with respect to your State. I know if this were something in Wisconsin, I certainly would be very interested in something which would provide enormous employment, great boom, great increase in income.

You have one of the few States that needs population and this would help greatly to increase your population—as you say you have to import workers here—because you would have a greatly increased demand for work.

But the question is, Is the Canadian pipeline a pipedream? Is it? I just wonder. From what I hear it is a very practical operation. I have frankly a vested interest in this, too, just as you have in another way. We desperately, urgently need natural gas, as you can tell, and oil in the Middle West, perhaps as much as any section in the country, including New England. We feel we need a lot more than California does. And we feel our case is a much stronger case in the whole Chicago area, whole Middle Western area.

I do not see that the documentation here that would indicate that it is impracticable, let alone impossible to work out a trans-Canada pipeline that would provide what you want. No. 1, the full exploitation of this wonderful resource we have. And on the basis of the testimony we seem to have an environmentally safe operation than if it went the trans-Alaska route.

Senator GRAVEL. I think your point is well taken and I hope I did not misstate my point—the second premise I will accept. On the first premise I did not want to make the point that the Alyeska line was an all-or-nothing proposition because there is no question, there is the existence of an alternative. The Canadians have stated publicly that they would entertain such an application if one were forthcoming. None has been forthcoming. So this does not seem to be the way you can solve your problem, and I agree with you. I think the situation in the Middle West is appalling, the gas situation is really a tough set of facts.

But I might say that if the Alyeska line comes on early, then the feasibility for the gas line through the Mackenzie area would be clearly practicable and under the Canadian proposal the right-of-way can contain an oil line later. So if you want to satisfy your gas needs immediately, I would say we should implement the Alyeska proposal in all haste and the only point I am making is that Alyeska's is the only proposal around.

We can talk of other theoretical possibilities but until someone comes forward and says I am willing to build the line, then they are only theoretical.

Chairman PROXMIRE. Is it not true that the reason it is the only proposal around is because there is only one administration and they have decided this?

Senator GRAVEL. Oh, no. The oil companies have decided this is the way they want to move it. Whether they are right or wrong, I think that can be subjected to critical analysis.

Chairman PROXMIRE. I do not think either you or I want to do whatever the oil companies want to do.

Senator GRAVEL. Not necessarily, but in a free society like ours the only alternative you and I have is to say we are going to form an oil company that is going to move our product through Canada and apply for that. Otherwise we are forced to taking a gun, putting it at the oil companies' heads and saying, OK, we do not care what you have decided, this is the way we want it, you go do it. We have not done that in the past except in time of war.

Chairman PROXMIRE. We do not quite put it that way.

Senator GRAVEL. Well, but the other way—it is very dangerous.

Chairman PROXMIRE. We make it the policy of our country to provide that this resource goes where it is needed in our country and in doing so, there is a great deal of profit to be made here. There is a great advantage. This is a—as I say, there is a huge demand. There is a marvelous new supply that is available. I cannot believe that our free enterprise system and our great oil industry cannot take advantage of this to use a trans-Canada approach that would provide oil which we so desperately need in the Middle West.

Senator GRAVEL. They are probably taking advantage of it. Probably there are some very unique advantages to them in taking the Alyeska alternative. I do not know. I hope that maybe that is one of the things that you will discover.

Chairman PROXMIRE. Let me just say—

Senator GRAVEL. As you pursue this you cannot negate the facts and I wish it were not so, I wish it were one world, but Canada is a sovereign country and there are problems that have not even been addressed on the Canadian alternative because we talk about it in very general ways.

There is one area that is very serious, a pipeline through Canada means American ownership. The thought of coming into Canada with any sizable amount of American capital is not politically acceptable in that community today.

Chairman PROXMIRE. That is hard to believe when you look at the facts we own so much of industry in Canada right now.

Senator GRAVEL. That is exactly why this possibility—

Chairman PROXMIRE. On something like this I do not think there is any real indication that they would say no.

Senator GRAVEL. Well, Mr. Chairman, I would say that this could become the hottest political issue for them, the ownership of a trans-Canadian pipeline to move Alaska's product, and could even cause the downfall of a government in discussing it. I do not think we can dismiss it out of hand and say, "Of course, they want the pipeline." That is like saying there are some Alaskans that do not want the pipeline but—

Chairman PROXMIRE. Senator Gravel, you know I have high respect for you. I think you are an excellent Senator as well as a good friend but I think neither you nor I can speak with much authority on Canada's policy as a witness who will appear a little later, a member of the Parliament, who is expert in this area and represents to a considerable extent the Canadian view, who favors this.

Senator GRAVEL. Who is that?

Chairman PROXMIRE. David Anderson.

Senator GRAVEL. I know him. He is a fine man. Some day he will be a great leader, but he is just one member of Parliament as you and I—

Chairman PROXMIRE. I am just one U.S. Senator. That is all I am.

Senator GRAVEL. Mr. Chairman, you can appreciate if I went to the Soviet Union and testified for unilateral disarmament, which I feel very strongly about, it would not be very effective. Mr. Anderson will make a contribution—I do not want to denigrate that one iota—but I think the simple fact of the political situation is this. He is from Vancouver and the potential security problem I am talking about is Quebecois. It is really going to be two different worlds, particularly when his constituents stand to gain more, like yours from a trans-Canadian alternative rather than a trans-sea alternative.

There is another consideration. The impact of moving so much capital into Canada in such a concentrated period of time for such a project would have a bad effect on the balance of the Canadian economy. In other words, it would affect employment, it would cause the inflation, it would affect all these other facets, which again adds to the political problems of the government.

Chairman PROXMIRE. That is very, very hard for me to understand. They have worse unemployment than we have in this country. They have the need for jobs. They have a need for industrial development and activity. This would promote that, certainly. It would not reduce it.

Senator GRAVEL. No; because I think the article—

Chairman PROXMIRE. And we have, I think you would agree with me, perhaps, that unemployment is a more serious problem even than inflation. They are both serious problems in this country but we have unemployment that we have not begun to solve at all. As I say, Canada has a worse problem.

Let me ask you on one other area. The hour is late. Let me ask you about the environmental question because I would like to get your views on that. I think it would be very helpful.

As I say, we have a number of outstanding environmental experts, including some who will appear before us, Charles Cicchetti, an economist for Resources for the Future, others who have written us, filed statements, who are very, very concerned in some cases about either course. What can we say about making sure the environment is not polluted?

Senator GRAVEL. I think that the environmental problem can be mitigated as well as any possible human endeavor can be mitigated. In other words, the technology is there. They can use it. It remains to us to police it.

Where we are dissatisfied at certain design criteria, we can change it. There are only two areas we cannot fully design against and that is, of course, seismic problems that occur as you come down into the valley areas and also the impact upon the fisheries of the Prince William Sound area which will affect some fisheries. They are going to go to court for that. They have a right to do it. I think they are doing the right thing in going to court. So that will be adjudicated in the normal process.

I would hope that somebody would have the wisdom to set aside a sinking fund and determine some liability and then as a result of this liability see that people are compensated if they need to be compensated.

Chairman PROXMIRE. Let me interrupt there. I do not think either you or I would settle for compensating those people whose private property might be damaged. Alaska, as I understand it, about 99 percent of the land is not private, but is owned by the Federal Government, by all the taxpayers. It is not a matter of simply being concerned about some fishermen, although I am concerned about them. We are concerned about the environment itself, about the entire surface and ocean areas involved.

Senator GRAVEL. I think if you will examine very closely the design criteria for the pipeline you will find that the danger you are talking about in the areas in question are very small and I would hope you and your staff would really go over the details of the stipulation.

Chairman PROXMIRE. Let me just say—the hour is late—if you would like to file anything in the record to document this, as far as the technical protections against environmental pollution, we will be delighted to have it.

Senator GRAVEL. I think my statement speaks for itself. As I stated earlier, it is probably the largest single analytical endeavor of this sort in the industrial history of mankind. It is not a perfect statement, but I think it is the best that we as human beings can do.

I think one of the benefits of your hearings will be that we will develop a greater resolve to police these areas of regulation. I think our problem is policing. If we can transport human beings to the moon, it seems idiotic that we cannot transport oil without spilling it all over the place. It is like carrying a pail of water, like running across the room with a bucket of water because we want to hurry and get there and get some of it dropping out, or walking across slowly with your bucket and not spilling it. All you have to do is make them walk slowly so they do not spill the bucket.

Thank you very much.

Chairman PROXMIRE. Thank you very much, Senator Gravel. We appreciate your testimony.

The committee will stand in recess until tomorrow, when we will convene in this room and hear John Nassikas, Chairman of the FPC, S. David Freeman, research director, National Energy Policy Study, and John F. O'Leary, energy consultant, Washington, D.C.

(Whereupon, at 12:55 p.m., the committee was recessed, to reconvene at 10 a.m., Thursday, June 8, 1972.)

# NATURAL GAS REGULATION AND THE TRANS-ALASKA PIPELINE

THURSDAY, JUNE 8, 1972

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

The committee met, pursuant to recess, at 10:05 a.m., in room 1202, New Senate Office Building, Hon. William Proxmire (chairman of the committee) presiding.

Present: Senators Proxmire, Bentsen, Javits, and Percy; and Representative Brown.

Also present: John R. Stark, executive director; Loughlin F. McHugh, senior economist; Courtenay M. Slater, economist; Jerry J. Jasinowski, research economist; and Walter B. Laessig, minority counsel.

## OPENING STATEMENT OF CHAIRMAN PROXMIRE

Chairman PROXMIRE. The committee will come to order.

Today we continue our hearings into the energy situation. At the first session yesterday we heard from three private experts in the natural gas field. I believe it is a fair statement that all three witnesses agreed we are in an energy crisis, that the Federal Government, which is heavily involved, has not developed a rounded program to deal with the crisis. Among the problems identified were the following:

(1) There is a gas shortage, but no one could estimate its exact dimensions because the Federal Government is presently forced to rely on industry statistics.

(2) We know that these shortages have caused recent gas price increases that have cost consumers at least \$750 million a year and contributed to the problem of inflation.

(3) We do not know that these price increases—or even larger increases—will lead to additional gas supplies by producers. In fact, in the last few years gas prices have increased while gas reserves have declined.

(4) We have not attempted to meet this shortage by assigning priorities to how gas should be used—should industrial users be charged more than homeowners, for example? What should we do to educate people to conserve gas?

(5) The framework for regulating natural gas is inadequate. According to one witness, the Federal Power Commission is bogged down with “legal tomfoolery” and is much too narrow in its outlook and planning.

Now there are many ways that we as a nation can attempt to solve these and other problems in the gas area. Some say that we should

simply deregulate natural gas. All three of yesterday's witnesses said that, under present circumstances, such a policy would be disastrous. I agree. This is a nonpolicy that would increase fuel costs to consumers by billions with no assurance that it would increase gas supply.

In some ways the deregulation of gas idea may be symptomatic of what is wrong with our overall energy policy. We do not need quick stop-gap methods. We need a broad national energy program that provides economical fuel supplies while meeting our national security and environmental needs over the long run, and a program that allocates these scarce supplies to their highest end-use priorities. I hope that today's testimony will contribute to the development of such a national energy program.

Mr. Nassikas, you have a fine lengthy prepared statement to present to the Committee this morning with a great deal of backup documentation. The entire prepared statement will be printed in full in the record, including documentation and the tables. We are delighted to have you here. We know you will contribute greatly to our understanding and our record. Because of the press of time I have asked that oral presentations be confined to ten minutes. We have a timer. We have a buzzer which will go off so you will know when the ten minutes are up. Please go ahead with your statement.

**STATEMENT OF HON. JOHN N. NASSIKAS, CHAIRMAN, FEDERAL POWER COMMISSION, ACCOMPANIED BY GORDON GOOCH, GENERAL COUNSEL; THOMAS J. JOYCE, CHIEF, BUREAU OF NATURAL GAS; ARTHUR L. LITKE, CHIEF ACCOUNTANT, OFFICE OF ACCOUNTING AND FINANCE; HASKELL P. WALD, CHIEF, OFFICE OF ECONOMICS; WILLIAM P. DIENER, ASSISTANT TO THE CHAIRMAN; KENNETH B. LUCAS, ASSISTANT TO THE CHAIRMAN; RICHARD F. HILL, ACTING ADVISER ON ENVIRONMENTAL QUALITY; FRANKLIN P. GOULD, STAFF ATTORNEY, OFFICE OF GENERAL COUNSEL; JOHN P. MATHIS, ATTORNEY, OFFICE OF GENERAL COUNSEL; DAVID SCHWARTZ, ASSISTANT CHIEF, OFFICE OF ECONOMICS; AND WILLIAM WEBB, DIRECTOR, OFFICE OF PUBLIC INFORMATION**

Mr. NASSIKAS. Mr. Chairman, I appreciate this opportunity to appear before you to discuss major issues related to natural gas supply and demand and the Federal Power Commission's regulatory responsibilities regarding independent producers of natural gas.

I will confine myself to a ten-minute discussion as prescribed by your rules of procedure.

At the outset, I would like to briefly summarize certain basic energy principles applicable to natural gas which would include recognition that (1) fossil fuel supplies are finite and human needs, over time, are infinite, (2) growth of our national economy is dependent upon a continued and accelerated development of our domestic energy resource base, (3) national security considerations require as our primary objective the maximum efficient development of our continental resource base, (4) all energy forms are part of an interrelated and

interdependent resource complex, (5) government policies should encourage the free enterprise system to meet our country's energy demands, (6) an accelerated leasing policy with firm schedules on a long-term basis is required for Federal lands, (7) the consumer interest in reliable energy supply at a reasonable price, consistent with adequate service, must be protected, (8) there must be reasonable returns on investment to assure formation of the requisite capital and adequate sources of financing to meet our energy needs, (9) supplemental gas supplies will not significantly augment domestic gas production in the decade of the 1970's, and (10) nuclear facilities during the next 20 years and the breeder reactor thereafter will be relied upon to provide a major portion of our prospective energy needs.

I would certainly call your attention to figure 1 of my prepared statement, which is a summary of our staff analysis report number 2 on the gas supply and demand projected to 1990.

As indicated in my prepared statement, "The Council of Economic Advisers has stated 'we could afford to pay significantly more for domestic gas, thereby appreciably increasing its supply, and still have lower prices than would have to be paid from the alternative sources now being considered.'" Alternate supplies are, of course, higher priced than domestic sources currently being delivered to us. Alternate fuel sources are summarized in the prepared statement and some of the costs of those alternate fuel sources are summarized in the attached tables to the prepared statement.

For instance, we expect that liquefied natural gas (based upon applications we have before us and upon examination of records before us) for base load purposes will approximate between 75 cents and \$1.25 per M c.f. Synthetic gas according to applications filed with us, may run in the range of 80 cents to a dollar and a quarter also. Gas from Alaska should be at a somewhat lower price than liquefied natural gas based upon a preliminary examination of figures.

By way of contrast, gas delivered to New York from south Louisiana or from Texas, costs about 45 cents to 50 cents and to New England markets, 58 to 62 cents, so that the costs of liquefied natural gas and alternate sources in very broad terms would run about double the costs under our present structure.

The FPC is a resource allocating agency as I have summarized in my prepared statement. We have taken a number of actions in an endeavor to improve gas supply since I became Chairman of this Commission, which I have summarized in appendix A of the prepared statement.

We have reviewed nationally all of our area rate structures. Most of these cases are on appeal to various Federal courts throughout the United States. There are some 27 pipelines which have filed curtailment plans with the FPC and seven pipelines were required to curtail service during the 1971-72 heating season.

We have stimulated exploration and development through an advance payment program that we initiated about a year ago and which is still in effect subject to reconsideration by December 31, 1972.

We have not only raised the price that producers receive at the well-head for gas but we have tried to stimulate competition at the producer level. We have reduced barriers to entry by releasing some 4,600 independent producers from area price ceiling, and to regulate the price

they charge to the pipeline companies through the cost of service to the pipelines in rate proceedings.

Over the long term I believe that competition may be a better method of gas resource allocation. In the present seller's market I am not in favor of legislation to eliminate producer regulation. I support the sanctity of contract principle which is incorporated in pending legislation before the Congress and I would hope that this Congress enacts such legislation which would assist us in carrying out our responsibilities and in inducing more exploration and development for badly needed supplies of gas.

We issued a Notice of Proposed Rule-making and Statement of Policy Relating to Optional Procedures for Certificating New Producer Sales of Natural Gas in Docket R-441 on April 6, 1972. We have extended the deadline date for submission of comments to June 15. This is the second extension in order to assure that all parties who may wish to comment will have an opportunity to do this.

The procedures of our national gas survey, which began about 18 months ago, are summarized in appendix E of the prepared statement.

On the Alaska pipeline my position has been, ever since I became Chairman, that the resource should be developed, however, the manner in which the resource is developed is a question for the Department of the Interior to determine as a matter of national policy. It is imperative to develop the resource so associated gas can be brought down to the lower 48 States where its environmental benefits will far outweigh, in my opinion, any degradation to the Alaskan environment.

That completes my 10-minute oral presentation. I will respond to your questions, Chairman Proxmire.

(The prepared statement of Mr. Nassikas follows:)

PREPARED STATEMENT OF HON. JOHN N. NASSIKAS

Mr. Chairman, I appreciate this opportunity to appear before you to discuss major issues related to natural gas supply and demand and the Federal Power Commission's regulatory responsibilities regarding independent producers of natural gas. While I will endeavor to respond to the questions of the Committee, indicating my views as Chairman and not necessarily those of the Commission, many of these questions are pending for deliberation at the present time or may come before the Commission for decision. I cannot speculate as to the outcome because the Commission functions as a court in performing the judicial responsibilities entrusted to us by Congress under the Natural Gas Act. Accordingly, I am sure you will understand that I cannot comment on certain topics until decisions have been reached on a public record.

At the outset, I would like to briefly summarize certain basic energy principles applicable to natural gas which would include recognition that (1) fossil fuel supplies are finite and human needs, over time, are infinite, (2) growth of our national economy is dependent upon a continued and accelerated development of our domestic energy resource base, (3) national security considerations require as our primary objective the maximum efficient development of our continental resource base, (4) all energy forms are part of an interrelated and interdependent resource complex, (5) government policies should encourage the free enterprise system to meet our country's energy demands, (6) an accelerated leasing policy with firm schedules on a long-term basis is required for federal lands, (7) the consumer interest in reliable energy supply at a reasonable price, consistent with adequate service, must be protected, (8) there must be reasonable returns on investment to assure formation of the requisite capital and adequate sources of financing to meet our energy needs, (9) supplemental gas supplies will not significantly augment domestic gas production in the decade of the 1970's, and (10) nuclear facilities during the next twenty years and the breeder reactor thereafter will be relied upon to provide a major portion of our prospective energy needs.

## NATURAL GAS SUPPLY AND DEMAND

In 1971, natural gas supplied about one-third of our total energy consumption.<sup>1</sup> This Nation is confronted with a gas supply-demand imbalance of developing crisis proportions. Some evidence of the market shortage of natural gas may be summarized as follows:

1. Twenty-seven interstate pipelines have filed curtailment plans with the Commission and seven major pipelines were required to curtail service during the 1971-1972 heating season.<sup>2</sup>

2. Eighteen pipelines made emergency gas purchases in order to maintain customer service.

3. Industry has made increasing commitments of risk capital to develop supplementary gas resources, e.g. LNG imports coal gasification synthetic gas plants, Alaskan and Canadian gas resource development.

4. Since 1956, there has been a steady decline in the total number of oil and gas wells drilled. Total gas wells drilled annually have radically declined from their historic high level of 5,459 in 1961 to 3,225 in 1970. Total gas well footage drilled has likewise declined from over 29 million feet in 1961 to less than 20 million feet in 1970, while average well depths have increased from 5,345 feet to 6,149 feet during the same period. (Table 1) Total exploratory gas wells have likewise declined from 912 in 1959 to 481 in 1970. (Table 2)<sup>3</sup>

5. Gas reserves dedicated to interstate pipelines declined for the third consecutive year in 1970 to 173.6 trillion cubic feet while production continued to increase. The result was a decline in the reserves-to-production ratio of 12.3 from a 1963 high of 20.2 (Table 3)

6. The American Gas Association reported that proved natural gas reserves in the contiguous states declined for the fourth straight year in 1971 to 247.4 trillion cubic feet, or a reserves-to-production ratio of 11.3. (Table 4) Total U.S. proved natural gas reserves, including Alaska were reported at 278.8 trillion cubic feet in 1971. (Table 5)

7. The finding-to-production ratio for the lower 48 states has averaged .5 for four successive years, 1968-1971. (Table 4)

In a report prepared by the Commission's Bureau of Natural Gas and published in February 1972,<sup>4</sup> staff projects a level of unsatisfied demand for gas of about 3.6 trillion cubic feet in 1975 which increases to 9.5, 13.7 and 17.1 trillion cubic feet in 1980, 1985, and 1990, respectively. The projected gas shortfall would require, by reference to other fuels, an energy equivalent of 1.56 billion barrels of oil in 1980, 2.25 billion barrels of oil in 1985, and 2.81 billion barrels of oil in 1990, or 374 million tons of coal in 1980, 540 million tons of coal in 1985, and 674 million tons of coal in 1990.<sup>5</sup>

The Commission's Bureau of Natural Gas, even assuming a turnaround in the annual finding level of gas reserves, projects that by 1980, our demand for natural gas will be 34.5 trillion cubic feet and lower 48 production will be 20.4 trillion cubic feet, resulting in an imbalance of 14.1 trillion cubic feet.<sup>6</sup> by 1990, the deficit between demand and lower 48 supply is expected to increase to 28.6 trillion cubic feet.<sup>7</sup> In order to balance supply and demand between 1971-1990, approximately 34 trillion cubic feet of new gas reserves must be developed each year in addition to the staff's projection of anticipated gas from supplemental sources. This rate of reserve additions is 38 percent higher than the historical peak of 24.7 trillion cubic feet of new reserves added in 1956. We will not be able to meet projected demands unless there is a marked acceleration in the domestic exploration and development of natural gas reserves. Nor do I anticipate that the quantities of gas available from alternate sources will significantly alter the anticipated supply deficit.

The gas supply-demand imbalance may well be heightened even further if the nuclear facilities required in utility generating capacity are not on-line. For instance, the Commission's 1970 *National Power Survey* projects 475,000 mega-

<sup>1</sup> In 1970, natural gas supplied about 29 percent of the total fossil fuel use for thermal power generation.

<sup>2</sup> The question of jurisdiction of the Commission over curtailments of interstate pipelines to direct, in addition to resale customers, a question of paramount importance is pending before the United States Supreme Court. *Louisiana Power & Light Co. v. United Gas Pipe Line Co.*, No. 71-1016, October Term, 1971.

<sup>3</sup> Reserve additions have been declining at a rate faster than the decrease in gas well footage drilled during the last several years.

<sup>4</sup> *Natural Gas Supply and Demand, 1971-1990, Staff Report No. 2*, p. 3.

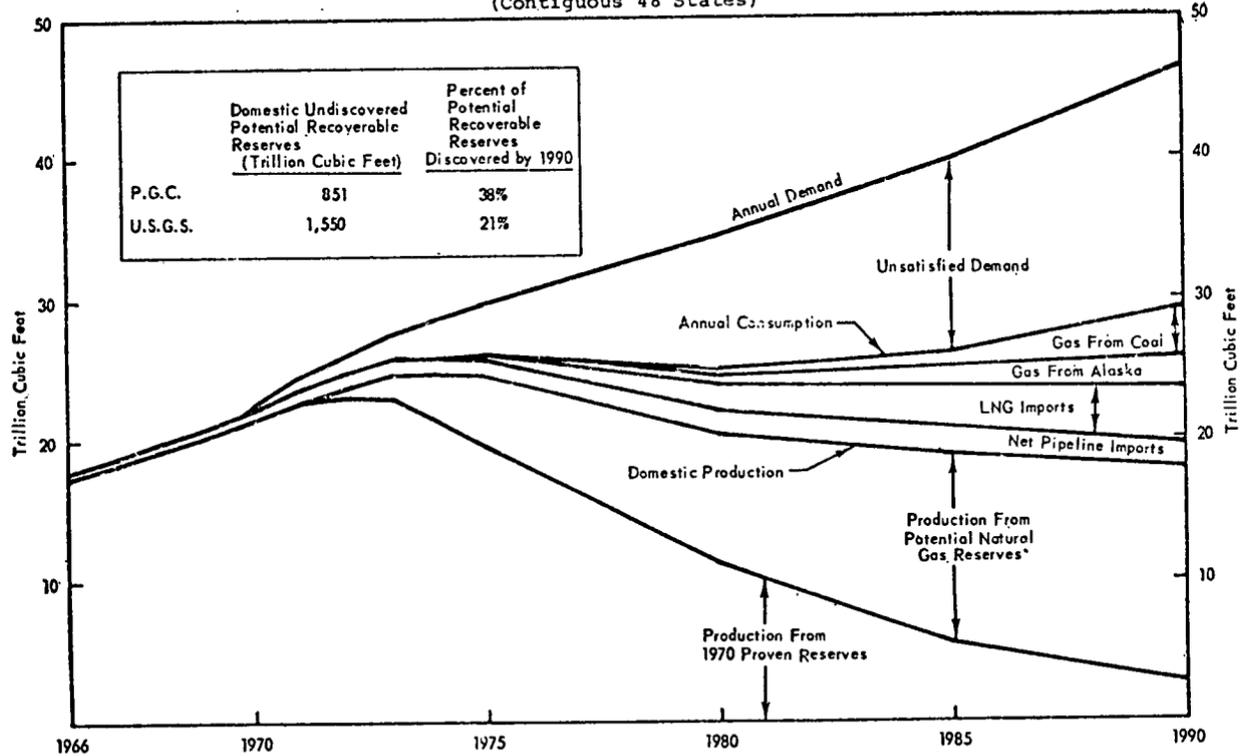
<sup>5</sup> *Infra*, note 3, shows the 1971 production figures of coal and oil for comparative purposes.

<sup>6</sup> Alternate gas sources are estimated at 4.6 trillion cubic feet in 1980.

<sup>7</sup> The staff report projects demand in 1990 at 46.4 trillion cubic feet and domestic production in 1990 at 17.8 trillion cubic feet.

Figure 1

UNITED STATES GAS SUPPLY-DEMAND BALANCE  
(Contiguous 48 States)



\*U.S. Natural Gas Reserve Additions (1971-1990) Total 325 Trillion Cubic Feet.

watts will be supplied by nuclear facilities in 1990. If such facilities are not operational as forecasted, there will be an increased reference to fossil fuels approaching the magnitude of one and one-quarter times 1971 natural gas production, two and one-half times the 1971 coal production, or almost double 1971 oil production.<sup>8</sup>

While the Nation is now confronted with a shortage of developed deliverable gas resources, various studies show that we do not have a physical shortage of natural gas resources. The Potential Gas Committee (PGC), in their report of October 1971, estimated that the total undiscovered potential of natural gas in the United States is 1,178 trillion cubic feet. The U.S. Geological Survey estimated our undiscovered potential gas resource base at about 2,100 trillion cubic feet. Thus, theoretically our potential gas resource should be adequate to meet demand for several decades, if economically recoverable so that the development rate can be accelerated to equate demand. However, more than 60 percent of this gas (based on the PGC estimate) is located in areas which will be difficult and expensive to explore and develop: 14 percent lies below a depth of 15,000 feet, 20 percent is in the offshore areas and about 28 percent is estimated to lie in Alaska.<sup>9</sup>

#### ALTERNATE GAS SOURCES

At the present time, pipeline imports are the only substantive supplemental supplies in the near term. In 1970, net imports of natural gas from Canada (776 billion cubic feet) and Mexico (25 billion cubic feet) amounted to almost 795 billion cubic feet,<sup>10</sup> or about 3.5 percent of total gas consumption in the United States, excluding Alaska. Staff anticipates an import level not exceeding 2 trillion cubic feet by 1990. The 1970 average price of pipeline imports at the U.S. border was 25.34 cents per Mcf. (Table 6) This price includes only the transportation costs to the international boundaries with no allowance for subsequent transportation to market areas.

The level of future imports of liquefied natural gas (LNG) depends upon alternate fuel supplies, price, national security and the availability of domestic gas resources. Even if all pending LNG applications were approved, the level would not exceed 1.5 billion cubic feet daily. The prices of maritime transport of LNG range from 65 cents to 85 cents for long-term contracts and up to \$1.70 per Mcf. for commitments of less than one year. (Table 7)

From the standpoint of national security, development of coal gasification technology should be accelerated. Formal applications have not as yet been filed with the FPC, but publicly quoted estimates for the cost of gas from plants using a Lurgi gasification process range from 85 cents to \$1.10 per Mcf.

Proved gas reserves in Alaska have been estimated by the American Gas Association to be 31.4 trillion cubic feet. There is little definitive cost data on the domestic delivery price; however, estimates have ranged from 80 cents to \$1.00 per Mcf. Until an evidentiary record is developed such price estimates remain conjectural.

As far as synthetic gas from naphtha, depending upon feed-stock costs, gas may cost from about \$1.05 to \$1.80 per Mcf at the plant. As with pipeline gas from Alaska, such cost estimates are to a large degree conjectural, pending the development of a formal evidentiary record.

In summary, alternate gas supplies to supplement domestic natural gas production will not be available, except at relatively higher prices, in sufficient quantities in the near term to alleviate the gas supply imbalance. The Council of Economic Advisers has stated "we could afford to pay significantly more for domestic gas, thereby appreciably increasing its supply, and still have lower prices than would have to be paid from the alternative sources now being considered."<sup>11</sup>

#### ALTERNATE FUEL SOURCES

In curtailment and other proceedings before the Commission we are examining whether alternate fuel sources could be used to satisfy part or all of present unsatisfied demand for gas, including gas used for power generation.

<sup>8</sup> Nuclear displacement is estimated at 26.9 trillion cubic feet of natural gas, 1,283 million tons of coal, and 5,280 million barrels of oil. Preliminary 1971 production, as reported by the Bureau of Mines, was 22.6 trillion cubic feet of natural gas, 560 million tons of coal, and 3,481 million barrels of oil, unadjusted for imports and exports.

<sup>9</sup> Availability of Alaskan gas, which is primarily associated-dissolved volumes related to the oil reserves, is dependent upon the marketability of the oil reserves.

<sup>10</sup> Staff estimates a 1971 level of 900 billion cubic feet.

<sup>11</sup> *The Annual Report of the Council of Economic Advisers*, January 1972, p. 122.

To what extent higher gas prices would induce fuel substitution is unclear. We are without concrete empirical evidence on the price elasticity of demand. For instance, such price elasticity may well be inhibited in the electric utility industry by the lack of alternate fuels in sufficient quantity and quality, the inefficient conversion of equipment, and environmental constraints. Arbitrary demand reductions could also have regressive effects upon our economy and standard of living, as well as retard our ability to meet our environmental objectives. The Commission has undertaken examination of demand-commodity rate relationships in directing limited gas supplies to residential and commercial uses and discouraging large volume industrial and boiler fuel uses.<sup>12</sup> The continuing National Power Survey (the 1970 Survey was issued in April 1972) will examine the allocation of fuels for power use in relation to environmental constraints. The National Gas Survey, *infra*, will contain an intensive end-use investigation of gas resources. However, I generally support the proposition that the competitive marketplace is better equipped to allocate resources.

Price comparisons of competing fossil fuels at the market level are shown in Tables 8, 9, and 10. Despite considerable shifts in the fuel components, the increase in the wholesale price of gas has generally remained below the increases for alternative fuels. Based upon thermal equivalents, natural gas is priced significantly below oil and coal of the quality required to meet ambient air quality standards, or electricity. In the three major cities studied, New York, Chicago, and Philadelphia, the price of gas at the city gate is currently lower than the market prices for alternative clean fuels with a sulfur content of one percent or less.

The Council of Economic Advisers has indicated that the gas shortage has been precipitated by artificially low gas prices, which has contributed to a greater demand and higher prices for other fuels.<sup>13</sup>

#### FEDERAL POWER COMMISSION'S ROLE AS A RESOURCE ALLOCATING AGENCY

I have briefly outlined in Appendix A a summary of Commission actions taken over the last two and one-half years to insure adequate service to the Nation's 42 million gas consumers at the lowest reasonable cost consistent with national economic, social, and environmental objectives.

In two major area rate decisions by this Commission,<sup>14</sup> we provided for incentives to producers in the form of increased prices as additional volumes of gas are dedicated to the jurisdictional market. Thus, we have used price as a tool to stimulate the necessary exploration and developmental activity, yet providing that consumers will not have to pay these increased prices until gas is dedicated.<sup>15</sup> Moreover, the prices and incentives in our recently completed area rate decisions have reflected consideration of supply and demand, capital requirements, market conditions, and other principles of economic costing, in addition to utility-costing concepts.<sup>16</sup>

On March 18, 1971, the Commission announced a policy to exempt small producers from area ceiling prices by blanket certification of small producer sales (those producers with less than 10 million Mcf in annual jurisdictional sales).<sup>17</sup> This action was designed to stimulate market entry and competition, as well as relieve some 4,600 small producers from area price ceilings and from certain regulatory burdens.

The Commission has permitted pipelines to capitalize exploration and lease acquisition costs as rate base item.<sup>18</sup> This policy has encouraged the entry of pipelines into the exploration and development for natural gas, as well as provided an immediate source of capital to conduct the required exploratory effort.

<sup>12</sup> The Council of Economic Advisers has suggested that a free market for natural gas may actually reduce demand as prices rise to a market-clearing level.

<sup>13</sup> *The Annual Report of the Council of Economic Advisers*, January 1972, at p. 121.

<sup>14</sup> Opinion No. 595, May 6, 1971, appeal docketed *sub nom. P.S.C. of New York v. F.P.C.*, No. 71-1828, D.C. Circuit, in the Texas Gulf Coast area. Opinion No. 598, July 16, 1971, appeal docketed *sub nom. Placid Oil Co. v. F.P.C.*, No. 71-276, 5th Circuit, in the Southern Louisiana area.

<sup>15</sup> Table 11 illustrates the changes in average wellhead price ceilings.

<sup>16</sup> Appendices B and C describe the methodology for determining new gas-well gas and flowing gas posts. For purposes of illustration, I have attached the staff's exhibit in Docket No. R-389A as Appendix B.

<sup>17</sup> Order Nos. 428 and 428-B, July 15, 1971, appeal docketed *sub nom. Tennessee Gas Pipeline Co. v. F.P.C.*, No. 71-1558, D.C. Circuit.

<sup>18</sup> *P.S.C. of New York v. F.P.C.*, No. 71-1161, D.C. Circuit, March 29, 1972, affirming Order Nos. 410 and 410-A.

These particular actions by the Commission recognize that competitive factors can and should be operative in a flexible, responsive and effective regulatory policy. The Commission has and should continue to provide the appropriate regulatory climate to recognize the economics of the market-place in carrying out our responsibilities to allocate resources at a reasonable price to the consumers. For instance, our recent area rate decisions have recognized the price levels in the essentially unregulated intrastate markets.

It would be premature to attempt to judge the impact on gas supplies and the exploratory and developmental effort of our recent actions, many of which are pending for review before the several United States Circuit Courts of Appeals.<sup>19</sup> I can say that in very pragmatic terms the Nation's gas consumers are confronted with the following propositions: (a) unless domestic exploration and development are significantly expanded, some consumers will be without a sufficient supply of gas, and (b) the overall cost of a limited supply of gas will increase by utilizing more costly supplementary sources. The Commission has sought to provide the appropriate incentives, recognizing increases such as drilling costs and capital needs, for development of our domestic resource base. The alternatives, higher priced alternate gas sources and alternative fuels,<sup>20</sup> would place a greater burden on the consumer. As we stated in Order 437A-4,<sup>21</sup> which supplemented our orders implementing the Economic Stabilization Act of 1970, and Executive Order Nos. 11615 and 11627:

This Commission has been confronted with conclusive evidence demonstrating a gas supply shortage. Every indication is that such a shortage will continue into the near future. The actions which we have taken in these recent opinions [area rate decisions] are designed to reverse this trend and to augment the Nation's dwindling gas reserves. To this extent the rates and other provisions in those determinations have used price as a tool to bring gas to the marketplace; in other words, to obtain for the public service the needed amount of gas. We have attempted to provide the proper economic climate to stimulate exploratory and developmental efforts in order to provide adequate service to the consumer at the lowest reasonable rate. An important policy consideration which we cannot ignore is the substantial burden which would fall upon the consumer if higher priced alternative energy supplies are required to alleviate the gas shortage. It is imperative that adequate sources of energy, including natural gas, be available to sustain the Nation's economic growth. Thus, we have balanced our regulatory responsibilities under the Natural Gas Act with the President's economic goals, and find they are not inconsistent.

The Commission, in its capacity as a resource allocating agency, issued Order No. 431, 45 FPC 570 (1971), which, in addition to providing for the filing of curtailment plans by interstate pipeline companies, indicated that the Commission intended to review the demand-commodity rate relationships. Such a policy was reaffirmed only recently in Opinion No. 600-A, May 8, 1972.

On March 22, 1972, the Commission, in Opinion No. 615, denied a certificate application which would have allowed the transportation of gas in interstate commerce to be used to fuel the boilers of an electric utility. The end-use of natural gas was an issue in a recent court affirmance of Commission action issuing a certificate authorizing the transport of natural gas for consumption at a petroleum refinery.<sup>22</sup>

The impact of the gas supply problem on rate design and end-use considerations will be continually examined. It is incumbent upon this agency to evaluate, and where in the public interest, implement policies which will conserve limited gas supplies and to allocate such limited resources in the most efficient manner.

<sup>19</sup> *Supra* note and Opinion No. 586, 44 FPC 761 (1970), appeal docketed, *Hugoton Anadarko Area Rate Case*, No. 71-1036, 9th Circuit; Opinion No. 607, October 29, 1971, appeal docketed *sub nom. Shell Oil Co. v. F.P.C.*, No. 72-1114, 5th Circuit, for the other Southwest Area; and area rates for the Rocky Mountain area, *Phillips Petroleum Co. v. F.P.C.*, No. 71-1659, 10th Circuit, and *A.P.G.A. v. F.P.C.*, No. 71-1812, D.C. Circuit.

Table 12a indicates that total gas wells drilled in the first quarter of 1972 increased about 10 percent over the first quarter of 1971 and 30 percent over the first quarter of 1968. Total wells drilled (oil, gas, and dry holes) indicated increases in the Hugoton-Anadarko, Appalachia, and Rocky Mountain areas, and an overall increase of 8 percent in the first quarter of 1972 over the first quarter of 1971. Table 12b. We have not yet determined the resulting productivity.

<sup>20</sup> See *supra*, notes 11 and 13. Artificially low gas prices may accentuate the demand for gas and by reference the demand and possibly increased prices of other energy forms.

<sup>21</sup> Docket No. R-427, issued November 29, 1971.

<sup>22</sup> *P.S.C. of New York v. F.P.C.*, No. 71-1197, etc., D.C. Circuit, May 16, 1972. Also, see generally, *F.P.C. v. Transcontinental Gas Pipe Line Corp.*, 365 U.S. (1961).

## NATURAL GAS PRODUCING INDUSTRY

There are about 4,700 independent natural gas producers in the United States, twenty-five of which supplied about 68 percent of the domestic gas purchased by interstate pipelines in 1969.<sup>23</sup> Many of the independent gas producers are the large integrated petroleum companies, which is to be expected, inasmuch as the exploration for oil has historically resulted in important findings of natural gas.

Producers of natural gas cannot be usefully classified as public utilities.<sup>24</sup> They enjoy no franchises or guaranteed areas of service and their value to the public is measured by the gas produced, not the resources devoted to the search for gas.<sup>25</sup> The Commission can neither compel a producer to explore and develop natural gas reserves nor can it require the producer to sell discovered gas to the jurisdictional market.<sup>26</sup> The producer can cease exploration and development activities without a certificate of public convenience and necessity. Thus, one of the most important regulatory tools is to establish prices at the wellhead in the jurisdictional market at levels sufficient to elicit the required exploratory and developmental activity and to increase commitments to the jurisdictional market.

The degree of competitiveness among natural gas producers has been subject to debate and controversy since 1954.<sup>27</sup> For instance, the Supreme Court has recognized the basic arguments on both sides;<sup>28</sup> (1) the gas producing industry is intensely competitive with low entry barriers and modest capital requirements, (2) without price regulation, the wellhead value of gas would gravitate toward a market clearing level thus lessening the supply and price demands upon other fossil fuels, (3) the gas consumer must absorb the regulatory costs. On the other hand, it has been argued that (1) workable competition is absent due to the control of gas reserves by large producers and the weak bargaining position of the pipelines, (2) incremental gas supplies over and above those anticipated at area ceiling levels are conjectural in the short-run, (3) absent regulation, price increases would be greater than the costs of regulation.

While over the long-term competition may be a better method of gas resource allocation, in the present "seller's market," I am not in favor of legislation to eliminate producer regulation. I do, however, support the "sanctity of contract" principle which would establish price certainly for new gas dedicated to interstate markets during the contract term. In addition, such legislation should enable the Commission to determine just and reasonable rates on the basis of all relevant data, including cost data, and economic and market factors. I would urge this Congress to enact such legislation along the lines I have suggested.<sup>29</sup>

On April 6, 1972, the Commission issued a Notice of Proposed Rulemaking and Statement of Policy Relating to Optional Procedure for Certifying New Producer Sales of Natural Gas, Docket No. R-441.<sup>30</sup> Written comments on the proposed rule and policy statement were solicited from any interested person before June 15, 1972. As noticed, this proposal provides for an optional procedure, in addition to the area rate procedures, for certifying contracts for new gas sales to the jurisdictional market. The proposed procedure supplements and complements the area price ceiling concept and does not displace those ceilings. Moreover, the proposed procedure has no impact upon flowing gas prices, but is applicable only to new gas dedications.

A final decision on the optional certificate procedure has not yet been made by the Commission. Such a decision may either abandon the proposal as noticed or

<sup>23</sup> FPC S-208, *Sales by Producers of Natural Gas to Interstate Pipeline Companies*, 1969, at p. V.

<sup>24</sup> *Permian Basin Area Rate Cases*, 390 U.S. 747, 756-7 (1968).

<sup>25</sup> *Id.*

<sup>26</sup> This is not the case where developed gas is by definition "jurisdictional", e.g. located on Federal lands.

<sup>27</sup> *Phillips Petroleum Co. v. Wisconsin*, 347 U.S. 672 (1954).

<sup>28</sup> *Permian*, *supra*, at 795, n. 68.

<sup>29</sup> Hearings on H.R. 2513 before the Subcommittee on Communications and Power of the House Committee on Interstate and Foreign Commerce, 92nd Cong., 1st Sess., September 21, 1971.

<sup>30</sup> Appendix D. Two years ago the Commission provided procedures for the issuance of permanent certificates for new gas, notwithstanding that the proposed rates may be in excess of the area ceiling or guideline rates, Docket Nos. R-389 and R-389A. 35 Fed. Reg. 10152, June 20, 1970; 35 Fed. Reg. 11638, July 21, 1970.

adopt it with or without modifications. Since that proceeding is pending before the Commission for decision, I am not at liberty at this time to evaluate the substantive arguments for or against such a procedure or to predict our final action. I can, however, state categorically that *if* such a proposal is adopted there would be no deregulation. Certificates issued under such a procedure must meet the "public convenience and necessity" tests of the Natural Gas Act.<sup>31</sup> Nor would promulgation of such a rule obviate the immediate need for "sanctity of contract" legislation, along the lines I have suggested, inasmuch as subsequent Commissions could reverse or abandon such a rule.

#### NATIONAL GAS SURVEY

In order to obtain a more complete overview of the future course of the natural gas industry the Commission in January 1971, following Congressional authorization in December 1970, instituted a National Gas Survey. Some of the areas to be investigated and evaluated in the Survey are supply-demand-price relationships; price structures and inter-fuel competition;<sup>32</sup> the impact of environmental standards on gas production, transmission, distribution and marketing; the future capital requirements for all phases of the industry; and an independent survey and analysis under the direction of the Commission staff of the Nation's current proved natural gas reserves. Beginning in January 1972, reserve study teams composed of Commission staff, the U.S. Geological Survey, the Office of Petroleum and Oil Shale Reserves, state agencies, and technical experts from various schools and universities, were conducting independent reserve evaluations of gas reserves in the continental United States.<sup>33</sup>

#### ALASKA PIPELINE

On May 11, 1972, the Secretary of the Interior gave notice of his intention to issue permits for the Trans-Alaska pipeline. Since 1969, I have urged the development of Alaska's oil reserves so as to enable the production and marketing of associated natural gas for delivery to the Mid-West and the Pacific Coast.<sup>34</sup>

As I stated earlier, there is about 31.4 trillion cubic feet in proved reserves and about 327 trillion cubic feet in potential gas in Alaska. The proved gas reserves are primarily associated-dissolved volumes related to the North Slope oil reserves and their development is dependent upon the development and marketability of those oil reserves.

The Prudhoe Bay resource base represents an urgently needed source of secure, low-cost oil and associated gas; however, the proposed pipeline traverses remarkable wilderness areas. On the other hand, there are substantial environmental and economic benefits to important urban areas in the Mid-West and Far West from delivery of this gas resource as an imperatively needed supplement to our accelerating gas supply crisis in the lower 48 states. The Council of Economic Advisers has indicated that if we have to import from overseas the same amount of oil which can be produced at Prudhoe Bay, we stand to lose \$15 to \$17 billion over the expected life of the field.<sup>35</sup> There are additional economic costs affecting the economy and employment in Alaska. Finally, national security considerations require the development of those resources which would be at a cost equivalent to, or less than, imported LNG.

Appendix F is an analysis by the Commission's Bureau of Natural Gas of the development of the Prudhoe Bay gas resources as a corollary to the development of the oil resources, in order to meet gas supply shortages on the Pacific Coast and in the Mid-West and to attain our environmental, economic, and national security objectives.

<sup>31</sup> See *F.P.C. v. Sunray Dr Oil Co.*, 319 U.S. 9 (1968); *Atlantic Refining Co. v. P.S.C. of N.Y.*, 360 U.S. 378 (1959).

<sup>32</sup> In Docket No. R-432, issued June 7, 1972, the Commission required the monthly reporting of fuel cost and quality for steam-electric plants by electric utilities.

<sup>33</sup> Appendix E describes the reserve analysis program.

<sup>34</sup> Deliveries of oil from Prudhoe Bay are not anticipated to begin before 1976.

<sup>35</sup> *The Annual Report of the Council of Economic Advisers*, January 1972, at p. 123.

TABLE 1.—TOTAL WELLS DRILLED FOR HYDROCARBONS<sup>1</sup>

[Footage drilled in thousands of feet]

Year	Total <sup>2</sup> wells	Footage	Average depth	Oil wells	Footage	Average depth	Gas wells	Footage	Average depth	Dry holes	Footage	Average depth	Success- ful wells (percent)
1945	23,601	87,545	3,709	13,738	50,956	3,709	2,637	9,300	3,527	7,226	27,289	3,777	69.4
1946	27,975	97,393	3,481	15,962	56,632	3,548	3,510	11,801	3,362	8,503	28,960	3,406	69.6
1947	30,833	109,358	3,547	17,478	62,802	3,593	3,809	13,169	3,457	9,546	33,387	3,497	69.0
1948	36,659	131,187	3,579	21,760	77,307	3,553	3,387	12,312	3,635	11,512	41,567	3,611	68.6
1949	37,312	135,619	3,635	21,352	79,428	3,720	3,363	12,437	3,698	12,597	43,754	3,473	66.2
1950	42,050	157,358	3,742	23,812	92,695	3,983	3,439	13,685	3,979	14,799	50,978	3,445	64.8
1951	43,643	172,145	3,944	23,179	95,106	4,103	3,438	13,946	4,056	17,026	63,093	3,706	61.0
1952	44,563	184,134	4,132	23,290	98,147	4,214	3,514	15,257	4,342	17,759	70,730	3,983	60.1
1953	47,740	194,245	4,069	25,323	102,135	4,033	3,968	18,248	4,599	18,449	73,861	4,004	61.4
1954	51,109	208,009	4,070	28,141	113,362	4,028	4,038	18,857	4,670	18,930	75,790	4,004	63.0
1955	55,150	226,182	4,101	30,432	121,149	3,981	4,266	19,931	4,672	20,452	85,102	4,161	62.9
1956	57,170	233,280	4,080	30,528	120,351	3,942	4,531	22,738	5,018	22,111	90,191	4,079	61.3
1957	51,995	217,046	4,174	27,364	110,043	4,021	4,475	23,836	5,326	20,156	83,167	4,126	61.2
1958	46,941	193,304	4,118	23,774	93,105	3,916	5,005	25,556	5,106	18,162	74,643	4,110	61.3
1959	47,563	200,693	4,220	24,043	94,611	3,935	4,931	26,607	5,396	18,589	79,476	4,275	60.9
1960	45,547	192,078	4,217	22,233	86,538	3,892	5,129	28,199	5,498	18,185	77,341	4,253	60.1
1961	44,254	189,633	4,285	21,413	85,508	3,993	5,459	29,179	5,345	17,382	74,947	4,312	60.7
1962	44,158	194,634	4,408	21,727	88,432	4,070	5,353	28,950	5,408	17,078	77,253	4,524	61.3
1963	41,467	182,649	4,405	20,135	81,309	4,063	4,570	24,533	5,368	16,762	76,307	4,552	59.6
1964	42,293	187,420	4,431	19,905	80,463	4,042	4,694	25,591	4,453	17,694	81,359	4,598	58.2
1965	38,773	174,882	4,510	18,065	73,322	4,059	4,482	24,931	5,562	16,226	76,629	4,723	58.2
1966	35,730	165,420	4,630	16,216	67,430	4,158	4,321	25,636	5,933	15,193	72,353	4,762	57.5
1967	31,633	144,723	4,575	15,073	59,300	3,967	3,602	21,482	5,964	12,958	63,440	4,896	59.0
1968	30,265	147,721	4,881	13,982	59,330	4,243	3,329	20,152	6,053	12,954	68,239	5,268	57.2
1969	29,945	150,907	5,039	13,213	58,980	4,464	3,656	21,829	5,971	13,076	70,098	5,361	56.3
1970	26,784	135,951	5,076	12,398	56,183	4,532	3,225	19,830	6,149	11,161	59,938	5,370	58.3

<sup>1</sup> See table 17, "National Gas Supply and Demand 1971-90, Staff Report No. 2, prepared by the Commission's Bureau of Natural Gas, February 1972.<sup>2</sup> Includes Alaska. Excludes service wells.  
Source: World Oil.

TABLE 2.—TOTAL EXPLORATORY WELLS DRILLED FOR HYDROCARBONS 1

[Footage drilled in thousands of feet]

Year	Total 2 wells	Footage	Average depth	Oil wells	Footage	Average depth	Gas wells	Footage	Average depth	Dry holes	Footage	Average depth	Successful wells (percent)
1945	5,610	23,049	4,109	836	3,750	4,486	376	1,772	4,712	4,398	17,537	3,985	21.6
1946	5,759	22,338	3,879	762	3,455	4,534	375	1,832	4,885	4,622	17,052	3,689	19.7
1947	6,775	26,393	3,896	982	4,281	4,359	396	1,895	4,787	5,397	20,217	3,746	20.3
1948	8,013	32,751	4,087	1,098	4,883	4,447	355	2,306	6,319	6,550	25,562	3,903	18.3
1949	9,058	34,798	3,842	1,406	5,950	4,232	424	2,409	5,682	7,228	26,439	3,658	20.2
1950	10,306	40,175	3,898	1,583	6,862	4,335	431	2,356	5,456	8,292	30,957	3,733	19.5
1951	11,756	49,344	4,197	1,763	8,125	4,609	454	2,496	5,497	9,539	38,723	4,059	18.9
1952	12,425	55,615	4,476	1,776	8,491	4,781	559	3,394	6,071	10,090	43,731	4,334	18.8
1953	13,313	60,664	4,557	1,981	9,432	4,761	699	3,952	5,654	10,633	47,280	4,447	20.1
1954	13,100	59,601	4,550	1,985	9,409	4,740	726	4,399	6,059	10,389	45,792	4,408	20.7
1955	14,942	69,206	4,632	2,236	10,774	4,819	874	5,212	5,954	11,832	53,220	4,498	20.8
1956	16,207	74,337	4,587	2,267	11,111	4,901	822	5,179	6,301	13,118	58,047	4,425	19.1
1957	14,714	69,181	4,702	1,945	9,794	5,036	865	5,967	6,898	11,904	53,420	4,488	19.1
1958	13,199	61,484	4,658	1,745	8,712	4,993	822	5,472	6,657	10,632	47,300	4,449	19.4
1959	13,191	63,253	4,795	1,702	8,545	5,021	912	6,031	6,613	10,577	48,676	4,602	19.8
1960	11,704	55,831	4,770	1,321	6,829	5,170	868	5,466	6,298	9,515	43,535	4,575	18.7
1961	10,992	54,442	4,953	1,157	5,900	5,099	813	5,249	6,457	9,022	43,293	4,799	17.9
1962	10,797	53,616	4,966	1,211	6,205	5,124	771	5,187	6,728	8,815	42,223	4,790	18.4
1963	10,664	53,485	5,015	1,314	6,409	4,877	664	4,230	6,370	8,686	42,847	4,933	18.5
1964	10,747	55,497	5,164	1,219	6,715	5,509	577	4,204	7,285	8,951	44,578	4,980	16.7
1965	9,466	49,204	5,198	946	5,366	5,672	515	3,757	7,295	8,005	40,081	5,007	15.4
1966	10,313	55,223	5,355	1,030	5,880	5,708	578	4,881	8,445	8,705	44,462	5,108	15.6
1967	9,059	49,124	5,423	1,039	5,990	5,765	556	4,231	7,609	7,464	38,903	5,212	17.6
1968	8,879	50,958	5,739	863	5,036	5,835	430	3,320	7,720	7,586	42,603	5,616	14.6
1969	9,701	57,466	5,924	1,084	6,563	6,054	616	4,985	8,092	8,001	45,918	5,739	17.5
1970 3	7,693	45,253	5,882	790	5,055	6,399	481	3,675	7,639	6,422	36,524	5,687	16.5

1 Table 18, "National Gas Supply and Demand 1971-1990, Staff Report No. 2, p. 134.

2 Includes Alaska. Excludes stratigraphic and core tests.

3 Preliminary from API data.

Source: AAPG.

TABLE 3.—INTERSTATE GAS RESERVES AND PRODUCTION, 1963-70

[All volumes in trillions of cubic feet at 14.73 p.s.i.a. and 60° F.]

Year (1)	Annual production (2)	Year-end reserves (3)	R/P ratio (4)÷(2) (4)
1963	9.4	188.5	20.2
1964	10.0	189.2	18.9
1965	10.4	192.1	18.5
1966	11.1	195.1	17.5
1967	11.8	198.1	16.8
1968	12.6	195.0	15.5
1969	13.4	187.6	14.0
1970	14.1	173.6	12.3

Source: Form 15.

TABLE 4.—U.S. NATURAL GAS SUPPLY EXCLUDING ALASKA,<sup>1</sup> 1946-70

[All volumes in trillions of cubic feet at 14.73 p.s.i.a. and 60° F.]

Year (1)	Net production (2)	Reserve additions (3)	Year-end reserves (4)	R/P ratio (4)÷(2) (5)	F/P ratio (3)÷(2) (6)
1946	4.9	17.6	159.7	32.6	6.3
1947	5.6	10.9	165.0	29.5	1.3
1948	6.0	13.9	172.9	28.8	2.0
1949	6.2	12.6	179.4	28.9	2.7
1950	6.8	12.0	184.6	26.8	1.0
1951	7.9	16.0	192.8	24.4	2.7
1952	8.6	14.3	198.6	23.1	1.2
1953	9.2	20.3	210.3	22.9	2.0
1954	9.4	9.6	210.6	22.4	1.2
1955	10.1	21.9	222.5	22.0	2.3
1956	10.9	24.7	236.5	21.7	2.8
1957	11.4	20.0	245.2	21.5	1.7
1958	11.4	18.9	252.8	22.2	1.7
1959	12.4	20.6	261.2	21.1	1.1
1960	13.0	13.8	262.2	20.2	1.2
1961	13.4	16.4	265.4	19.8	1.4
1962	13.6	18.8	270.6	19.9	1.2
1963	14.5	18.1	274.5	18.9	1.2
1964	15.3	20.1	279.4	18.3	1.3
1965	16.3	21.2	284.5	17.5	1.3
1966	17.5	19.2	286.4	16.4	1.1
1967	18.4	21.1	289.3	15.7	1.1
1968	19.3	12.0	282.1	14.6	.6
1969	20.6	8.3	269.9	13.1	.4
1970	21.8	11.1	259.6	11.9	.5
1971	21.9	9.4	247.4	11.3	.4

<sup>1</sup> Data represents total U.S. natural gas supply prior to 1960. Alaska's natural gas supply was not reported until 1960.

Source: AGA. Some reserves resulting from drilling on acreage in South Louisiana leased in the December 1970 lease sale are not included because of insufficient data upon which to base an estimate of proved reserves as of Dec. 31, 1971.

TABLE 5.—U.S. NATURAL GAS SUPPLY INCLUDING ALASKA,<sup>1</sup> 1960-70

[All volumes in trillions of cubic feet at 14.73 p.s.i.a. and 60° F.]

Year (1)	Net production (2)	Reserve additions (3)	Year-end reserves (4)	R/P ratio (4)÷(2) (5)	F/P ratio (3)÷(2) (6)
1960	13.0	13.9	262.3	20.2	1.1
1961	13.5	17.2	266.3	19.7	1.3
1962	13.6	19.5	272.3	20.0	1.4
1963	14.5	18.2	276.2	19.0	1.3
1964	15.3	20.3	281.3	18.4	1.3
1965	16.3	21.3	286.5	17.6	1.3
1966	17.5	20.2	289.3	16.5	1.2
1967	18.4	21.8	292.9	15.9	1.2
1968	19.4	13.7	287.4	14.8	.7
1969	20.7	8.4	275.1	13.3	.4
1970	22.0	37.2	290.7	13.2	1.7
1971	22.1	9.8	278.8	12.6	.4

<sup>1</sup> Refer to table 1 for data prior to 1960.

Source: AGA.

TABLE 6.—NATURAL GAS IMPORTS: VOLUME, VALUE AND UNIT COST, 1969-70

Importing company	Docket No.	Point of entry	Gas volumes in M c.f. at 14.73 p.s.i.a. and 60 ° F.		Percentage change	Value		Cents per M c.f.	
			1970	1969		1970	1969	1970	1969
<b>IMPORTS FROM CANADA</b>									
Interstate companies:									
El Paso Natural Gas Co.....	G-8932	Sumas, Wash.....	174, 098, 302	171, 938, 412	1.3	\$43, 904, 065	\$43, 055, 299	25.22	25.04
Do.....	G-18033	Eastport, Idaho.....	49, 158, 929	47, 987, 474	2.4	11, 865, 108	11, 326, 592	24.14	23.60
Great Lakes Gas Transmission Co.....	CP66-110	Noyes, Minn.....	1 48, 933, 800	19, 894, 859	146.0	13, 911, 500	5, 428, 293	28.43	27.28
Michigan Wisconsin Pipe Line Co.....	CP70-22	do.....	1, 533, 641	0		490, 765		32.00	
Midwestern Gas Transmission Co.....	G18314	do.....	121, 751, 727	117, 792, 058	3.4	34, 363, 600	32, 176, 341	28.22	27.32
Pacific Gas Transmission Co.....	G-17351	Eastport, Idaho.....	304, 481, 244	264, 108, 769	15.3	72, 584, 839	59, 386, 726	23.84	22.49
Tennessee Gas Pipeline Co.....	G-20389	Niagara Falls, N.Y.....	0	5, 416, 638	(100.0)		1, 824, 552		33.68
Do.....	CP69-256	do.....	20, 986, 023	5, 682, 312	269.3	7, 823, 286	2, 116, 606	37.28	37.25
Do.....	CP70-229	do.....	7, 156, 563	0		3, 012, 197		42.09	
Total, interstate.....			728, 100, 229	632, 820, 522	15.1	187, 955, 360	155, 314, 409	25.81	24.54
Intrastate companies:									
The Montana Power Co.....	G-2805	Whitlash, Mont.....	17, 429, 429	17, 175, 917	1.5	2, 947, 257	2, 783, 391	16.91	16.21
Do.....	G-17371	Babb, Mont.....	25, 130, 768	22, 654, 059	10.9	5, 622, 699	4, 718, 833	22.37	20.83
The St. Lawrence Gas Co., Inc.....	G-17500	Massena, N.Y.....	5, 495, 012	5, 361, 252	2.5	2, 934, 134	2, 722, 039	53.40	50.77
Vermont Gas Systems, Inc.....	CP65-142	Highgate Falls, Vt.....	2, 532, 311	2, 094, 857	20.9	1, 516, 795	1, 212, 272	59.90	57.87
Total, intrastate.....			50, 587, 520	47, 286, 085	7.0	13, 020, 885	11, 436, 535	25.74	24.19
Subtotal, Canada.....			778, 687, 749	680, 106, 607	14.5	200, 976, 245	166, 750, 944	25.81	24.52
<b>IMPORTS FROM MEXICO</b>									
Interstate company: Texas Eastern Transmis-									
sion Corp.....	C-9785	McAllen, Tex.....	41, 302, 499	46, 812, 957	(11.8)	6, 810, 386	7, 677, 325	16.49	16.40
Intrastate Company: City of Roma, Tex.....									
	CP63-293	Roma, Tex.....	33, 731	31, 921	5.7	8, 516	8, 059	25.25	25.25
Subtotal, Mexico.....			41, 336, 230	46, 844, 878	(11.8)	6, 818, 902	7, 685, 384	16.50	16.41
Grand total, imports.....			820, 023, 979	726, 951, 485	12.8	207, 795, 147	174, 436, 328	25.34	24.00

<sup>1</sup> In addition to this amount, 230,391,635 M c.f. were received from Trans-Canada Pipe Lines, Ltd., for transportation and redelivery to Trans-Canada at St. Clair and Saul Ste. Marie, Mich.

Source: FPC files and company letters.

TABLE 7.—FEDERAL POWER COMMISSION LIQUEFIED NATURAL GAS IMPORT APPLICATIONS (MAY 31, 1972)

No.	Applicant	Docket No.	Delivery point	Transport mode	Volume and price <sup>1</sup>		Date of authorization
					M M c.f.	Dollars per M c.f.	
SHORT-TERM <sup>2</sup>							
Canada:							
1	Willbros Terminal Co.....	CP70-194.....	Boston, Mass.....	Truck.....	266 <sup>3</sup> .....	2.20.....	Feb. 13 and May 12, 1970.
2	Fall River Gas Co.....	CP70-305.....	Fall River, Mass.....	do.....	150 <sup>4</sup> .....	1.12.....	July 2, July 17, and Sept. 22, 1970.
3	Lowell Gas Co.....	CP71-9.....	Tewksbury, Mass.....	do.....	630.....	12.5 for deliveries by Oct. 7, 1970.....	Aug. 28, 1970 and Mar. 15, 1971.
4	Boston Gas Co.....	CP71-61.....	Boston, Mass.....	do.....	220.....	1.94 delivered Oct. 7, 1970-Apr. 30, 1971... 1.25 delivered Oct. 19-Nov. 1, 1970.....	Nov. 4, 1970.
5	do.....	CP71-247.....	do.....	do.....	714 <sup>3</sup> .....	2.00 delivered Nov. 1, 1970-Apr. 1, 1971... 1.30 delivered Apr. 1-Sept. 1, 1971 <sup>13</sup> ..... 1.45 delivered Sept. 1-Nov. 1, 1971 <sup>13</sup> ..... 1.92 delivered Nov. 1, 1971-Apr. 1, 1972 <sup>13</sup> .....	June 4, 1971.
6	Lowell Gas Co.....	CP72-10.....	Tewksbury, Mass.....	do.....	696 <sup>13</sup> .....	1.30-1.45 delivered Apr. 1-Oct. 31, 1971 <sup>13</sup> ...	Aug. 5, 1971.
7	Fall River Gas Co.....	CP72-18.....	Fall River, Mass.....	do.....	120 <sup>13</sup> .....	1.92 delivered Nov. 1, 1971-Apr. 1, 1972 <sup>13</sup> ... 1.30 for deliveries by Aug. 31, 1971 <sup>13</sup> ..... 1.45 for deliveries by Oct. 31, 1971 <sup>13</sup> .....	Sept. 8, 1971.
Algeria:							
8	Boston Gas Co.....	CP69-112.....	Boston, Mass.....	Ship.....	200.....	1.14.....	Oct. 25, 1968.
9	Lowell Gas Co.....	CP70-143.....	do.....	do.....	374 <sup>4</sup> .....	1.52.....	Dec. 17, 1969 and Jan. 16, 1970.
10	Texas Eastern Transmission Corp.....	CP70-208.....	Staten Island, N.Y.....	do.....	2,600.....	1.37.....	Mar. 16 and Apr. 8, 1970.

11	Boston Gas Co.....	CP70-291.....	Boston, Mass.....	do.....	1,600.....	1.70.....	July 14 and
12	do.....	CP71-248.....	do.....	do.....	1,250.....	1.66.....	Nov. 16, 1970.
13	Libya: Texas Eastern Transmission Corp..	CP72-93.....	Staten Island, N.Y.....	do.....	11,160 <sup>13</sup> .....	.81 <sup>13</sup> .....	June 4, 1971.
LONG-TERM							
14	Algeria: Distrigas Corp <sup>7</sup> .....	CP70-196 <sup>8</sup> .....	Everett, Mass., and Staten Island, N.Y.....	do.....	6,600 per year <sup>13</sup> .....	.68 delivered Apr. 1-Nov. 1 <sup>13</sup> .....	(9).
						.70 delivered Nov. 1-Dec. 1 <sup>13</sup> .....	
						.76 delivered Dec. 1-Jan. 1 <sup>13</sup> .....	
						.85 delivered Jan. 1-Mar. 1 <sup>13</sup> .....	
						.71 delivered Mar. 1-Apr. 1 <sup>13</sup> .....	
					8,800/per year <sup>13</sup> .....	.68 year-round.....	
	Distrigas total.....				15,400/per year <sup>13</sup> .....		
15	Columbia LNG Corp.....	CP71-68 et al. <sup>10</sup> .....	Cove Point, Md., and Savannah, Ga.....	Ship.....	390,000/per year. <sup>11 13</sup> .....	.65 <sup>13</sup> -.69 <sup>13</sup> .....	(15).

<sup>1</sup> Unless otherwise noted, volumes and prices are as reported in the respective applications filed with the FPC and have been rounded to the nearest MM c.f. and cents per M c.f. where necessary; delivery at shiprail or truckside.

<sup>2</sup> 1 year or less, except No. 13 which covers about 2 years.

<sup>3</sup> Estimated from reported volumes delivered.

<sup>4</sup> Estimated from the original filing on basis of 83.3 c.f. per gallon.

<sup>5</sup> Estimated from the original filing on basis of 52 M c.f. per metric ton.

<sup>6</sup> 2 shiploads authorized Feb. 15, 1972; examiner's decision approving import issued May, 2 1972; now pending before commission.

<sup>7</sup> 20-year term; annual price escalation of 0.6 cents per MM B.t.u.; start-up 1971; resale for peak shaving at \$1.04 to \$1.64 per MM B.t.u. Everett and \$1.07 to \$1.74 per MM B.t.u. Staten Island.

<sup>8</sup> Lead docket number; consolidated with Distrigas Corp. CP72-165, CP72-167 and CP72-168 which have been terminated.

<sup>9</sup> Authorized Mar. 9, 1972, by opinion No. 613 which is now pending further consideration as to rehearing.

<sup>10</sup> Lead docket No.; consolidated with Southern Energy Co. CP71-151, CP71-264 and Consolidated System LNG Co. CP71-153, CP71-290 and Southern Natural Gas Co. CP71-276 and Columbia LNG Co./Consolidated System LNG Co. CP71-289.

<sup>11</sup> 25-year term; prices are based on 1971 construction and operating costs, subject to revision based on actual costs; estimated price in 1st full year of deliveries 77 cents per MM B.t.u. Cove Point and 83 cents per MM B.t.u. Savannah; volume rounded to nearest MMM c.f.; start-up 1975.

<sup>12</sup> Examiner's decision approving import issued May 22, 1972; now pending before commission.

<sup>13</sup> Volume is billion B.t.u. and price is dollars per million B.t.u.

TABLE 8.—WHOLESALE PRICE INDEX AND COMPONENT INDEXES FOR FUELS AND ELECTRICITY IN THE UNITED STATES

[Index, 1967=100]

Year	All commodities	Natural gas	Residual fuel oil	Bituminous coal (industrial screenings)	Electric power
1957.....	93.3	(1)	138.8	98.1	(1)
1962.....	94.8	96.8	111.5	90.8	102.1
1966.....	99.8	98.6	105.0	94.7	99.6
1967.....	100.0	100.0	100.0	100.0	100.0
1968.....	102.5	101.6	95.7	103.1	100.9
1969.....	106.5	103.0	93.3	112.7	102.0
1970.....	110.4	105.6	125.5	152.9	104.8
1971.....	114.0	112.2	166.0	187.2	113.6
1972:					
January.....	116.3	116.3	154.3	198.9	118.9
February.....	117.3	116.3	158.8	198.9	120.0

<sup>1</sup> Indexes not developed before 1957.

Source: Bureau of Labor Statistics.

TABLE 9.—RECENT PRICES OF FOSSIL FUELS IN 3 CITIES

Fuel	Date	New York City area		Chicago		Philadelphia		Conversion Factors
		Reporting unit	Cents per millions of B.t.u.	Reporting unit	Cents per millions of B.t.u.	Reporting unit	Cents per millions of B.t.u.	
Natural gas.....	Jan. 1, 1972	49.74 cents per thousand cubic feet.	48.2	40.05 cents per thousand cubic feet.	38.8	50.9 cents per thousand cubic feet.	49.37	1 031 B.t.u. per thousand cubic feet.
Bituminous coal.....	do.....	\$16 per ton <sup>1</sup> .....	65.1	\$7 per ton <sup>2</sup> .....	28.5	12.30 cents per ton <sup>3</sup> .....	50.0	24,580,000 B.t.u. per short ton.
Residual fuel oil No. 6.....	do.....	\$3.28 per barrel <sup>4</sup> .....	52.2	\$11 per ton <sup>5</sup> .....	44.8	4.78 per barrel <sup>7</sup> .....	76.0	6,287,000 B.t.u. per barrel.
				10.75 cents per gallon <sup>6</sup> .....	71.8			

<sup>1</sup> Average of contract price 1 percent sulfur coal Hudson Plant, Jersey City, N.J. (after Feb. 25, 1972 this was only utility plant burning coal in New York City area.)

<sup>2</sup> Estimated average contract price Illinois coal, 3½ percent sulfur delivered at utilities.

<sup>3</sup> Minemouth price plus transport charge to plant. Sulfur content 1.5 percent plus.

<sup>4</sup> Estimated average contract price western coal 0.8-1 percent sulfur delivered at utilities.

<sup>5</sup> Price to electric utilities for deliveries by tanker or pipeline.

<sup>6</sup> Current price, 1 percent sulfur. Price for 1½ percent sulfur is 10.5 cents per gallon (70.4 cents per million B.t.u.).

<sup>7</sup> Price 1-1.5 percent sulfur content. Price for 1.5 percent plus sulfur is \$3.58 per barrel.

Source: Natural gas: 3 cities—FPC reported average prices charged distributors by pipelines at city gate. Coal: Chicago and New York City areas—average of contract prices for coal delivered at utilities; Philadelphia—Fuel price report to EPA, October 1971 by Foster Associates, Inc. Oil: New York—OEP press release, Feb. 17, 1972; Chicago—Platt's Oilgram, Mar. 2, 1972; Philadelphia—Fuel price report to EPA, October 1971, by Foster Associates, Inc.

TABLE 10.—COMPARATIVE PRICES 1961–1971 THERMAL EQUIVALENTS OF GAS, OIL, COAL, AND ELECTRICITY

Enclosed is a 1961–1971 series of comparative retail prices for gas, oil, and electricity (Table 1) and a 1961–1970 series for electric utility costs for coal, gas, and oil as burned (Table 2) in 10 major cities geographically representative of regional energy markets in the United States.

The prices in Table 1 are average retail prices reported by the Bureau of Labor Statistics in these cities. The costs of fuel at utilities, shown in Table 2, are representative of utility fuel costs at plants in or near the 10 cities, as reported in the National Coal Association annual publication *Steam-Electric Plant Factors*.

Comparison of the relative retail price of natural gas with other sources of energy, in a number of the cities shown in Table 1, indicates the price of gas there is low in respect to alternative fuels and may be an indicator of the major role price has played in the present gas shortage. This is especially notable in inland cities such as Chicago, Detroit, St. Louis, St. Paul, and on the West Coast, Seattle. In these cities the price of natural gas for heating is about 20–30% lower than the next competitive heating fuel, #2 distillate fuel oil. Conversely, for the cities in closer proximity to the Eastern Seaboard—Baltimore, Philadelphia, Washington, New York and Boston, the retail price of #2 distillate, mainly imported, is 5–10% below the retail price of natural gas. (In Boston in 1971 the price of #2 distillate was 18% below the gas price.)

In nine of the ten cities the retail price of electric power, on a thermal basis, is 5–8 times the price of natural gas for heating. The exception is Seattle where the price of electricity, mainly hydropower, is about three times the price of natural gas for heating.

In Table 2 the relative costs per unit of fuel as burned, by type, reflect the location of the 10 cities and their proximity to primary energy resources utilized for electricity generation.

In the case of cities near the Eastern Seaboard which have access to major gas pipelines, all three sources—oil, gas and coal—seem to be competitive in price. In Boston, both coal and gas are of small importance in utility generation and imported oil is the major fuel source. In the Middle West—St. Louis, Chicago, and Detroit—oil is not a major source of utility fuel and the price competition is between gas and coal. In Seattle the principal electric power source is hydropower with some imported oil being used for utility generation. Since 1968 there have been substantial increases in the prices of coal, oil and gas used in utility fuels in the cities near the Eastern Seaboard. Inland cities, however, appear to have experienced proportionally smaller increases in the prices of utility fuels, possibly due to long-term contracts for coal and gas.

TABLE 10.—ENERGY PRICES AT POINT OF CONSUMPTION IN 10 REPRESENTATIVE CITIES 1961-71

[Cents per million B.t.u.]

December	Baltimore, Md.				Boston, Mass.				Chicago, Ill.				Detroit, Mich.				New York, N.Y.			
	Gas		Oil		Gas		Oil		Gas		Oil		Gas		Oil		Gas		Oil	
	Heating	Non-heating	Electric	Electric	Heating	Non-heating	Electric	Electric	Heating	Non-heating	Electric	Electric	Heating	Non-heating	Electric	Electric	Heating	Non-heating	Electric	Electric
1971	1.51	1.91	1.38	9.21	1.80	3.07	1.48	8.97	1.05	1.62	1.33	8.89	0.95	1.58	1.34	8.11	1.60	2.60	1.47	10.87
1970	1.31	1.71	1.37	7.89	1.57	2.74	1.42	8.49	.98	1.55	1.31	8.20	.87	1.44	1.34	8.27	1.38	2.38	1.37	10.14
1969	1.33	1.73	1.27	7.71	1.50	2.59	1.34	7.85	.94	1.51	1.23	7.52	.87	1.44	1.27	7.08	1.32	2.32	1.30	9.05
1968	1.25	1.64	1.25	7.57	1.44	2.51	1.27	7.85	.87	1.42	1.18	7.47	.85	1.32	1.22	7.08	1.30	2.28	1.26	8.92
1967	1.28	1.66	1.22	7.54	1.43	2.50	1.27	7.95	.94	1.49	1.18	7.44	.85	1.32	1.18	7.08	1.29	2.28	1.23	8.92
1966	1.28	1.67	1.19	7.48	1.42	2.49	1.25	7.95	.93	1.47	1.14	7.38	.85	1.32	1.17	7.08	1.30	2.29	1.21	8.84
1965	1.17	1.55	1.15	7.48	1.45	2.52	1.22	8.21	.93	1.45	1.14	7.28	.85	1.32	1.12	7.08	1.36	2.31	1.18	8.51
1964	1.34	1.73	1.11	7.54	1.42	2.50	1.14	8.25	.94	1.45	1.13	7.34	.86	1.32	1.12	7.08	1.36	2.26	1.14	8.42
1963		1.20	1.13			1.84	1.14			1.04	1.13		.84	.94	1.13			1.62	1.17	
1962		1.19	1.12			1.83	1.14			1.05	1.13		.83	.93	1.13			1.62	1.17	
1961		1.19	1.13			1.85	1.17			1.06	1.06		.83	.95	1.13			1.63	1.15	

December	St. Louis, Mo.				Philadelphia, Pa.				Washington, D.C.				St. Paul, Minn.				Seattle, Wash.			
	Gas		Oil		Gas		Oil		Gas		Oil		Gas		Oil		Gas		Oil	
	Heating	Non-heating	Electric	Electric	Heating	Non-heating	Electric	Electric	Heating	Non-heating	Electric	Electric	Heating	Non-heating	Electric	Electric	Heating	Non-heating	Electric	Electric
1971	1.09	1.92	1.39	8.26	1.37	1.92	1.36	9.22	1.50	1.87	1.42	7.96	1.25	1.83	1.60	7.86	1.25	2.01	1.60	3.81
1970	.98	1.80	1.34	7.75	1.43	2.01	1.37	7.88	1.35	1.72	1.38	7.85	.90	1.62	1.28	7.13	1.16	2.04	1.57	3.56
1969	.91	1.73	1.25	7.68	1.38	1.95	1.27	7.27	1.36	1.72	1.27	7.03	.88	1.58	1.23	7.15	1.16	1.99	1.46	3.56
1968	.84	1.59	1.20	7.27	1.38	1.95	1.27	6.78	1.32	1.68	1.26	6.99	.84	1.45	1.20	7.07	1.15	1.98	1.39	3.56
1967	.84	1.59	1.18	7.27	1.37	1.93	1.22	6.72	1.29	1.66	1.22	6.86	.81	1.46	1.26	6.84	1.15	1.98	1.38	3.56
1966	.84	1.59	1.15	7.25	1.37	1.93	1.19	6.72	1.35	1.72	1.18	6.86	.83	1.42	1.10	6.64	1.16	1.97	1.33	3.56
1965	.82	1.57	1.14	7.25	1.37	1.93	1.17	6.72	1.14	1.50	1.14	7.05					.97	1.96	1.32	3.58
1964	.84	1.59	1.14	7.25	1.37	1.93	1.11	6.72	1.41	1.76	1.12	7.06					.97	1.96	1.34	3.58
1963	.85		1.13			1.13		1.35		1.15			.98		1.10				1.32	
1962	.85		1.12			1.13		1.34		1.15			.97		1.10				1.32	
1961	.85		1.09			1.14		1.31		1.15			1.01		1.10				1.24	

Source: Gas, Oil, and Electric: Retail Prices and Indexes of Fuels and Electricity, U.S. Department of Labor, Bureau of Labor Statistics, December 1962-71. Oil is No. 2 distillate.

TABLE 10-2.—STEAM ELECTRIC PLANT FUEL UNIT COSTS, 1961-70

[Cents per million B.t.u. as burned]

Year	Baltimore			Boston			Chicago			Detroit			New York		
	Coal	Oil	Gas	Coal	Oil	Gas	Coal	Oil	Gas	Coal	Oil	Gas	Coal	Oil	Gas
1970	41.5	33.1	32.2	36.3			43.6		43.2	42.1	77.7	48.6	45.3	48.9	39.3
1969	34.9	29.4	36.2	27.9			31.2		32.8	32.8		47.5	39.7	40.0	37.7
1968	32.4	31.1	47.8	28.8			29.4		29.4	31.6			38.0	34.9	37.1
1967	32.0	36.5	48.8	29.0			28.0		26.6	30.2			35.9	32.8	36.8
1966	29.7	42.2	41.0	32.0			28.2		24.3	29.4			32.1	32.1	36.2
1965	29.6	39.5	57.5	31.9			28.7		24.1	29.1			30.9	33.1	35.7
1964	29.1	39.5	53.6	42.4	33.1		29.1		24.0	30.1			30.9	32.9	35.9
1963	31.0	40.8	53.0	40.0	33.9		29.5		24.0	30.3			32.5	32.5	35.2
1962	33.3	46.1	57.8	41.6	34.8		29.6		29.5	30.8			35.7	33.5	39.6
1961	34.8	NA	NA	39.3	36.7		28.7	99.2	68.1	31.7			36.4	36.3	40.5

Year	St. Louis			Philadelphia			Washington, D.C.			St. Paul			Seattle		
	Coal	Oil	Gas	Coal	Oil	Gas	Coal	Oil	Gas	Coal	Oil	Gas	Coal	Oil	Gas
1970	25.2		32.6	39.0	40.1	39.0	57.9	43.0		32.6	82.5	24.4		NA	
1969	23.0		24.2	34.0	30.3	30.7	41.1	41.2		29.5	72.8	24.2		NA	
1968	21.9		23.1	32.4	33.3	30.2	37.8	41.3		28.3	90.8	23.4		NA	
1967	20.8		22.8	31.5	32.5	31.1	35.9	NA		28.3	83.6	23.9		NA	
1966	21.0		21.3	29.9	31.5		34.1	NA		28.3	76.9	23.4		44.4	
1965	20.8		20.3	29.3	31.9	29.9	32.3	NA		27.7	73.3	23.6		30.7	
1964	21.0		19.2	29.5	31.3	30.5	34.9	NA		27.2	76.0	23.7		NA	
1963	20.9		20.4	31.4	32.3	30.2	34.8	NA		27.4	78.3	23.7		32.3	
1962	21.0		20.5	34.4	36.5	32.6	34.8	NA		27.5	91.8	23.1		32.9	
1961	21.7		20.4	35.0	37.6	32.2	34.6	NA		26.9	98.6	23.0		33.0	

Source: Steam-Electric Plant Factors, National Coal Association 1961-71, annual edition.

TABLE 11.—PRODUCERS WHOSE COMBINED SALES WERE 2 MILLION OR MORE  
WEIGHTED AVERAGE PRODUCER INTERSTATE GAS REVENUES BY FPC PRODUCTION AREAS 1965 THROUGH 1970<sup>1</sup>  
[Cents per thousand cubic feet]

Production area	Commission opinion and date issued	Average revenue <sup>2</sup>					
		1965	1966	1967	1968	1969	1970
Permian Basin.....	Opinion 468, Aug. 5, 1965.....	15.27	15.43	15.36	15.16	15.49	16.70
Hugoton-Anadarko.....	Opinion 586, Sept. 18, 1970.....	15.33	15.71	16.09	16.23	16.52	16.07
Texas gulf coast.....	Opinion 595, May 6, 1971.....	15.00	15.17	15.52	15.77	16.20	16.83
Southern Louisiana.....	Opinion 598, July 16, 1971.....	19.99	19.72	19.66	19.81	19.76	19.79
Other Southwest.....	Opinion 607, Oct. 29, 1971.....	15.31	15.38	15.52	15.77	16.19	16.73
Appalachian and Illinois Basin.....	Order No. 411, Oct. 2, 1970.....	24.70	24.60	24.04	24.63	25.81	26.95
Rocky Mountain.....	Order No. 433, July 15, 1971.....	14.46	14.43	14.33	14.37	14.76	15.47

<sup>1</sup> Sales by producers of natural gas to interstate pipeline companies.

<sup>2</sup> At 14.73 p.s.i.a.

1970 WEIGHTED AVERAGE EFFECTIVE RATE AND WEIGHTED AVERAGE CEILING RATE

Production area	Cents per thousand cubic feet		Commission opinion and date issued
	1970 weighted average effective rate <sup>1</sup>	Weighted average base ceiling rate <sup>1</sup>	
Permian Basin:			
Flowing gas.....	<sup>2</sup> 16.94	<sup>3</sup> 21.0	
New gas.....	<sup>2</sup> 17.31	<sup>3</sup> 25.5	
Total.....	16.97	21.42	
Texas gulf coast:			
Flowing gas.....	16.35	19.0	Opinion 595, May 6, 1971.
New gas.....	18.18	24.0	
Total.....	16.46	19.3	
Southern Louisiana:			
Flowing gas onshore.....	<sup>4</sup> 20.18	22.375	Opinion 598, July 16, 1971.
Flowing gas offshore.....		21.375	
New gas.....	<sup>4</sup> 20.28	26.0	
Total.....	20.18	<sup>5</sup> 22.24	
Other southwest:			
Flowing gas.....	<sup>4</sup> 16.60	<sup>7</sup> 19.59	Opinion 607, Oct. 29, 1971.
New gas.....	<sup>4</sup> 17.45	<sup>7</sup> 24.30	
Total.....	16.64	19.83	
Hugoton-Anadarko:			
Flowing gas.....	<sup>4</sup> 15.74	<sup>7</sup> 15.42	Opinion 586, Sept. 18, 1970.
New gas.....	<sup>4</sup> 19.04	<sup>7</sup> 20.08	
Total.....	15.78	15.47	

<sup>1</sup> Rates shown at respective area pressure bases.

<sup>2</sup> Source: AR70-1 R/S analysis.

<sup>3</sup> Staff proposed rates in AR70-1.

<sup>4</sup> Source: 1970 Form 2 summarized by staff.

<sup>5</sup> Source: 1970 Form 2 summarized by staff—Assumed 70 percent of volume is onshore.

<sup>6</sup> Source: 1970 Form 2 summarized by staff—Weighted average for both onshore and offshore combined.

<sup>7</sup> Weighted average ceiling rate.

## TYPICAL NEW GAS PRICE INCREASES

Area	Previous levels authorized by Commission action (cents)	New Levels	Increase cents per thousand cubic feet	Area percent of interstate production <sup>1</sup>	Area percent of total production <sup>2</sup>
South Louisiana:					
Onshore.....}	20.0	26	6	41.4	33.6
Offshore.....}					
Permian:					
Texas.....	16.5	25.5	9	12.8	12.7
New Mexico.....	15.5	-----	10	-----	-----
Rocky Mountain—San Juan.....	13.0	24	11	5.9	5.1
Texas gulf coast.....	16.0	24	8	9.5	17.9
Other Southwest areas: Other Oklahoma areas.....	15.0	23.75	8.75	8.4	9.8
Appalachian: South subarea.....	28.0	32	4	2.5	2.1
Hugoton-Anadarko.....	16.0	19	3	18.5	15.1
All other (excluding Alaska).....	-----	-----	-----	1.0	3.7
Total.....	-----	-----	-----	100.0	100.0

<sup>1</sup> 1970 Production—FPC form 2 summarized by staff.

<sup>2</sup> 1970 Production—AGA special reports.

<sup>3</sup> Since March 1971 producers could collect rates up to 26 cents per thousand cubic feet subject to refund.

<sup>4</sup> Staff proposal in AR70-1 not approved by Commission.

TABLE 12A.—TOTAL WELLS DRILLED IN THE UNITED STATES,<sup>1</sup> FIRST QUARTERS 1968-72

	1968	1969	1970	1971	1972
Gas wells.....	762	870	911	938	1,021
Oil wells.....	2,799	3,281	3,298	2,971	2,981
Dry holes.....	2,539	2,910	2,701	2,256	2,690
Total wells.....	6,100	7,061	6,910	6,165	6,692

<sup>1</sup> Includes discovery and developmental wells. Includes Alaska.

Source: Quarterly Review of Drilling Statistics; American Petroleum Institute.

TABLE 12B.—TOTAL WELLS DRILLED BY PRODUCING AREAS,<sup>1</sup> FIRST QUARTERS 1971-72

	1st quarter 1971	1st quarter 1972
South Louisiana.....	447	556
Onshore.....	244	352
Offshore.....	203	204
Texas Gulf Coast.....	439	479
Onshore.....	429	467
Offshore.....	10	12
Hugoton-Anadarko <sup>2</sup> .....	1,069	1,297
Permian Basin.....	1,066	1,014
Other Southwest <sup>2</sup> .....	772	835
Rocky Mountain.....	715	830
Appalachia.....	901	1,013
All other <sup>3</sup> .....	745	660
Lower 48 States.....	6,154	6,684
Alaska.....	11	8
Total United States.....	6,165	6,692

<sup>1</sup> Includes oil and gas well and dry hole completions for both discovery and developmental wells.

<sup>2</sup> All of Oklahoma included in Hugoton-Anadarko.

<sup>3</sup> Excluding Alaska.

Source: Quarterly Review of Drilling Statistics for the United States; American Petroleum Institute.

## APPENDIX A

## ACTIONS BY THE FEDERAL POWER COMMISSION TO INCREASE EXPLORATION AND DEVELOPMENT OF NATURAL GAS SUPPLIES

I. On October 3, 1969, in Opinion No. 567, the Commission revised its area rate policy to encourage the search for gas in reservoirs which underlie acreage already committed to the interstate market. Potential gas bearing sedimentary rocks up to 40,000 feet in thickness occur in the deepest basins. A large portion of the sediments below 5,000 feet remain untested. The new policy provides that under the two-price system, with higher rates for new gas-well-gas to encourage exploration, production from newly discovered reservoirs on previously dedicated acreage would be allowed the price it would have if the contract had been dated coincident with discovery.

II. On October 7, 1969, in Opinion No. 568, 42 FPC 738, affirmed *sub nom. City of Chicago v. F.P.C.*, D.C. Cir., No. 23,740, December 2, 1971, the Commission applied the area rate principle to pipeline company producers of natural gas. The new policy placed pipeline producers on a parity with independent producers by pricing, in future pipeline rate proceedings, gas produced by pipelines or by their affiliates from leases acquired after October 7, 1969, at the just and reasonable rate applicable to gas of a vintage corresponding to the date of completion of the first well on the lease. Natural gas reserves owned by jurisdictional pipelines have declined in recent years when Commission policy was to price their gas on an individual company cost-of-service basis. This new policy should encourage greater natural gas exploration and development by interstate pipelines so as to provide additional gas supplies to their own customers or to other pipelines. From the records of the Department of the Interior, it is clear that there has been increased gas exploration activity on the part of pipelines. This was evidenced by the participation of Consolidated Gas Supply, Texas Eastern Exploration Corp., a unit of Pennzoil United Inc. (Pennzoil Offshore Gas Operators Inc.), and a unit of Tenneco (Tenneco Oil Co.), among others, in the latest Louisiana Offshore lease auction.

III. The Commission has moved to clarify the status of research and development expenses in an effort to stimulate technological developments in the natural gas industry. The Commission issued on August 26, 1970 in Docket No. R-381, new regulations which revise and clarify the Commission's accounting treatment of research and development expenditures. These changes allow the regulated companies to recover legitimate research costs. This rulemaking resulted from the analysis of responses to the Commission's Order No. 322 which required annual reporting of research and development expenditures. These responses showed minimal research and development activity in the natural gas industry at a time when major supply problems and environmental concerns affect the industry. To provide impetus for a much needed comprehensive natural gas research effort an industry sponsored Gas Research Council has been proposed. Such an organization, drawn from all segments of the natural gas industry, could aid immeasurably in coordinating a research and development program which would benefit the entire industry. An industry sponsored Electric Research Council has been actively engaged in promoting research and development programs of benefit to the electric power industry and has effectively promoted international exchanges of research and development information of benefit to all countries.

The Commission is currently taking action to provide utility companies with a more informed basis for planning ways to meet their ever increasing operating and financial needs by reducing regulatory uncertainty and providing consistency between accounting and ratemaking wherever possible and by clarifying the existing policies in these areas, as required. For example, see Commission Order No. 420 issued January 7, 1971, (36 F.R. 507) prescribing the accounting treatment of land held for future use.

IV. The Commission set just and reasonable rates for production from Southern Louisiana, our most prolific gas producing area, by Opinion Nos. 546 and 546-A, issued on September 30, 1968, and March 20, 1969, respectively, in Docket Nos. AR61-2, *et al.* Concurrently with the latter opinion, the Commission initiated in Docket No. AR69-1 a limited investigation into future sales of natural gas from Offshore Southern Louisiana.

On December 15, 1969, the Commission enlarged that proceeding to include all gas regardless of contract date produced both onshore and offshore in the South-

ern Louisiana area and called for evidence with respect to the adequacy of gas supply and adequacy of service to consumers, the demand for gas, and the cause of a gas shortage, if any.

On March 19, 1970, the U.S. Court of Appeals for the Fifth Circuit sustained the orders of the Commission in Opinion Nos. 546-546-A but explicitly provided that this mandate should not be interpreted to interfere with Commission action that would change the rates approved. The Court expressed concern over strong evidence that a supply deficiency is imminent. *Southern Louisiana Area Rate Cases v. FPC*, 428 F. 2d 407 (5th Cir. 1970), cert. denied, *Municipal Distributors Group et al. v. FPC* 400 U.S. 950, 27 L. Ed. 257, 91 S. Ct. 241 (1970). On petition for rehearing, the Fifth Circuit on June 16, 1970, affirmed its grant of authority to the Commission to reopen any part of its orders, including those affecting revenues from gas already delivered.

In light of these actions by the Courts, on December 24, 1970, the Commission reopened the proceedings in Docket Nos. AR61-2, et al. and consolidated them with the proceedings in Docket No. AR69-1 so that parties might be given an opportunity to submit, if they so desired, relevant evidence concerning whether the rates established in Opinion Nos. 546 and 546-A should be changed in the light of the Fifth Circuit's decision.

By Opinion No. 598 issued July 16, 1971, the Commission set new, higher ceiling rates for the Southern Louisiana area and provided a system of incentives to promote dedication of gas reserves to the interstate market. *Area Rate Proceedings, (Southern Louisiana Area)*, Docket Nos. AR61-2, et al., and AR69-1. The order denying rehearing was issued on September 9, 1971, and is presently on appeal to the Fifth Circuit, *Placid Oil Co. v. F.P.C.*, No. 71-2761.

V. On January 23, 1970, the Commission gave notice in Docket No. R-380 of a proposed rulemaking to amend its Regulations to provide for accounting and rate treatment of advance payments made to suppliers by pipelines for gas to be delivered at a future date. The receipt of such advance payments by producers is intended to encourage acquisition, exploration, and development of gas producing properties.

Subsequent to receipt of comments, on October 2, 1970, in Order No. 410 the Commission amended its Uniform System of Accounts to permit unrecovered advance payments to be included by pipelines in their rate base as part of working capital. In the Commission's view, it was not at the present time in the public interest for pipeline companies to bear the cost of assuring themselves and their customers of a future supply of natural gas.

On January 8, 1971, in response to applications for rehearing, the Commission issued Order No. 410-A and a notice of proposed rulemaking in Docket No. R-411 to permit further comments on proposed modification, but stressed that Order No. 410 treatment applied in the interim except as to advances made to affiliates for lease acquisition and exploration costs. Order Nos. 410 and 410-A have been affirmed, *Public Service Commission for the State of New York v. F.P.C.*, D.C. Cir., No. 71-1161, March 29, 1972. The Commission, by Order No. 441, issued November 10, 1971, in Docket No. R-411, provided that: (1) all advance payments made under contracts executed prior to November 10, 1971, shall receive rate treatment in accordance with the provisions of Order Nos. 410 and 410-A in Docket No. R-380, where the payments are reasonable, necessary and appropriate in order to contract for gas supplies by agreement executed not later than December 31, 1972; (2) all other advance payments for gas, including exploration and lease acquisition, shall not receive rate base treatment after November 10, 1971; (3) for rate purposes advance payments to pipeline affiliated producers shall be treated the same as advances to independent producers; (4) advances included in rate base must be repaid in full, by delivery of natural gas or other consideration, within five years, or as otherwise authorized by the Commission, from the date gas deliveries commence or the date it is determined that recovery will be in other than gas and (5) a working interest obtained by a pipeline or a pipeline affiliate as a result of a related advance payment should not be included in rate base.

VI. On February 25, 1970, in Order No. 395, the Commission revised its regulations and rules under the Natural Gas Act to allow increased expenditures for budget-type gas purchase facilities. The purpose of the budget rule is to expedite numerous minor projects. The increase in allowable expenditures gives companies added flexibility and results in a decrease in the lag in deliverability time between the discovery of gas and its flow to interstate pipelines.

VII. On June 17, 1970, the Commission in Docket No. R-389 instituted an investigation and proposed rulemaking to consider the terms and conditions under which it will issue permanent certificates for, and otherwise regulate, new sales of natural gas subject to the Commission's jurisdiction in the Permian Basin area of southwestern Texas and southeastern New Mexico. On July 17, 1970, in Docket No. R-389A, the Commission expanded the scope of this investigation and proposed rulemaking to cover certificates for new sales of natural gas subject to the Commission's jurisdiction nationwide (except Alaska and Hawaii). The Commission stated it would accept for consideration applications by independent producers requesting issuance of a certificate for sales of natural gas notwithstanding that the proposed rates may be in excess of the ceiling or guideline rates.

Numerous applications for certificates have been filed pursuant to this statement by the Commission. These applications represent sizable volumes of natural gas potentially available to interstate pipelines. Several of the applicants have already received permanent certificates permitting sales of natural gas in interstate commerce in proceedings in which no petitions to intervene were filed. On February 22, 1971, the Commission ordered consolidation of 55 applications for such certificates for a public hearing to allow the presentation, cross examination and rebuttal of evidence concerning whether the present or future public convenience and necessity requires issuance of a permanent certificate on the terms proposed in each individual application. That hearing commenced on April 6, 1971.

VIII. On June 17, 1970, in Docket No. AR70-1, the Commission instituted a second area rate proceeding in the Permian Basin area to review the just and reasonable rates established by the Commission in 1965. In order to induce producers to dedicate supplies to the interstate market without waiting for the final price determination of the proceedings, the Commission stated that contracts dated after June 17, 1970, would have the same price ceilings as contracts entered into subsequent to a final order. A prehearing conference was held on February 23, 1971, cost questionnaires have been submitted to producers, non-cost evidence is to be filed by June 11, 1971, and hearings for purposes of cross examination of the direct evidence will commence on July 27, 1971. In order to expedite the proceedings, the Commission incorporated by reference all relevant evidence filed and subjected to cross examination and rebuttal in the Southern Louisiana Area Rate Proceedings. (See IV above). The Commission stated that there should be no repetition of this testimony.

IX. On July 30, 1970, the Commission gave notice of a proposed rulemaking in Docket No. R-394 which would terminate the existing moratorium prohibitions against rate increase filings by natural gas producers in the Southern Louisiana area. Data available to the Commission indicated that circumstances had changed since the establishment of the moratorium. It was proposed that such a termination would encourage increased exploration and development efforts for natural gas and the dedication of greater volumes of gas from that area to the interstate market.

The moratorium provisions were terminated by Order No. 413 on October 27, 1970, thus permitting offshore and onshore gas producers in the South Louisiana area to file for gas price increases in excess of ceiling prices, although such rate increases would be collected subject to refund. By subsequent order of December 24, 1970, the Commission limited rate increase filings made prior to June 30, 1971, to the levels set forth in the settlement proposal filed in Docket Nos. AR61-2. *et al.* and AR69-1 on November 6, 1970. By order of February 10, 1971, the Commission denied motions for a rehearing of the December 24, 1970 order. By further order of April 13, 1971, the Commission denied an application for rehearing on the Commission's February 10, 1971 order.

X. On October 16, 1969, the Commission issued a Notice of Proposed Rulemaking in Docket No. R-371, proposing to determine just and reasonable area rates for the Appalachian and Illinois Basins through rulemaking procedures rather than the lengthy area rate hearings which had been conducted in the major producing area, thus hoping to assure rapid disposition of the matter and insure continued stability in the area. On October 2, 1970, the Commission, relying on written comments and reports which had been filed and on an oral conference, rather than a full-blown evidentiary hearing, issued Order No. 411 establishing area rates for these Basins.

XI. By letter dated July 9, 1970, the Commission urged the Secretary of the Interior to conduct a general oil and gas lease sale in the Gulf of Mexico. The

Commission, by letter dated August 18, 1969, had previously urged that steps necessary to the orderly marketing of Outer Continental Shelf leaseholds be accomplished at the earliest practicable time. Public hearings were held on July 14, 1970, in New Orleans, and the Chief of the Bureau of Natural Gas presented detailed testimony in further support of the sale at that hearing. The importance of the Louisiana lease sale cannot be overemphasized since the geological evidence would seem to indicate that this area is one of the most prolific potential sources of natural gas. Gas from Federal domain lands on the Outer Continental Shelf offshore Louisiana may then be available for dedication to the interstate market. The Offshore Louisiana Area is capable of rapid development and may be connected with existing pipeline systems to meet the threat of near-term gas shortage in the Northeast and Great Lakes marketing areas. The oil and gas lease sale was held on December 15, 1970. Involved were 1,043 bids and bonuses to the Federal Government from 116 winners totaling a record \$845.8 million. Eleven high bids were rejected. The average sale price per acre was \$1,434. An all-time high of \$12,874.79 per acre was received for Tract No. 2153 from Pennzoil Offshore Gas Operators, Mesa Petroleum, Texas Production and Mobil. The next highest bid was \$7,636.87 per acre for Tract No. 2213 by the Trans Ocean Group. By letter dated September 8, 1971, to Secretary of the Interior, Rogers C. B. Morton, the Federal Power Commission expressed the belief that the public interest can best be served if the proposed general lease sale of Outer Continental Shelf tracts is held as proposed in December, 1971. The Chief of the Bureau of Natural Gas also testified in favor of proposed lease sale at public hearings held in New Orleans on September 8, 1971.

XII. In order that the Commission may improve its capability in the measurement of supply and demand and thereby enhance its ability to effectively regulate and provide a continuing reliable supply of gas to meet consumer demands, the Congress approved the Commission recommendation to undertake a National Gas Survey by providing funds for the Agency's fiscal year 1971 budget. Some of the more important questions to be examined in depth by the Survey are (a) the precise dimensions of the gas supply problems, (b) the extent to which pipeline expansion of facilities is threatened by inflation and uncertainty of new gas supplies, (c) the role of natural gas in air pollution control, (d) the supply-price-demand relationship, (e) the potential impact of interfuel competition, (f) import-export policies, (g) the role of synthetic fuels in the long-term supply of gas, and (h) the regulatory role in relation to these issues.

XIII. On November 4, 1970, the Commission undertook a nationwide investigation to enable it to establish policies and regulations for developing plans to help assure the reliability of electric power and natural gas service—Policy Statement Notice of Investigation and Proposed Rulemaking with Respect to Developing Emergency Plans—Reliability of Electric and Gas Service, Docket No. R-405.

Although the proceeding was initiated for the purpose of fulfilling the responsibilities of the Commission for reliability of gas and electric service under the Federal Power Act and the Natural Gas Act, the resulting plans and procedures will serve to aid in carrying out the overall Federal program to assure an adequate energy supply.

The investigation was separated into two phases: Phase I concentrated on the period from November 4, 1970 (the date of the notice), through March 31, 1971. The objective of this phase was "to elicit information from those anticipating emergency situations during this phase period." Only those with such an emergency situation were required to respond and were requested to do so by December 1, 1970. Phase II concentrated on the period from the date of the notice through 1975, and all gas transmission and distribution companies were asked to respond by January 7, 1971, with projections through 1975 of relevant information including but not limited to—

(a) Adequacy of supplies and delivery capacity.

(b) Adequacy of plans to meet emergency conditions. For this purpose, information on the following matters should be supplied.

The Commission received replies from interstate and intrastate pipeline companies, privately and publicly owned distribution companies, interested state regulatory agencies, trade associations and the Environmental Protection Agency. These responses totaling about 300 are currently being reviewed and analyzed by the Commission's staff.

The Commission obtained data from the producers of natural gas to determine what volumes of proved natural gas reserves, if any, were held by producers in any area that were not contracted to pipelines or direct customers.

XIV. The Commission was advised that natural gas distributing companies, which are exempt from the provisions of the Natural Gas Act under Section 1(c) thereof, have received an increasing number of requests from distributors located in other States and interstate pipeline companies for short-term supplies of gas to meet temporary emergencies caused by weather conditions, acts of God, breakdown of facilities or other unforeseen situations or to replenish depleted storage reservoirs in order to meet consumer needs in a forthcoming heating season. In order to facilitate responses to such requests, the Commission indicated by Statements of Policy issued May 6 and June 3, 1970, Order Nos. 402 and 402-A that the recipients of such requests would not jeopardize their exempt status under the Act by making short-term sales or deliveries of natural gas in interstate commerce to the extent that such transactions enabled those companies confronted with emergencies to meet their system requirements, subject to reporting provisions and prior Commission approval in emergencies exceeding 60 days. By Order No. 418 issued December 10, 1970, in Docket No. R-404, the Commission amended its Regulations under the Natural Gas Act to permit independent producers to sell natural gas to pipelines for emergency purchases for periods up to 60 days without first obtaining certificate authorization from the Commission.

XV. The Commission on September 18, 1970, in Opinion No. 586 adopted a settlement proposal submitted by a majority of the parties to the Hugoton-Anadarko Area Rate Proceeding, Docket No. AR64-1, *et al.*, thus establishing just and reasonable rates for the area. The Commission found that the proposed settlement was fair to the consuming public and would promote certainty and stability and contribute to obtaining additional supplies of gas from this crucial area. This opinion is on appeal to the Ninth Circuit, No. 71-1036.

XVI. The Commission on February 18, 1971, issued Order No. 423 in Docket No. R-407 establishing as a matter of general policy a suspension period of one day from the proposed effective date of a rate change filing made by an independent producer unless the Commission imposes a longer suspension period. The former five-month suspension period which had generally been applied to producers placed them at a disadvantage because they also were limited by contract as to when an increase might be made effective. A five-month suspension period also deprives a producer of revenues to which it would otherwise be entitled in the event the proposed rate is found to be just and reasonable.

XVII. On March 18, 1971, in Order No. 428 issued in Docket No. 393, the Commission amended its regulations covering natural gas sales by small producers, which are defined as independent producers with annual total nationwide jurisdictional sales not in excess of 10,000,000 Mcf. Although only accounting for about 15% of the total volumes of interstate gas sales, small producers comprise all except about 70 of the over 4700 natural gas producers in the United States. Their exploratory efforts are extremely valuable to the discovery of new sources of gas.

Under the new provisions, small producers may apply for a blanket certificate to cover all existing and all future jurisdictional sales. Those receiving such certificates are authorized to make small producer sales pursuant to existing and future contracts at the price specified in each such contract. Thereafter, so long as the holder of the certificate qualifies as a small producer and complies with its terms, the only filings required by the Commission are an annual statement of total jurisdictional sales and applications for abandonment of facilities or service. The Commission's purpose in thus classifying small producers was to facilitate their entry into the interstate market and to stimulate competition among producers to sell in interstate commerce as well as to encourage their exploratory efforts. Assurance is given small producers that the provisions of their contracts for the interstate sale of gas will not be subject to change. A further purpose is to relieve the small producer of the expenses and burdens relating to regulatory matters.

The Commission's action did not constitute deregulation of sales by small producers, but exempted small producers from area price ceilings. Such sales will be regulated in pipeline rate and pipeline certificate proceedings by Commission review of the purchased gas costs of each pipeline with respect to small pro-

ducer sales. The Commission's order assures adequate protection for the consumer by providing certain other safeguards against unreasonably high small producer prices. These orders are on appeal. *Tennessee Gas Pipeline Co. v. F.P.C.*, D.C. Cir. No. 71-1558.

XVIII. The Commission has authorized increased imports of gas by pipeline from Canada. The net import of natural gas from Canada in 1970 was approximately 767.8 million Mcf, which was an annual percentage increase of 19.0 percent over the 1969 figure.

During 1970, net Canadian imports accounted for 3.4 percent of U. S. consumption. The 1969 figure was 3 percent. If U.S. companies take advantage of all present Commission authorizations to import gas from Canada, the net import could go to approximately 1 billion Mcf in 1971.

XIX. As of September 15, 1971, the Commission authorized the importation of the equivalent of 8,820,000 Mcf of liquefied natural gas (LNG) on a short-term basis from Canada and Algeria. On March 9, 1972, the Commission issued Opinion No. 613 granting the import authorization sought in Docket No. CP70-196. *Distrigas Corporation*. Other proceedings are pending.

XX. On April 15, 1971, in Order No. 431, the Commission promulgated as a new Section of its General Policy and Interpretations, Section 2.70, entitled "Measures for the Protection of Reliable and Adequate Natural Gas Service." The statement of general policy provides that jurisdictional pipeline companies shall take all steps necessary for the protection of a reliable and adequate service as present supplies and capacities will permit during the 71-72 heating season and thereafter. In order to effectuate this, the Commission:

- (a) Encouraged companies to fill all storage fields;
- (b) Required the filing of curtailment plans as an amendment to existing tariffs by jurisdictional companies which intended to curtail service;
- (c) Indicated that additional short-term gas purchases may still be necessary to meet the 1972 demands and indicated the procedure under which this could be done;
- (d) Stated that where emergency gas purchases are made and/or curtailment program is instituted, volumetric limitations should be set on sales at current levels;
- (e) Indicated that the Commission will reexamine existing commodity rate levels and may redesign existing commodity demand rate relationships;
- (f) Encouraged pipelines to enter into exchange arrangements with other pipelines.

XXI. The Commission on May 6, 1971, in Opinion No. 595, set just and reasonable rates for sales of gas in interstate commerce from the Texas Gulf Coast, Docket Nos. AR62-4, *et al.* The Commission set a ceiling of 24 cents per Mcf for gas sales made under contracts dated on or after October 1, 1968, whether within the tax jurisdiction of the State of Texas or the offshore Federal domain. Rates for gas sold in interstate commerce under contracts dated prior to October 1, 1968, were established at varying levels with the ultimate rate of 19 cents established as of October 1, 1968, for all such contracts. In addition, the Commission offered incentives to producers to stimulate exploration and production by permitting credits to refund obligations through dedication of new supplies, and increased rates if new dedications reached the levels set forth in the opinion. The Texas Gulf Coast is the nation's second largest producing area. This case is on appeal to the District of Columbia Circuit. *Public Service Commission for the State of New York v. F.P.C.*, No. 71-1828.

XXII. On July 15, 1971, the Commission by Order No. 435 in Docket Nos. R-389 and R-389A, established initial rates at which sales of natural gas in the Rocky Mountain Area are to be certificated, without refund obligation, for sales made under contracts dated after June 17, 1970. The rates which the Commission established represent the area rate levels for the areas involved until such time as just and reasonable rates are promulgated for the area. This case is on appeal to the District of Columbia Circuit. *American Public Gas Assn. v. F.P.C.*, No. 71-1812.

Concurrently, the Commission, in Docket No. R-425, gave notice instituting a proposed rulemaking to issue rules fixing the just and reasonable rates and otherwise regulating jurisdictional sales in the Rocky Mountain Area and to determine whether the initial rates established by Order No. 435 shall apply to contracts dated on or after October 1, 1968. The just and reasonable rates to be determined pursuant to this proceeding shall be for all jurisdictional sales of natural gas

made under contracts dated before October 1, 1968. These procedures of setting area rates by rulemaking were previously used in the Appalachian and Illinois Basin areas and found successful in sharply reducing the protracted regulatory lag heretofore associated with area rate proceedings.

XXIII. On October 29, 1971, in Docket No. AR67-1, *et al.*, the Commission issued its unanimous Opinion No. 607 setting higher ceiling rates for natural gas produced in the "Other Southwest Area." This area covers all of Mississippi and Arkansas; four counties in Northwest Alabama; northern Louisiana; Railroad Commission districts Nos. 5, 6, and 9, in northeast Texas; and 56 counties in eastern and southeastern Oklahoma. This completes the determination of initial area rates in the Southwest area which includes the Hugoton-Anadarko, Texas Gulf Coast, Southern Louisiana, and Permian Basin areas. The opinion establishes prices by dates under three general contract periods which include variations by date and sub-areas within these periods. The ceiling prices for contracts dated on and after October 1, 1968, range from 23.0 cents per thousand cubic feet to 26 cents for pipeline quality gas. Less prices are provided for contracts dated prior to this time. The opinion includes provision for escalation of area ceilings, provides for refunds in excess of applicable area rates and places a moratorium on price increases until July 1, 1976. No minimum rates are provided. The higher prices provide incentives to the producers in this area to find gas and dedicate it to interstate commerce. The Commission indicated this action is subject to its policy statement implementing Executive Order No. 11615, stabilizing prices.

XXIV. On January 17, 1972, the Commission issued Opinion No. 607-A, which permits producers to discharge their refund obligations by dedications of additional gas reserves to interstate commerce. This policy is consistent with previous Commission decisions regarding Southern Louisiana (Opinion Nos. 598 and 598-A) and Texas Gulf Coast (Opinion Nos. 595 and 595-A). This case is on appeal to the Fifth Circuit. *Shell Oil Co. v. F.P.C.*, No. 72-1114.

XXV. On April 6, 1972, the Commission issued Notice of Proposed Rulemaking and Statement of Policy Relating to Optional Procedure for Certificating New Producer Sales of Natural Gas, Docket No. R-441. The proposed rule, to which comments will be received before final promulgation, provides for certification of new sales as an alternative to existing procedures and area rate orders. Hearings will be held on each applied-for certificate and if found to serve the public convenience and necessity, a certificate would be issued.

#### APPENDIX B—FEDERAL POWER COMMISSION, BUREAU OF NATURAL GAS

##### INITIAL RATES FOR FUTURE SALES OF NATURAL GAS FOR ALL AREAS—DOCKET NO. R-389A

(Estimated Current, Nationwide Cost of Finding and Producing Non-Associated Natural Gas Based Upon Methods Set Forth in FPC Opinion Nos. 468 and 546, Washington, D.C., August, 1970)

##### ESTIMATED CURRENT, NATIONWIDE COST OF FINDING AND PRODUCING NONASSOCIATED NATURAL GAS BASED UPON METHODS SET FORTH IN FPC OPINION NOS. 468 AND 546

[Stated at 14.65 p.s.i.a. exclusive of State tax]

Item No.	Cost item	Cents per M. c.f.
1.....	Successful well costs.....	3.49
2.....	Other production facilities.....	.49
3.....	Lease acquisition costs.....	1.65
4.....	Return on foregoing investment at 12 percent.....	7.43
5.....	Dry holes.....	2.02
6.....	Other exploratory costs.....	2.11
7.....	Adjustment for exploration in excess of production at 7 percent.....	.29
8.....	Production operating expense.....	2.70
9.....	Return on working capital at 12 percent.....	.49
10.....	Net liquid credit.....	(3.90)
11.....	Regulatory expense.....	.14
12.....	Total.....	16.91
13.....	Royalty at 14 percent.....	2.75
14.....	Total at 12 percent return.....	19.66
15.....	Total at 13 percent return.....	20.43

## SUMMARY EXPLANATION OF COST ITEM COMPUTATIONS

Item No.	Item	Summary of computation
1	Successful well cost	$(\$15.76 \times 1.449 = 22.84) \div 654 = 3.49\text{¢}$ .
2	Other production facilities	$0.1396 \times 3.49\text{¢} = 0.49\text{¢}$ .
3	Lease acquisition cost	$0.472 \times 3.49\text{¢} = 1.65\text{¢}$ .
4	Return on production investment at 12 percent	$11 \times 0.12 \times (3.49\text{¢} + 0.49\text{¢} + 1.65\text{¢}) = 7.43\text{¢}$ .
5	Dry holes	$(\$12.59 \times 0.970 \times 1.0828) \div 654 = 2.02\text{¢}$ .
6	Other exploratory costs:	
	G. & G., lease rentals, etc.	$0.988 \times 1.65 = 1.63\text{¢}$ .
	Exploratory overhead	$0.132(2.02\text{¢} + 1.63\text{¢}) = 0.48\text{¢}$ , $1.63\text{¢} + 0.48\text{¢} = 2.11\text{¢}$ .
7	Adjustment	$0.07(2.02\text{¢} + 2.11\text{¢}) = 0.29\text{¢}$ .
8	Production operating expense	(Copied) = 2.70¢.
9	Return on working capital at 12 percent:	
	Exploration working capital	$(2.02\text{¢} + 2.11\text{¢} + 0.29\text{¢}) \times 1.289/8 = 0.712\text{¢}$ .
	Production working capital	$(2.70\text{¢} \times 2.668) \div 8 = 0.900\text{¢}$ .
	Lease play	$1.5 \times 1.65 = 2.475\text{¢}$ .
	Return	$(0.712\text{¢} + 0.900\text{¢} + 2.475\text{¢}) \times 12\% = 0.49\text{¢}$ .
10	Net liquid credit	(Copied) = 3.90¢.
11	Regulatory expense	(Copied) = 0.14¢.
12	Royalty at 14 percent (after payment of State production taxes).	= 2.75.

*Coverage*

The cost figures shown represent unit cost at the point of lease sale. Published cost data were used for the latest five-year period, 1965 through 1969, with an exception regarding Lease Acquisition Cost which is explained with that item.

*Successful well cost*

The gas-well footage cost figure shown in the 1963 Census Report is \$16.48 per foot. After deducting the cost of equipment beyond the wellhead, the remaining cost is \$15.76 per foot. This is the latest Census cost data available at the time of this report.

Preliminary drilling cost data from Docket No. AR69-1 respondents show that the 1968 cost of gas-well footage is 1.426 times the 1963 cost of gas-well footage.

The Independent Petroleum Association of America provides an annual index based on the cost of drilling and equipping new wells. The year 1969 index figure, when related to year 1963, is 1.449.

These are the latest drilling cost figures available at the time of this study. Using the higher, and later, IPAA figure applied to the \$15.76 Census figure yields an estimated \$22.84 per foot for use here.

The same IPAA index figure applied to the 1963 Census dry-hole cost of \$8.69 per foot yields an estimated dry-hole cost of \$12.59 per foot for use later in this report.

The weighted average findings per foot resulting from the drilling of gas wells during the five-year period 1965-1969 is 654 Mcf. The 1969 figure is 316 Mcf per foot which appears to be atypical relative to recent prior years. The 1969 figure, however, is included. These figures are based upon gas findings as reported by the American Gas Association and gas-well footage as reported by *World Oil* magazine.

The unit cost of successful wells is then \$15.76 multiplied by 1.449 and then divided by 654 or 3.49 cents per Mcf.

*Other production facilities*

This item is designed to include (a) lease facilities beyond the Christmas tree, (b) related off-lease producing facilities, and (c) apportioned overhead investments. In Docket No. AR61-2 Proceeding, Examiner's Decision, mimeograph copy, pages 57 through 59, a figure of 13.96% of Successful Well Cost is used to determine the cost of Other Production Facilities. The result was adopted by the Commission in Opinion No. 546 and is used here. Application of the 13.96% to the unit Successful Well Cost results in a cost figure of 0.49¢ per Mcf.

### *Lease acquisition costs*

Joint Association Survey reports include the annual amounts spent for both "Lease Acquisitions" and for "Drilling and Equipping Producing Wells." The ratio of the former to the latter for the six-year period 1963 through 1968, equal 0.472, applied to the Successful Well Cost determined here yields a unit Lease Acquisition Cost of 1.65 cents per Mcf.

The period 1963 through 1968 was selected because it is the latest six-year span and provides what appears to be a realistic average unit lease acquisition cost figure. The annual lease acquisition cost figure reported for year 1968 is approximately double that for the highest of the previous years. The highest figure prior to 1968 was for year 1967.

The use of cost figures covering only the latest five-year period appears, therefore, to be unreasonable while the addition of year 1963 data does yield a figure that appears to be reasonable.

### *Return on production investment*

The method used to determine this cost item is the same as that used by the Commission in Opinion Nos. 468 and 546. In those Opinions a depletion period of twenty years was assumed, yielding an average investment life of ten years. To the ten years was added a year for the average pre-production investment period. A twelve percent rate of return was then applied to the eleven years in order to determine the overall return factor applied to the unit investment. Production investment is comprised of Successful Well Cost, Other Producing Facilities and Lease Acquisition Cost. The sum of the three multiplied by the return factor yields a unit return of 7.43 cents per Mcf.

### *Dry-hole cost*

The cost of dry holes used in this report was \$12.59 per foot as mentioned earlier.

Dry-hole footage allocated to gas equaled to 0.970 feet for each foot of gas-well footage for the period. This computation was based on *World Oil* reported successful gas-well footage, oil-well footage and dry-hole footage. The unsuccessful dry-hole footage was allocated to the successful gas footage and to the successful oil footage based on the ratio of the two. A separate computation was made for exploratory wells and for developmental wells. The overall weighted average of the two determinations for years 1965 through 1969 resulted in the 0.970 feet per foot ratio.

A dry-hole cost correction factor was used in both Commission Opinion Nos. 468 and 546 which was equal to 1.0828 (See Opinion No. 468, mimeograph copy, page 2 of Appendix B, Line 4). This adjustment was adopted to reflect the greater average depth of gas wells, and related higher costs, and the apparent greater success ratio of gas wells of greater depths.

Combining the several factors, to compute the unit cost of dry holes charged to gas, results in a figure of 2.02 cents per Mcf.

### *Other exploratory costs*

Other Exploratory Costs are comprised of geological, geophysical, lease rentals, land, leasing, scouting, and exploratory overhead costs. Following Commission Opinion No. 546, the sum of the foregoing cost items, except overhead, were determined as a ratio of Lease Acquisition Cost. The Joint Association Survey reports for years 1963 through 1968 were used here to establish this Other Exploratory Cost ratio. The weighted cost ratio determined for that period was 0.988 resulting in a unit Other Exploratory Cost figure of 1.63 cents per Mcf ( $0.988 \times 1.65$ ). Exploratory overhead was also determined using JAS data, as was done in Opinion Nos. 468 and 546. Exploratory overhead was found to equal 13.2% of the sum of the other Exploratory Expenses (1.63 cents per Mcf) and Dry-hole Cost (2.02 cents per Mcf), or 0.48 cents per Mcf. Therefore total Other Exploratory Costs equals 1.63 cents per Mcf plus 0.48 cents per Mcf or 2.11 cents per Mcf.

*Adjustment for exploration in excess of production*

Because annual gas findings have been greater than current annual production and because exploration is expensed and charged to the lesser current volumes, then the *unit cost to production* is higher than the *unit cost to findings*. The adjustment factor over the period 1965 through 1969, which is equal to 7%, is used here. This factor applied to the sum of the unit Dry Hole and Other Exploratory expenses yields a cost of 0.29 cents per Mcf.

*Production operating expense*

In Opinion Nos. 468 and 546, the Commission adopted, in each instance, a unit cost figure of 2.70 cents per Mcf for Production Operating Expenses. There is no new data at this time that can be used to redetermine this cost item. Therefore it is shown at the previously determined level.

*Return on working capital*

This item is made up of (a) return on working capital allowance for production, (b) return on working capital allowance for exploration, and (c) return on working capital for lease play. Using the method used in the previous two Commission Area Rate Opinions and two factors determined from AAQ data and used in Docket No. AR67-1, an allowance of 0.49 cents per Mcf was computed. A 12% rate of return was used.

*Liquid credit*

The liquid credit amount determined by the Examiner in the last full area rate proceeding, Docket No. AR67-1, was adopted and used here. The figure is 3.90 cents per Mcf.

*Regulatory expense*

The regulatory expense applicable to gas at a pressure base of 14.65 psia, 0.14 cents per Mcf, adopted by the Commission in Opinion No. 468 was adopted for use here.

*Royalty*

Following Commission Opinion No. 546, a royalty rate of 14 percent was used.

*State production taxes*

The production tax rate, levied on gas produced, varies from state to state, as shown at pages 9 and 10 herein. In translating the nationwide cost to the various producing states, the applicable state tax is used.

*Pressure base*

The estimated unit cost shown was computed at a pressure base of 14.65 pounds per square inch absolute, the same as was used in FPC Opinion Nos. 468 and 546. The cost figures shown at page one were calculated at 14.65 psia. In translating the nationwide cost to the various producing states, the applicable pressure base is used as shown at pages 9 and 10.

*Unit cost of gas by States—seven principal gas producing States*

Cost of gas at wellhead after including royalty but before including state production tax has been determined to be 19.66 cents per Mcf at 14.65 psia pressure base. The figure is 20.43 cents per Mcf at a 13% rate of return. After state production tax and after adjusting for state pressure base the cost would be as shown:

State	Pressure base	State tax		Cost, cents per M c.f.	
		Percent of value	Cents per M c.f.	At 12 percent	At 13 percent
Arkansas.....	14.65	-----	0.35	20.01	20.78
Kansas.....	14.65	-----	.0425	19.7025	20.4725
Louisiana.....	15.025	-----	2.3	22.46	23.25
Mississippi.....	15.025	6.0	.01	21.46	22.30
New Mexico.....	14.65	5.19	-----	20.74	21.55
Oklahoma.....	14.65	5.0	.04	20.73	21.55
Texas.....	14.65	7.5	-----	21.25	22.09

## STATE GAS TAXES AND PRESSURE BASE REQUIREMENTS

	State tax		Pressure base <sup>1</sup>
	Percent of value	Cents per M c.f.	
Alabama	4.0		15.025.
Alaska	4.0		14.65.
Arizona			15.025.
Arkansas		0.35	14.65.
California	( <sup>2</sup> )		14.73.
Colorado	( <sup>2</sup> )	.10	15.025.
Connecticut			14.73.
Delaware			14.73.
Florida			14.65.
Georgia		.05	14.65.
Hawaii			
Idaho		.01	
Illinois			
Indiana			
Iowa			
Kansas		4.0425	14.65.
Kentucky	.5		14.73.
Louisiana		2.3	15.025.
Maine			
Maryland			( <sup>3</sup> ).
Massachusetts			
Michigan	2.0		{14.65 sales, 15.025 production.
Minnesota			
Mississippi	<sup>4</sup> 6.0	.01	15.025.
Missouri			14.73.
Montana	2.1	.01	15.025.
Nebraska	2.0	.20	15.025.
Nevada		.01	14.73.
New Hampshire			
New Jersey			
New Mexico	7 5.19		14.65.
New York			14.73.
North Carolina		.05	
North Dakota	5.0		
Ohio			29.5" Hg. (14.49).
Oklahoma	5.0	.04	14.65.
Oregon			14.65.
Pennsylvania			( <sup>5</sup> ).
Rhode Island			14.73.
South Carolina			
South Dakota			15.025.
Tennessee	5.0		
Texas	7.5		14.65.
Utah	2.2		15.025.
Vermont			
Virginia			
Washington			14.73.
West Virginia			
Wisconsin			14.73.
Wyoming	6.28		15.025.

<sup>1</sup> The pressure base in p.s.i.a. except where specified and temperature base at 60° F., except Ohio which specifies 62° F.

<sup>2</sup> Determined annually.

<sup>3</sup> Production tax of 2 percent for each interest owner with gross value of less than \$25,000; 3 percent for over \$25,000 but less than \$100,000; 4 percent for over \$100,000 but less than \$300,000; and 5 percent for over \$300,000.

<sup>4</sup> Includes .005 cents per M c.f. for prevention of stream pollution

<sup>5</sup> Average atmospheric pressure plus standard delivery pressure.

<sup>6</sup> Or 3 mills per M c.f. measured at 14.4 p.s.i. plus 10 ounces, whichever is greater. Also a maintenance tax not to exceed  $\frac{1}{4}$ 0 mill per M c.f.

<sup>7</sup> Includes privilege tax at 2 $\frac{5}{100}$  percent of value.

<sup>8</sup> 14.73 p.s.i.a. for manufactured gas and not less than 14.65 p.s.i.a. for natural gas.

Note: Those States having blank spaces adopted no specific pressure base or require any taxes.

Source: For State taxes—Commerce Clearing House, Inc., on State taxes.

## APPENDIX C

## STAFF ANALYSIS OF FACTORS AFFECTING FLOWING GAS COSTS

The cost of flowing gas, unlike the cost of new gas which is based on industry-wide data, is a composite of data obtained from the books and records of specific producers through use of Commission questionnaires. Generally producers are

required to report costs in two broad categories, i.e. Production costs and Exploration and Development costs. In addition, since the lease is the basic accounting unit for the industry, production costs and volumes are reported by lease classifications. Leases are classified as (1) single product leases which produce either gas or oil separately or (2) joint product leases which produce gas and liquids jointly.

*Production Costs* include operating expenses, Depletion, Depreciation and Amortization (DD&A) and return on investment related to properties productive of oil and gas. Wherever possible, costs are specifically assigned. However, for leases productive of both oil and gas there is no alternative but to allocate the jointly incurred costs. For this purpose the allocation method used is the relative cost method. In using this method the unit cost incurred on single product leases is imputed to the products produced on joint product leases. The relationship of the imputed costs is then developed in the form of a ratio which is used to allocate the actual cost in joint product leases. The costs allocated to gas on the joint product leases are combined with the costs on the single product gas leases to obtain the weighted average unit cost of producing gas.

*Exploration and Development (E&D) Costs* are the unsuccessful expenditures incurred in the nation-wide search for oil and gas and includes costs for dry holes, geological and geophysical work, cancelled and surrendered leases, amortization of non-productive acreage and lease rentals. Included also is return on the E&D rate base which consists essentially of investment in non-producing properties. In addition, producers in reporting E&D costs to the Commission were required to directly assign such costs to oil or gas reservoirs, records permitting, and to identify the remainder as unassigned. The unassigned amount is allocated to oil and gas reservoirs based on the directly assigned<sup>1</sup> E&D expenses. Return on investment is accorded similar treatment.

Since some gas reservoirs include hydrocarbon liquids, it is necessary to allocate such cost among the joint products. This allocation is made on the basis of the Btu content of the products involved as modified by an appropriate economic factor. The factor represents the economic relationship between the products and its determination involves the exercise of expertise and judgment. In this regard, the Commission in the first Permian Case (Opinion No. 468) used an economic factor of  $3\frac{1}{2}$  for liquids to 1 for gas whereas in the most recent cases such as Opinion Nos. 598 and 607 an economic factor of  $2\frac{1}{2}$  to 1 is used.

The unit cost of production and E&D together with regulatory expenses, production taxes and gathering cost make up the total unit cost of flowing gas.

#### APPENDIX D—UNITED STATES OF AMERICA, FEDERAL POWER COMMISSION

##### OPTIONAL PROCEDURE FOR CERTIFICATING NEW PRODUCER SALES OF NATURAL GAS— DOCKET NO. R-441

(18 CFR 2.75)

(Notice of Proposed Rulemaking and Statement of Policy Relating to Optional Procedure for Certificating New Producer Sales of Natural Gas Issued April 6, 1972)

1. Pursuant to 5 U.S.C. 551, *et seq.* Supp. V, (1967) and Sections 4, 5, 6, 7, 8, 15, and 16 of the Natural Gas Act (52 Stat. 822, 823, 824, 825, 829, 830; 56 Stat. 83, 84; 61 Stat. 459; 76 Stat. 72; 15 U.S.C. 717c, 717d, 717f, 717g, 717n, 717o), the Commission gives notice that it will consider adopting rules and regulations providing an alternate method under which it will consider the issuance of permanent certificates for, and will otherwise regulate, new sales of natural gas subject to the Commission's jurisdiction. Current procedures for issuing permanent certificates for new sales of natural gas are:

<sup>1</sup> Approximately 90% of lease investment was directly assigned to gas or oil at the time of purchase based on anticipated findings. Additionally, approximately 40% of expenses reported were directly assigned.

(A) Pursuant to area rate orders<sup>1</sup> or, in the alternative

(B) Pursuant to special certification procedures.<sup>2</sup>

Nothing herein is intended to supersede the procedures set forth in A, *supra*. If adopted, with or without modification, the alternate method proposed herein would supplement the procedures set forth in B, *supra*. Nothing in this Notice shall affect any certificate or proceeding completed, pending, or hereinafter initiated pursuant to (A) or (B), *supra*, or affect the operation of Orders 402, 402A (18 C.F.R. 2.68, May 6, 1970 and June 3, 1970), or our Regulations 157.22 and 157.29.

2. Jurisdictional pipelines are presently unable to procure contracts for new supplies of gas on a spot or long-term basis, in sufficient quantities to insure that consumers of natural gas will receive a reliable and adequate supply of gas. Interstate pipelines are unable, in many instances, to provide service to new customers, and some major interstate pipelines are, at this time, being forced to curtail deliveries of natural gas below their contractual commitment and are unable to supply the quantities requested by their customers because of insufficient supplies. Such disruptions of service create an intolerable situation for human needs customers dependent on the interstate pipelines. Prolonged curtailment of industrial sales of natural gas until industry can switch to alternate

<sup>1</sup> Area rate orders:

Area and docket No.	Opinion No.	FPC	Date	Court cite
<b>Permian Basin:</b>				
A R61-1.....	447	33 FPC 43.....	Jan. 12, 1965	375 F.2d 35 (1967).
A R61-1.....	468	34 FPC 159.....	Aug. 5, 1965	390 U.S. 747 (1968).
A R61-1.....	468-A,	34 FPC 1068.....	Sept. 4, 1965	
	540.....			428 F.2d 407 (1970).
<b>Hugoton-Anadarko (incentive price policy): A R64-1.....</b>				
A R64-1.....	567	42 FPC 726.....	Oct. 3, 1969	
<b>Hugoton-Anadarko: A R64-1.....</b>				
A R64-1.....	586	44 FPC 761.....	Sept. 18, 1970	USCA9, No. 71-1036.
<b>Texas gulf coast:</b>				
A R64-2.....	595	45 FPC.....	May 6, 1971	USCA5, No. 71-3061 et al.
A R64-2.....	595-A	46 FPC.....	Oct. 18, 1971	
<b>Southern Los Angeles:</b>				
A R61-2.....	598	46 FPC.....	July 16, 1971	USCA5, No. 71-2761 et al.
A R61-2.....	598-A	46 FPC.....	Sept. 9, 1971	
<b>Other Southwest:</b>				
A R67-1.....	607	46 FPC.....	Oct. 29, 1971	USCA5, No. 72-1114 et al.
A R67-1.....	607-A	47 FPC.....	Jan. 17, 1972	
	Order No.			
<b>Appalachian-Illinois:</b>				
R-371.....	411	44 FPC 1112.....	Oct. 2, 1970	
R-371.....	411-A	44 FPC 1334.....	Oct. 30, 1970	
R-371.....	411-B	44 FPC 1487.....	Mar. 27, 1970	

<sup>2</sup> See table below:

Area and docket No.	Opinion No.	FPC	Date	Court cite
<b>Nationwide gas rates:</b>				
R-389.....		35 FR 10152.....	June 20, 1970	
R-389A.....		35 FR 11638.....	July 17, 1970	
<b>Adequacy of supply, Rocky Mountain area:</b>				
R-418.....	431	36 FR 7505.....	Apr. 21, 1971	
R-389A.....	435	FPC.....	July 15, 1971	CADC No. 71-1812.

fuels, and continued non-expansability of gas utility service, will inevitably have a repressive effect on the productivity of the Nation's economy. On the basis of certificate filings, at the present time, supplemental supplies of natural gas from foreign imports or non-conventional sources have been offered only at high cost to the consuming public.

3. The recent report on "National Supply and Demand 1971-1990," prepared by the Federal Power Commission's Bureau of Natural Gas (BNG) shows the level of "unsatisfied demand" for gas increasing from 3.6 trillion cubic feet in 1975 to 9.5 trillion cubic feet in 1980, 13.7 trillion cubic feet in 1985 and 17.1 trillion cubic feet in 1990.<sup>3</sup> Additionally, it is estimated that between 1971 and 1990, the United States will require 186.4 trillion cubic feet more gas than will be available, even after making liberal allowances for pipeline imports, liquefied natural gas imports, coal gas, Alaskan gas and reformed gas.<sup>4</sup>

4. The Future Requirements Committee (FRC) estimates that the natural gas requirements for the United States will increase from about 28.2 trillion cubic feet in 1971 to 33.9 trillion cubic feet in 1975.<sup>5</sup> Based on information concerning presently contracted or reasonably assured supplies, the FRC estimates that the gap between the potential demand for gas and the most likely available supply will increase from .9 trillion cubic feet in 1971 to 3.9 trillion cubic feet in 1975.<sup>6</sup>

5. The assurance of adequate supplies of natural gas can mitigate the damage being done to the nation's environment. Natural gas is by far the cleanest burning and least polluting of all the fossil fuels.

6. Any further aggravation of the gas supply problem also portends grave implications for the nation's economic objectives. Between 1947 and 1970, the nation increased its annual consumption of energy from 32.9 quadrillion Btu to 68.8 quadrillion Btu, with the share of the total being contributed by natural gas increasing from 13.8 percent in 1947 to 32.5 percent in 1970.<sup>7</sup> During this period, the nation's real output of goods and services more than doubled and its real income per capita increased by about one half. It is inescapable that the continued growth and productivity of the U.S. economy requires adequate and reliable supplies of energy, including adequate and reliable supplies of natural gas.

7. Moreover, the "lowest reasonable cost to the consumer" can only be eroded if the nation is forced to satisfy its requirements for gas (1) through increased reliance on new substitute supplies of gas or (2) through the increased use of other fossil fuels. In the case of number (1) above, all information available to the Commission indicates that the new base load supplies of substitute gas will be available to consumers only at costs significantly higher than the prices of currently available domestic well head supplies. In the case of (2) above, the price per BTU for many primary fuels is greater than the price per Btu for natural gas. This comparison is especially unfavorable to the alternative fossil fuels when the costs of storage, handling and pollution control are included. In summary, when the gas shortage forces consumers of natural gas to satisfy their energy requirements by using either substitute gas supplies, *e.g.*, imported liquefied natural gas, propane, reformed hydrocarbons, gasified coal, imported natural gas, or other fossil fuels, the net effect is higher energy costs throughout the economy, with resulting inflationary pressures.

8. Based on a careful and comprehensive evaluation of all facts and information available, the Commission herein proposes to adopt an optional certificate procedure, as hereinafter detailed, for new producer sales of natural gas, in order to provide an alternate method to stimulate and accelerate domestic exploration and development of our natural gas reserves. Herein we propose this alternate procedure designed to assure the interstate consumers of natural gas, and the nation as a whole, an adequate and reliable supply of natural gas at the lowest reasonable cost.

9. We are hereby proposing to amend our General Rules of Practice and Procedure to insert Section "2.75, Optional Procedure for Certifying New Producer Sales of Natural Gas," in Part 2, General Policy and Interpretations, Subchapter A, Chapter 1, Title 18 of the Code of Federal Regulations.

<sup>3</sup> *Natural Gas Supply and Demand 1971-1990*, and Bureau of Natural Gas, Federal Power Commission, February 1972, p. 3.

<sup>4</sup> *Ibid.*, p. 3.

<sup>5</sup> *Future Gas Requirements of the United States*, Future Requirements Committee, Vol. No. 4, October 1971, p. 3.

<sup>6</sup> *Ibid.*, p. 3.

<sup>7</sup> *Mineral Industry Surveys, Petroleum Statement Monthly*, Bureau of Mines, Department of Interior, December 1970, p. 37.

## 10. The new Section 2.75 reads as follows:

**"Section 2.75 Optional Procedure for Certificating New Producer Sales of Natural Gas**

a. Notwithstanding any other provisions in the General Rules of Practice and Procedure of the Federal Power Commission, or the Regulations Under the Natural Gas Act of the Federal Power Commission, applications for certification of future sales of natural gas produced within the United States may, at the option of the signatory parties to sales contracts, be submitted in accordance with the provision of this Section. To the extent that any Federal Power Commission General Rules of Practice and Procedure or Regulations under the Natural Gas Act are inconsistent herewith, the same are hereby amended to permit the optional procedure herein set forth.

b. The provisions of this Section shall be available if each of the following conditions exists:

1. A contract covering the sales of natural gas in interstate commerce has been executed on or after April 6, 1972.

2. All parties to such contract agree to the submission of the same for certification in accord with the provisions of this Section;

3. The purchaser under such contract is a jurisdictional pipeline which, as of the date of the contract in question, has a deliverability life on its entire system, considered as a whole, of less than 12 years; deliverability life as used herein is defined in Section 2.61 of this Chapter;

4. The seller under such contract establishes that he has discharged, or is prepared by specific plan or program to discharge, all obligations (such as refunds) prescribed by prior orders or opinions of this Commission; provided, however, that any such seller may make the showing here required without prejudice to his claim in any case now pending on judicial review that such obligations were unlawfully imposed by the Commission.

5. The acreage covered by the contract offered for certification has not been previously dedicated to the interstate market (unless abandonment has been previously granted), nor has an application been previously filed with the Commission for certification of the sale of gas from such acreage; provided that nothing herein shall preclude certification of contracts covering acreage from which sales have been certificated pursuant to special certification procedures under R-389 (35 F.R. 10152), R-389-A (35 F.R. 11638), or Order 431 (36 F.R. 7505).

c. If all of foregoing conditions precedent exist, the signatory parties to the contract may tender the same to the Commission and request the issuance of a certificate of public convenience and necessity to the seller for sales of natural gas thereunder. The application shall certify that all parties to the contract desire certification in accordance with the terms and provisions of this Section, that the seller expressly agree to the waivers and elections hereinafter provided for in sub-sections m and o of this Section, and that all conditions precedent as set forth in sub-section b of this Section are met.

d. Certificates of public convenience and necessity issued and accepted under this Section shall not be subject to change by determinations or orders in area rate proceedings or pipeline rate proceedings whether heretofore made or hereafter to be made, and orders issued hereunder shall not constitute establishment of an area rate.

e. Applications presented hereunder will be considered for permanent certification, either with or without pregranted abandonment, notwithstanding that the contract rate may be in excess of an area ceiling rate established in a prior opinion or order of this Commission.

f. No contract shall be accepted for filing if it includes any type of indefinite pricing clause, including but not limited to a "favored nation clause," a "price redetermination clause", or a "special escalation clause".

g. A seller-applicant under this Section shall state the ground for claiming that the present or future public convenience and necessity require issuance of a certificate on the terms proposed in the application, and shall provide factual support for such claims. The application shall contain a contract summary as prescribed in Sec. 250.5 of our Regulation Under the Natural Gas Act.

h. The purchase under a contract filed under this Section shall certify that the present or future public convenience and necessity require issuance of a certificate to the seller, and shall provide information in support of such certification with respect to the purchaser's (1) system-wide supply, (2) present and estimated 3-year peak day and average day demands, (3) present and estimated 3-year requirements of customers on its system, (4) deliverability life, (5) implementa-

tion, if any of curtailment plans, (6) emergency purchases of gas under Order 431, or 157.22 or 157.29 of these Regulations, and (7) purchases of LNG or attachment of other supplemental supplies.

i. The information required by sub-section g. and h. may be submitted by cross-reference and incorporation of information already on file with the Commission.

j. Applications requesting issuance of certificates of public convenience and necessity as authorized in this Section shall be processed in accordance with the procedural requirements, including those relating to notice, intervention and hearing, set out in Part 157 of the Commission's Regulations Under the Natural Gas Act.

k. Pursuant to the authority contained in and subject to the jurisdiction conferred upon the Federal Power Commission by Sections 7 and 15 of the Natural Gas Act and the Commission's Rules of Practice and Procedure, a statutory hearing will be held before the Commission without further notice on all applications for certificates under this Section in which no petition to intervene in opposition is filed within the time required, if the Commission on its own review of the matter believes that a grant of a certificate is required by the public convenience and necessity. Where the Commission believes that a formal hearing is required notice of such hearing will be duly given.

l. A final order of this Commission, issuing a certificate as applied for, or issuing a conditioned certificate acceptable to the applicants, shall constitute a final determination, under Section 7 of the Natural Gas Act, that the rates and services therein specified are required by the present and future public convenience and necessity.

m. By acceptance of a certificate issued hereunder, the seller-applicant unconditionally agrees to (1) waive all rights to seek future rate increases under Section 4 of the Natural Gas Act with respect to the contract submitted, other than fixed price escalations, if any, as certified by the Commission; and (2) waive all rights to contingent adjustment of flowing gas rates as provided by the Commission in area rate decisions heretofore decided or hereafter issued, for flowing gas which the seller-applicant produces in the same geographical pricing area as the pricing area of the production covered by the application made under this Section.

n. Upon the filing of an application under this Section, deliveries pursuant to the provisions of the tendered contract may be commenced after notice to the Commission and pending review of such application by the Commission. Such notice shall be given within ten days after deliveries first commence, and shall include all pertinent information concerning the deliveries. Any such deliveries so commenced may be terminated (1) if such contract for any reason shall terminate or be terminated prior to the issuance by the Commission of a final order upon review of such application, or (2) upon the issuance of a certificate containing conditions unacceptable to the party adversely affected. If the Commission by final order shall deny such application, or if the party or parties to the contract adversely affected shall not accept the terms and conditions prescribed by the Commission, deliveries thereunder shall be terminated. Within thirty days after termination of deliveries, the seller shall notify the Commission of such termination, and shall report the date of termination, volumes delivered, and revenues received.

o. If the parties elect to commence deliveries as set forth in subsection n., such deliveries will be made at rates no higher than the prevailing area ceiling rate and shall so continue for six months unless the Commission has made its final orders on the application at an earlier date; at the end of such six-month period (if the Commission has not made its final orders), the seller shall be entitled to receive, and the purchaser shall be entitled to pay, the rates specified in the contract, and such contract rates shall continue as the effective rates until the Commission enters its final order on the certificate application.

11. The proposed new Section 2.75 of our General Rules does not replace geographical area pricing under existing regulations and orders of the Commission. The new Section provides an alternative procedure for certification of natural gas sales, as herein provided, for those who elect to seek certification of contracts on the basis that price and other provisions thereof are appropriate under standards of public convenience and necessity. This optional procedure, if adopted, is intended to encourage long term, large volume dedications of new supplies of natural gas to the interstate market.

12. Applications for certification under the optional procedures set forth in this notice will be accepted for immediate filing and processing; provided, however, that Commission action on any application so filed shall be subject to the Commission's final action on the rulemaking proposed in this Notice.

13. Mindful of the national gas supply problem delineated in paragraphs 2-8 above, the Commission reaffirms its obligation to consider applications for special relief under Sections 4 and 7 of the Natural Gas Act for contractually authorized rate increases for gas sold under certificates of public convenience and necessity heretofore issued. Neither the moratoriums imposed in area rate decisions, nor our regulations, preclude the right of an individual seller to apply for special relief and demonstrate that a contractually authorized increase is necessary, even if such increase involves rates above area ceilings. In considering individual applications for special relief, we are required by the Natural Gas Act to determine if a departure from area ceiling rates is required by the public interest. Upon an applicant's showing that the proposed contractually authorized amendment will result in securing a substantial net increase in the supply of gas for the interstate market, a determination of public convenience and necessity will be undertaken by the Commission in the light of the standards set forth in *Austral Oil Co. v. F.P.C.*, 428 F. 2d 407 (5th Circuit 1970), cert. denied 400 950 (1970).

14. Any interested person may submit to the Federal Power Commission, Washington, D.C. 20426, not later than May 1, 1972, views, comments or suggestions in writing concerning all or part of the procedures proposed herein. Written submittals will be placed in the Commission's public files and will be available for public inspection at the Commission's Office of Public Information, Washington, D.C. 20426, during regular business hours. The Commission will consider all such written submittals before action on the matters proposed herein. An original and 14 conformed copies should be filed with the Secretary of the Commission. Submittals to the Commission should indicate the name, title, mailing address and telephone number of the person to whom communications concerning the proposal should be addressed.

15. The Secretary shall cause prompt publication of this notice to be made in the Federal Register.

By direction of the Commission.

#### APPENDIX E

##### NATIONAL GAS SURVEY—INDEPENDENT RESERVE ANALYSIS PROGRAM

The initial step of the gas reserves analysis program was set forth in the Federal Power Commission's Order, issued on December 21, 1971, entitled, "Order Directing Study and Analysis of Natural Gas Reserves and Prescribing Procedures for the National Gas Survey." (Hereinafter called "Reserves Study Order").<sup>1</sup> This step of the program has been designed to yield independent estimates of proven reserves for a representative sample of gas fields in the United States. The sample will be chosen by means of valid statistical techniques from which statistical inference will permit sound conclusions to be drawn about the gas reserves of the total population of gas producing fields in the United States.

The proven reserves for each field in the sample will be obtained by aggregating the values for the proven gas reserves for each reservoir in that field. The estimates of the proven gas reserves in the reservoirs will result from independent analysis by government experts. In other words, the proven gas reserves for the fields constituting the sample will be evaluated independently on a "reservoir-by-reservoir" basis.

The quality and reliability of the statistical analysis and the field reserves estimations will be assured because the teams performing these tasks are composed of qualified government and academic experts. A statistical validation team will prescribe the number of fields to be surveyed and will determine the adequacy of the sample. This statistical validation team, which will have final responsibility for all decisions concerning the sampling procedure and its im-

<sup>1</sup>The Commission's subsequent order of March 9, 1972, "Order Amending Order Prescribing Procedures for the National Gas Survey," did not materially affect the technical procedures in the "Reserve Study Order" and serves only to guarantee that the field team's worksheets will be available to the Commission, if needed.

plementation, is composed of experts from the Office of Management and Budget and others which are commissioned by the Federal Power Commission.

The reserve analysis teams which will make the reservoir-by-reservoir estimates will be supervised by an FPC staff member. They will be comprised solely of Federal Power Commission staff experts, specialists from other Federal and state agencies and technical experts from schools and universities. No gas industry employees are involved in the reserve estimation work of these teams or in the activities of the statistical validation team.

After the "Reserve Study Order" was issued, the Federal Power Commission initiated the procedure for obtaining the services of an independent accounting agent. On March 9, 1972, Arthur R. Young and Company, in accordance with standard government service procurement practices, was awarded a contract for \$68,200 to perform this function. At the present time Arthur Young and Company is receiving from members of the American Gas Association Committee on Natural Gas Reserves, the field identification information and reserve estimates on all fields reported by the Committee in the United States. The accounting agent is preparing for each field a punch card containing all information supplied by the A.G.A. Committee representatives. From these cards, a list of identified natural gas fields will be prepared. This list of field names will be forwarded to the University of Oklahoma Research Institute for analysis and checking.

A comprehensive list identifying all gas fields in the United States will be compiled by the Oil Information Center (OIC) at the University of Oklahoma Research Institute from all available information sources. To assure that all fields are covered, OIC will compare the two lists, note all differences and then with the assistance of the FPC staff, reconcile field names and identify duplications and omissions. Currently, a pilot test using information from Texas Railroad Commission 3 is being conducted. OIC will compile a complete list identifying all gas fields in the United States and a supplemental list of fields which may have been omitted in the estimates prepared by the American Gas Association's Committee on Natural Gas Reserves. Reserves for fields in this supplemental list will be estimated by independent survey teams.

Arthur Young and Company will also provide the statistical validation team with the necessary tabulations (frequency distributions or stratifications of the population of gas fields) so that the statistical validation team can stipulate the techniques and procedures that must be followed in order to obtain a valid sample.

On the basis of these tabulations the statistical validation team composed of experts from the United States Office of Management and Budget, and including other government and academic statistical experts, commissioned by the Federal Power Commission, will prescribe the number of fields, by category to be independently surveyed in order to project a statistically valid reserve estimation.

Mrs. Wann, Chief Mathematical Statistician, Statistical Policy Division, on the basis of preliminary information about the distribution on the reserves of gas fields in the United States, has specified in a letter to the Director of the National Gas Survey, that 102 major gas fields will be in the certainty stratum. These fields are certain to be included in the sample of fields designated for independent reserve estimates to be made by the field reserve teams.

The statistical validation team certainly is considering the factors and variables to be considered in determining the procedure for selecting the sample, as well as the classifications to be used to sub-divide the data into sampling cells.

Independent reserve teams, consisting of geologists, engineers and other professional members of the Commission staff with the assistance of experts from the Department of the Interior, other Federal and state agencies, as available, and college and university faculty members, will independently estimate on a reservoir-by-reservoir basis, the proved natural gas reserves from each field which is part of the sample.

At the present time, Federal Power Commission reserve analysis teams are assigned to field work, made up of 4 professionals each, plus the assistance of 2 professional accountants from the FPC's Office of Accounting and Finance, for a total of 22 FPC staff members. There are an additional 9 FPC personnel assigned to this project who have not as yet gone into the field due to other short-term commitments. Thus, there are 31 people directly assigned by the Federal Power Commission to field teams under the direction of the Reserve Team Supervisor. In addition, the Technical Director of the Survey has conducted field reserve estimations bringing to 33 the total of Federal Power Commission staff members directly involved in the field reserve estimation program.

In addition to the work of the FPC teams, the United States Geological Survey has agreed to accept responsibility for that portion of the survey covering the Outer Continental Shelf. A team of 8 professional people—4 geologists and 4 engineers, is currently working on these reserve estimations. Further, the Department of the Navy, Office of Naval Petroleum and Oil Shale Reserves in California, has assigned 2 professional people to work as a reserve estimation team. This makes a total of 43 professional personnel assigned to field teams to work on reserve estimation.

The agencies involved in oil and gas conservation and production activities in the following states have indicated by letter a willingness to participate in the reserves program by assigning space, providing access to data and, in some cases, providing personnel: Alaska, Arizona, Arkansas, Colorado, Florida, Indiana, Kansas, Kentucky, Louisiana, Michigan, Mississippi, Montana, Nebraska, New Mexico, New York, North Dakota, Oklahoma, South Dakota, Utah and Wyoming.

When the reserve teams make an analysis of the gas reserves in any individual field or reservoir, its independent estimate is developed from the basic raw data that are supplied to it by the company. These data usually consist of various types of electrical, radioactive and acoustical well logs; core analyses; open hole, production, back pressure, draw down and build-up, and other type well tests; temperature measurements; gas analyses; structural and isopachous maps; and, in the fields, periodic pressure versus cumulative production information. The basic data is reviewed to determine its adequacy, accuracy, validity (by comparing with other reports from FPC files for similar geologic provinces) and whether or not it is the most recently available information. The staff utilizes this information, and applying accepted geological and engineering methods, makes its own independent reserve estimation. Rather than rely solely upon the various factors developed by the company, the FPC staff derives its own factors for measurable physical properties such as porosity, water saturation, temperature, and pressure. Staff's analysis will also involve the exercise of the examiner's judgment on factors such as structural and isopachous interpretations, abandonment pressures and recovery factors and other decisions of professional judgment.

The two most commonly utilized methods of making reserve estimates are called the volumetric and the performance methods. In the volumetric method a calculation is made of the volume of gas that would be contained in the void (pore) space of a specific volume (acre feet) of reservoir rock at the reservoir conditions of temperature and pressure. This reserve of a unit volume of rock is then applied to a total reservoir volume as determined by structural and/or isopachous mapping interpretations. The boundaries of the total reservoir may be limited by structural closure, faults, gas-oil contact, gas-water contact, changes in rock facies or other complications. The accuracy of the total volume estimate will usually depend on the number of wells drilled to define the limits of the reservoir, although a good estimate can be made based on one or two wells, using good structural control.

It should be realized that there are specific reserve estimation problems in which the generalized techniques listed herein would have to be modified or adapted, for example, in abnormally high pressure field an adjustment of the estimated recovery factor may be required.

A performance estimate can only be made after a certain given amount of production history is available. This method usually involves a determination of the relationship of the loss of reservoir pressure accompany the production of a specific volume of gas. When this pressure-volume relationship has been established, the total amount of gas that will be produced down to a specific abandonment pressure can be estimated. As a general rule, the longer the pressure-production history, the more accurate is the estimation.

#### APPENDIX F

U.S. GOVERNMENT MEMORANDUM,

*June 5, 1972.*

To: Chairman Nassikas.

From: Thomas J. Joyce, Chief, Bureau of Natural Gas.

Subject: The Need for the Rapid Development of the Gas and Oil Resources of Alaska's North Slope.

As you requested, I have summarized below some of the factors which illustrate the importance and necessity for the timely and rapid development of Alaska's North Slope gas resources. Because the bulk of Alaska's gas resources are asso-

ciated—dissolved volumes related to the Prudhoe Bay Field, these resources will become available to the lower 48 states only if provision is made to market the North Slope oil.

The emergence of a natural gas shortage during the past several years and the unfavorable trends in the United States natural gas supply, necessitates the development of all of the potential sources of gas supply which can be made available to the Nation. Such development must of course take place in a manner which adequately weighs and considers all of the many facets of sound resource management. These development activities must additionally serve the National interest with regard to environmental, national security and other policy considerations. In this context, I believe that the overall national interest requires the rapid and timely development of Alaska's North Slope gas resources.

Analyses by the Commission Staff of gas supply data available to the Federal Power Commission give strong indication of a growing supply problem. The FPC requires interstate pipeline companies to submit in an annual report, Form 15, data on gas reserves and deliverability. Deliverability, as used in this context, represents the number of future years during which a pipeline company will be able to meet its annual requirements for its presently certificated delivery capacity from presently committed sources of supply.

The availability of gas from these sources of supply is governed by the physical capabilities of these sources to deliver gas, by the terms of existing gas-purchase contracts and by limitations imposed by state or federal regulatory agencies. The Form 15 reports cover gas supplies dedicated to interstate markets, a segment comprising approximately two-thirds of all gas produced, and disclose gas reserve data on a reservoir-by-reservoir and field-by-field basis.

The compilation of Form 15 data has been published for each year starting in 1963 in the Commission's publication "The Gas Supplies of Interstate Natural Gas Pipeline Companies." As reported in these publications, reserves owned or controlled by the interstate natural gas pipeline companies first suffered a net decline in 1968. Reserves again declined in 1969 and 1970 by 7.4 and 14.1 trillion cubic feet respectively. With respect to deliverability, the January 1970 edition of "The Gas Supplies of Interstate Natural Gas Pipeline Companies" states:

The trend of increasingly sharper rates of decline in deliveries occurring earlier in each twenty year projection indicates that the past and present trend of reserve additions is insufficient to offset the declining deliverability of the older reserves and at the same time satisfy rapidly increasing market requirements for extended periods of time. Over the past six years the number of years that scheduled deliveries from year-end reserves were sufficient to meet the presently certificated sales and company use requirements has been declining consistently.

The February 1972 Report (based on 1970 data) indicates that a 10 percent deficiency is indicated in the ability of the interstate pipeline companies to meet requirements by 1975. While the level of the deficiency would vary from company to company, it is indicative of a general tightening of supplies. Data for 1971 are not yet available.

The American Gas Association annually publishes national data on year end reserves. This data, which includes the gas reserves of both interstate companies and intrastate companies (the latter do not report to the FPC) confirms the trend indicated by Form 15 data. These data indicate a drop in U.S. proved lower 48 reserves from the high of 289.3 trillion cubic feet in 1967 to 247.4 trillion cubic feet by year-end 1971.

The finding to production ratio (F/P)—based on A.G.A. data—has also declined from a ratio of about 2.0 during the late 1940's and mid-1950's to about 1.3 as an annual average in the early 1960's. In 1968, the finding to production ratio dropped to 0.6; this was the first time since this information has been collected that annual reserve additions did not equal or exceed annual production. This trend continued through 1969, 1970 and 1971 when further declines in the finding to production ratio were experienced.

The Bureau of Natural Gas published a report in February of 1972 which considered these trends in gas supply and projected future supply trends based on all available information. This report entitled *National Gas Supply and Demand, 1971-1990, Staff Report No. 2* projected increasing deficits between the demand for gas and available domestic production. By 1975 this deficit would amount to 5.1 trillion cubic feet and is projected to increase to 14.1, 21.3 and 28.6 trillion cubic feet by 1980, 1985 and 1990 respectively. We know that these estimates are imprecise but it should be stressed that they are based on favorable rates of development of domestic productive capability plus a reasonably

optimistic rate of development for supplemental gas sources. We thus believe that these projections, while inexact, are reasonably indicative of the Nation's probable future supply-demand balance.

As a result of the worsening gas supply situation and in response to Order No 431 of the Commission, 27 pipeline companies either filed revised tariff sheets or indicated their intention to utilize curtailment plans set forth in presently filed tariffs (see Appendix F1). Of these companies filing curtailment plans, seven were in curtailment during the past winter and several others indicate projected deficiencies beginning during the winter of 1972-1973 (see Appendix F2).

Several companies serving the Mid-Western and Pacific Coast markets are having supply difficulties which could be alleviated to some degree by the availability of Alaskan gas to those markets. El Paso Natural Gas Company obtains its gas supply from Canada, Texas, New Mexico, Colorado, Wyoming and Utah. It serves distribution companies in the Pacific Northwest, which relies heavily on Canadian gas. It experienced no firm deficiency last year and expects none this year. In the Pacific Southwest it had no deficiency last year but projects a deficiency of firm gas of 33.1 billion cubic feet for the coming winter.

The other companies supplying the West Coast, Transwestern Pipeline Company and Pacific Gas Transmission do not project any curtailments for the 1972-73 heating season.

Michigan Wisconsin Pipe Line Company obtains its gas supply from Louisiana, the Texas and Oklahoma panhandles and indirectly from Canada. It serves principally distribution companies in Wisconsin, Michigan and Iowa. It experienced no deficiencies last winter. It did report however that it will be unable to deliver the full amount of additional volumes requested by its customers during the coming winter.

Natural Gas Pipeline Company of America obtains gas supplies from Texas, Oklahoma, Kansas and Louisiana and indirectly from Canada. Its principal market is the Chicago area of Illinois and Indiana. It also serves markets elsewhere in Illinois, Iowa and southern Wisconsin. For the summer of 1971 it reported a firm deficiency of 83.9 billion cubic feet and expects a deficiency of 149.8 billion cubic feet during the summer 1972. It met its winter obligations last winter and expects to do so again next winter.

Northern Natural Gas Company obtains its gas supply from Kansas, Oklahoma and Texas. It serves customers in a broad area extending from Kansas to Wisconsin and upper Michigan. Its customers also agreed to summer curtailments of unspecified amounts for the summers of 1971 and 1972. It met its obligations during the winter season of 1971-72 but projects a possible deficiency of up to 6.3 billion cubic feet during the late fall of 1972 or the 1972-73 heating season.

It is ironic that these shortages should exist in the face of an actual condition of adequate resources. Potential domestic reserves exist to provide ample supply to meet incremental demand. The Potential Gas Committee<sup>1</sup> estimated that as of December 31, 1970, the potential supply of natural gas in the United States was 1.178 trillion cubic feet, including Alaska. The United States Geological Survey of the Department of the Interior independently estimates potential supply at about 2.100 trillion cubic feet inclusive of Alaska. Those volumes do not include the December 31, 1970, inventory of 290.7 trillion cubic feet of proved recoverable reserves which existed as of that date.

Proved reserves of oil and gas in Alaska were estimated at 10.1 billion barrels and 31.4 trillion cubic feet at year end 1971. Of these amounts 9.6 billion barrels and 26 trillion cubic feet are attributed to the Prudhoe Bay area of the North Slope. These proved reserves, while large, are but an indication of the potential which exists in this newest of our hydrocarbon provinces. For example, the potential gas supply attributed to Alaska as of December 31, 1970 by the Potential Gas Committee was 327 trillion cubic feet, which represents about 28 percent of the total estimated United States gas potential. The bulk of Alaska's currently proved gas reserves are associated-dissolved volumes related to the Prudhoe Bay oil reserves and as such will become available for market only to the extent that the Prudhoe Bay oil reserve are producible.

Secretary Morton has indicated that the presently anticipated schedule of North Slope oil production calls for oil volumes of 0.6, 1.2 and 1.6 to 2.0 million barrels

<sup>1</sup>The Potential Gas Committee is sponsored by the Potential Gas Agency, Mineral Resources Institute, Colorado School of Mines and is composed of members from the gas producing, pipeline, and distribution industry, observers from state and federal regulatory bodies, American Gas Association, American Petroleum Institute, Independent Natural Gas Association of America and National Association of Regulatory Utility Commissioners.

per day in 1975, 1980 and 1985.<sup>2</sup> The availability of the North Slope's natural gas resources are of course necessarily dependent upon the implementation of plans to produce this oil.

Since the discovery of oil and gas in Prudhoe Bay, a number of proposed projects have been announced for the purpose of transporting gas from that area to markets in the contiguous states. In each instance, gas would be made available to West Coast and/or Great Lakes markets. One of these major projects is termed the "Northwest Project Study Group." This is a joint venture by six U.S. and Canadian petroleum and pipeline companies.<sup>2a</sup> The purpose of this study group is to determine the feasibility of constructing a 2,500 mile pipeline (currently estimated by the group to cost about \$5 billion) to transport natural gas from Alaska's North Slope and northern Canada to the U.S. Midwest and eastern Canada.

A second proposed project is a plan sponsored by the Gas Arctic Systems Group.<sup>2b</sup> The purpose of this plan is to construct a large gas pipeline across the Northwest Territories, the Yukon and Alaska for the initial purpose of conserving solution gas to be produced from Alaskan North Slope reserves, and to connect this early production to an existing system in Alberta now serving western and midwestern U.S. markets, as well as central and eastern Canadian markets.

A third major proposal is referred to as the Mountain Pacific Project and involves a large diameter gas pipeline originating on the Alaskan North Slope and extending approximately 1100 miles southeastward to a bifurcation point in the Canadian Northwest Territories. From the bifurcation point, a pipeline would extend approximately 950 miles southward to serve U.S. Pacific Coast markets while another large diameter line would extend eastward to serve eastern Canada and U.S. Midwestern markets.

The Canadian Government, recognizing the need for the early development of northern resources, has issued a series of guidelines for the construction and operation of northern oil and gas pipelines. The guidelines relate to pipelines tapping oil and gas resources north of the 60th degree of latitude in the Yukon and Northwest Territories and any other pipelines to be built in that region. They establish requirements ranging from environmental protection to pollution control and Canadian ownership. Initially, only one trunkline each for oil and gas will be permitted in the north within a "corridor" to be established at a future date.

A common feature of the northern gas pipelines which are proposed is their potential to tap both North Slope and Canadian Frontier gas potential. Estimates of the Canadian Petroleum Association put Canadian undiscovered potential raw recoverable gas reserves at about 496 trillion cubic feet with proved reserves of about 53 trillion cubic feet as of January 1, 1971. The Western Canada Sedimentary Basin which includes Alberta, the Mackenzie River Valley of the Northwest Territories and the Yukon Territory is estimated to contain potential gas supplies of about 185 trillion cubic feet or about 37 percent of Canada's total potential. The 179 trillion cubic foot potential of the Arctic Islands would raise the combined potential of these two areas to about 73 percent of the total for Canada.

The availability and use of natural gas in U.S. markets represents significant savings to consumers when compared with other energy sources even if natural gas prices were to be somewhat higher. The Independent Natural Gas Association of America (INGAA) has prepared a yearly survey since 1951 comparing residential heating costs for natural gas, oil, coal and electricity. The most recent of these data are published in the INGAA publication Comparison of Seasonal Househeating Costs for Gas, Fuel Oil, Coal and Electricity—1970 Season, 65 Cities. These data show that for the midwest city of Detroit, Michigan, the average fuel cost per season for the average home was \$121.50 for gas, \$218.02 for fuel oil, \$229.47 for coal and \$461.47 for electricity.

Natural gas is a clean-burning, sulfur-free fuel at the point of combustion. A commercially acceptable device for the removal of sulfur compounds from flue gases is not available, and, to date, the best method of controlling emissions of sulfurous pollutants is to burn low-sulfur fuels such as natural gas. While there is hope that stack devices for the removal of sulfurous pollutants from the flue gases of electric generating plants and other large volume fuel burning

<sup>2</sup> Applications for pipeline right-of-way and ancillary land uses—Prudhoe Bay to Valdez, Alaska, May 11, 1972.

<sup>2a</sup> Atlantic Richfield Co.; Humble Oil & Refining Co.; The Standard Oil Co. (Ohio); TransCanada Pipelines Ltd.; Michigan Wisconsin Pipeline Co.; Natural Gas Pipeline Co. of America.

<sup>2b</sup> The Alberta Gas Trunk Line Co. Ltd.; Canadian National Railway Co.; The Columbia Gas System, Inc.; Northern Natural Gas Co.; Texas Eastern Transmission Corp.

equipment may become available in the years ahead, it does not appear promising that such a device will in the near future be developed for space heating applications. A comparison of pollutants emitted when coal, oil and natural gas are used for residential heating during a representative heating season is given below. These are particularly sobering statistics when it is considered that during 1970 the increase in natural gas residential customers, as reported by the American Gas Association, totalled 1,395,000.

COMPARISON OF COMBUSTION EMISSIONS IN DOMESTIC APPLICATIONS<sup>1</sup>

[Pounds of pollutant per 150,000 B.t.u.]

	Coal <sup>2</sup> (6 tons)	Oil <sup>3</sup> (1,110 gallons)	Gas <sup>4</sup> (150,000 cubic feet)
SO.....	225	177.0	0.06
CO.....	300	2.0	.06
NO.....	48	13.0	17.4
Particulates.....	120-300	8.9	2.85

<sup>1</sup> Based on "Compilation of Air Pollutant Emission Factors" by R. L. Duprey, U.S. Department of Health, Education and Welfare, 1968

<sup>2</sup> 10 percent sulfur and 10 percent ash by weight.

<sup>3</sup> 10 percent sulfur by weight; heating value—135,000 B.t.u. per gallon.

<sup>4</sup> Heating value—1,000 B.t.u. per cubic feet.

It is our view that the emerging natural gas shortage requires the timely development of Alaska's gas potential. We see the construction of the Trans-Alaska oil pipeline as the necessary first step in the development of this potential. Failure to move forward with construction will serve only to delay the availability of these politically secure oil and gas resources to the United States economy. The provision of adequate future supplies of gas to meet our burgeoning needs for this clean, non-polluting form of energy will of course require our best efforts in developing all of the other sources of supply available to us. We do not feel, however, that this goal can be achieved without developing, at the earliest opportunity, the area which embraces approximately 28 percent of the country's estimated undiscovered gas potential.

While it would be technically possible to produce some portion of the gas reserves associated with the oil pools of Prudhoe Bay without producing the oil, these gas volumes, the so called "gas cap" gas, would be only a portion of the reported 26 trillion cubic feet of reserves. Producing this gas without producing the oil would additionally result in the loss of gas drive for future production of oil so that production of these oil reserves could never be efficiently accomplished.

At the present stage of energy technology, natural gas represents a major environmental asset. At the point of use it pollutes less than any other available fuel form. Therefore, in weighing the impact of development in Alaska we must balance it against the air quality in major metropolitan areas. Sound environmental planning involves a careful evaluation and balancing of all national needs in order to maintain and enhance economic progress while preserving the ecology of our land, air and water resources. An adequate energy supply and preservation of the environment are integral parts of the national interest. Environmental conservation must be viewed in composite terms, not isolated segments. Failure to develop the immense resource potential of one area can only add to the mounting crisis faced by millions of citizens in other areas. One of the stated goals of the National Environmental Policy Act of 1969 is to "attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable or unintended consequences."

This highly desirable goal is achievable through the balancing of environmental costs and environmental benefits. This need for a balanced approach between environmental protection and resource development is also recognized in Section 101-(b)-(5) which states that "it is the continuing responsibility of the Federal government to use all practicable means . . . (5) to achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities . . ." These considerations should also be carefully weighed in evaluating the proposed project in terms of the environment criteria listed in Section 102(2)(C) of the National Environmental Policy Act.

The gas supply situation makes development of Alaska's potential imperative, not only for the benefit of consumer and commercial interests but for the pro-

tection and enhancement of our human and natural environment as well. The need for this gas, its real and potential importance as a means of improving the environment, and the absence of a fuel supply with the same economic and environmental advantages leaves little room for alternatives to a carefully monitored development of the energy potential of one of the few frontiers left to us. As members of the Special Interagency Task Force for the Federal Task Force on Alaskan Oil Development members of the Bureau of Natural Gas participated actively in the consideration of possible alternatives to development of the North Slope's oil and gas resources.

It should also be pointed out that the development of these natural gas resources and their transportation to market areas will impose a minimal burden on the environment. Natural gas can be transported through pipelines in the gaseous state at temperatures well below the melting point of permafrost. Thus, natural gas pipelines can be constructed in the permafrost regions with minimum danger of permafrost melting or thermal erosion.

We urge prompt action to insure development of Alaska's oil and gas resources. The beleaguered environment of the "lower 48" states, especially the urban centers of the Pacific Coast and the Midwest, require this clean fuel supply. Millions of gas consumers depend on natural gas. The needs of many potential users of this clean fuel will go unfulfilled or will have to be satisfied by more expensive and environmentally inferior fuel supplies unless the undeveloped gas potential of Alaska is tapped. Rapid development of this area is consistent with the expressed declaration of national environmental Policy Act. It is there stated to be the "continuing policy of the Federal government . . . to create and maintain conditions under which man and nature can exist in productive harmony and fulfill the social, economic and other requirements of present and future generations of Americans."

Of all of the potential supplemental sources of gas supply which are presently available, only Alaskan gas offers the unique combination of accessibility to the gas short markets of the Mid-West and Pacific Coast and a high degree of political and economic security of supply. On balance we believe that the benefits which will accrue to Alaska and her sister states from the carefully monitored development of the North Slope's resource, far outweigh the foreseeable risks.

THOMAS J. JOYCE.

Attachments (2).

#### APPENDIX F1

#### CURTAILMENTS FILED WITH THE FEDERAL POWER COMMISSION

<i>Company</i>	<i>Docket Nos. (s)</i>
1. Bluefield Gas Company-----	RP72-94
2. Natural Gas Pipeline Company of America-----	RP70-67
3. United Gas Pipeline Company-----	RP71-29 and RP71-120
4. Trunkline Gas Company-----	RP71-100
5. Northern Natural Gas Company-----	RP71-107
6. Granite State Gas Transmission Company-----	RP71-116
7. Michigan-Wisconsin Pipe Line Company-----	RP71-117
8. Transcontinental Gas Pipe Line Corporation-----	RP71-118
9. Panhandle Eastern Pipe Line Company-----	RP71-119
10. Eastern Shore Natural Gas Company-----	RP71-121 and RP72-21
11. Arkansas Louisiana Gas Company-----	RP71-122
12. Consolidated Natural Gas System-----	RP71-127 and RP72-47
13. Florida Gas Transmission Company-----	RP71-128
14. Cities Service Gas Company-----	RP71-129
15. Texas Eastern Transmission Corporation-----	RP71-130
16. Algonquin Gas Transmission Company-----	RP71-131
17. Great Lakes Gas Transmission Company-----	RP71-134
18. Colorado Interstate Gas Company-----	RP71-135
19. Alabama-Tennessee Natural Gas Company-----	RP71-138
20. Mid Louisiana Gas Company-----	RP71-139
21. Shendoah Gas Company-----	RP71-141
22. El Paso Natural Gas Company (Southern Division)-----	RP72-6
23. Louisiana Nevada Transit Company-----	RP72-13
24. Lone Star Gas Company-----	RP72-15
25. Texas Gas Transmission Corporation-----	RP72-64
26. Southern Natural Gas Company-----	RP72-74
27. Columbia Gas Transmission Company-----	RP72-89

## APPENDIX F2

## FIRM REQUIREMENT DEFICIENCIES REPORTED BY PIPELINE COMPANIES TO THE FEDERAL POWER COMMISSION STAFF

Company	Firm deficiencies in billions of cubic feet	
	Actual April 1971-March 1972	Projected April 1972-March 1973
Algonquin Gas Transmission Co.....	2,144	13,483
Arkansas Louisiana Gas Co.....	75,237	149,093
Cities Service Gas Co.....	<sup>1</sup> 38,0	128,0
Colorado Interstate Gas Co.....	None	1,8
Consolidated Natural Gas System.....	None	<sup>2</sup> 23,853
Eastern Shore Natural Gas Co.....	None	0,083
El Paso Natural Gas Co.....	None	33,1
Great Lakes Transmission Co.....	<sup>3</sup> 36	None
Mississippi River Transmission Corp.....	None	6,5
Natural Gas Pipeline Co. of America.....	<sup>4</sup> 83,9	149,8
Northern Natural Gas Co.....	None	<sup>2</sup> 5,262
Panhandle Eastern Pipe Line Co.....		25,5
Texas Eastern Transmission Corp.....	18,66	90,910
Transcontinental Gas Pipe Line Corp.....	88,091	96,16
Trunkline Gas Co.....	43,435	97,599
United Gas Pipe Line Co.....	154,321	348,370

<sup>1</sup> Cities Service Gas Co. describes these as normal.

<sup>2</sup> Alternate lower figures were also reported.

<sup>3</sup> Deficiency due to mechanical difficulties.

<sup>4</sup> Summertime curtailments.

Note: These figures should not be added because of duplications among companies.

Chairman PROXMIER. Mr. Nassikas, will you give me an appraisal of how you see the energy crisis? Tell us what in your view as Chairman of the most significant regulating Commission we have in the Government, the overall energy needs of our country, the supply in relation to the demand, and then put the natural gas shortage and needs into that perspective.

Mr. NASSIKAS. In the first place, I am interested to note that you, as Chairman, recognize that there is an energy crisis in the United States.

There is an energy crisis and it is not only natural gas that is in short supply but all our energy resources are undergoing a severe imbalance between supply and demand. Part of this imbalance is attributable to a change in environmental standards which make a substantial part of our resource base inadequate to meet the air quality requirements and ambient air standards of various parts of the United States. This has created a substantially accelerated demand for natural gas and for other clean fuels.

We find that it is absolutely essential that we have and follow a national energy policy which will recognize the necessity of developing all of our energy resources to meet the economic needs of our nation. The development of oil, of course, as has been forecast by various studies including the National Petroleum Council and Bureau of Mines, the Office of Oil and Gas of the Department of the Interior, and studies which our own staff has made, would forecast that over the course of the next 10 to 15 years we will unquestionably have increasing reliance on imported oil, so that the comfortable feeling of security that the nation may have enjoyed during the sixties will no longer exist.

It is inevitable that we will import substantially larger portions of our petroleum requirements from abroad than we would have forecast even two to three years ago.

Chairman PROXMIRE. Recognizing that, is it not logical for us to do our best to develop, prove and retain our own domestic resource, in other words, develop our reserves as much as possible and to use the resources from abroad so that in any kind of a security crisis, military crisis, or whatever should happen abroad, we would be as secure as possible? In other words, encourage importation rather than discourage it, to the extent that is not inconsistent with developing our own resources?

Mr. NASSIKAS. Your question is two-fold, Chairman Proxmire. One is that we have to be certain that our national security interests are protected and, secondly, we must be certain that we have done all we can—which is a corollary to that first proposition—to develop our domestic energy resource base not only for national security reasons but for economic reasons also.

Chairman PROXMIRE. Let me just add to that something that has interested all of us and maybe it has been exaggerated, the shale which, of course, has a great potential. We understand the amount is really enormous if it should be an improvement and it is just a matter of applying the technological know-how.

Mr. NASSIKAS. It is applying the technological know-how but it is considering the relative price of developing oil shale compared to developing other resources. It is a national security measure, nevertheless, which requires, I think, substantial expenditures by the Federal Government in a definite leasing program to develop under adequate environmental safeguards to our oil shale reserves.

Chairman PROXMIRE. Are you responsible in any way for that?

Mr. NASSIKAS. No. This is the Department of the Interior that has jurisdiction over oil shale development.

Chairman PROXMIRE. But certainly you recognize that this could be a great benefit to our total energy policy if we could develop this potential source which I understand is very, very great. You also mention coal. You mentioned atomic energy.

Mr. NASSIKAS. I think nuclear power is probably the single most important energy development of this century and the breeder reactor about 1984, I hope even earlier, may prove to be commercially feasible so its own fuel can be bred in effect which will eliminate the drain on our fossil fuel.

I made a computation which might be of interest to you for the record that I have as part of my prepared statement, and that is if you take our projections under the National Power Survey, through 1990, this will displace in effect over twice our 1970 oil production in of new nuclear capacity, which is what our projected schedule is; by 1990, this will displace in effect over twice our 1970 oil production in the United States, about one and half times our 1970 gas production total in the United States, and a little over double our 1970 coal production. That is on the assumption that you would have to generate that amount of power by the use of fossil fuels.

Chairman PROXMIRE. Now, this may be an optimistic or it may be a conservative estimate. Everything that I have seen and heard and read and experienced in the last 30 years has told me that technology seems to be advancing at a very, very great rate, accelerating rate, tremendous rate. We had not even conceived of atomic energy 30 years ago, and now, of course, it is so important in so many areas.

Is it possible in your view, or maybe I should say likely, is it likely that we could greatly accelerate the atomic energy source of energy so that if we—in doing so we solve this shortage problem very decisively and once again being in the comfortable position which you said we have been in the past but no longer are?

Mr. NASSIKAS. From my studies of the matter and staff studies and discussions with scientific and technological experts, which I am not, they have indicated that the present program that we have formulated with the development of the nuclear reactors appears to be adequate. I think with reference to the breeder reactor, even though there is about \$250 million committed to development of that breeder reactor by the utility industry for a commercially feasible prototype in effect by the end of this decade. I have felt for some time that I would like to see an acceleration of breeder technology beyond our present target objectives.

I also believe that we should be certain that we try to develop alternative forms of reactors that may not simply be liquid metal cooled but helium cooled reactors and other exotic processes which I understand have great promise.

This will also create further competition among the very large manufacturers which have extensive research and development and we may then end up with a breeder reactor a little earlier than we anticipated.

While I say this, remember that currently we rely for 75 percent of our energy on petroleum (oil and gas) and we forecast, even with nuclear technology under our National Power Survey, that the petroleum industry will still account for over 60 percent of our total energy in the year 1990, despite the displacement of resources by nuclear technology.

Yesterday I talked to the Edison Electric Institute in San Diego and my talk related to accelerated research and development directly in line with our discussion here today and greatly increased contributions by industry to research and development in order that some of the new forms of energy can get on the line to preserve our fossil fuel resources.

Chairman PROXMIRE. You are not a—you said very modestly you are not a technology expert but you are the outstanding expert in the U.S. Government because of your position, your experience, on the overall general energy program and needs, I think. At least in many ways you represent that source. So I would like to impress again on this question and maybe frame it a little bit differently, what policies can the Congress adopt that would encourage a more vigorous expansion of this great and exciting area of atomic energy as a contribution to our energy shortage problem. or is there a policy that you can see that we might be able to adopt that would increase this more rapidly?

Is it a matter of appropriating more funds for research or is it something else?

Mr. NASSIKAS. I think it is largely a question of expanding the existing programs that have already been formulated under the Federal budget.

Chairman PROXMIRE. You do not see any new programs that we need?

Mr. NASSIKAS. Under the expanded research and development budget for 1973 research and development funds for energy needs and energy research and development have almost tripled. There is a coal gasification project, for example, that is being conducted by the Department of the Interior and partially being funded also by the gas industry. I would like to see an acceleration of this program, and increased funds devoted to the gasification of coal technology.

I would like to see a larger commitment by the Federal Government as well as by industry to develop the breeder reactor and on fusion and some of the more exotic forms of energy, magnetohydrodynamic and solar energy. I believe we are not thinking quite large enough because of the lead times that are involved to develop, to get a scientific breakthrough, then to reduce that breakthrough into, an organization and manufacture and the delivery and operation of a new energy system.

So I believe that that is one area that is extremely important.

To develop our fossil fuel resource base, I believe that it is essential through tax policies of the Federal Government to encourage exploration and development. I believe that with reference to the leasing of offshore lands where there are prolific gas resources in the Federal domain that we should have a greatly expanded program of leasing which the President indicated in his June 4, 1971, message was desirable.

For example, on the Atlantic coast—which is where I happen to come from—it is my understanding from talking to geologists from the U.S. Geologic Survey, there is a substantial potential in both oil and gas stretching down from the Maritime Provinces of Canada to Cape Hatteras and below Georgia. Yet as of year 1972—I believe this is accurate—I do not think one test well has been drilled on the entire Atlantic Coast on the Outer Continental Shelf. Some of our heaviest demands for oil and gas is, of course, from the heavily populated eastern part of the United States as well as the Midwest, and yet there does not seem to be any immediate program for a schedule of lease sales along the Atlantic Coast, with appropriate environmental safeguards, to develop that resource which would then reduce our reliance on imported supplies of both oil and natural gas.

Chairman PROXMIRE. Thank you very, very much. My time is up. I would like to ask you to do two things. First, introduce the members of your staff at the table with you and second, introduce the Commissioners who I understand are in the room but are seated at the back.

Mr. NASSIKAS. At my right is Gordon Gooch, General Counsel. To my left is William Diener, my assistant and Tom Joyce is the Chief of the Bureau of Natural Gas.

We have with us today in the first row rear, to your left and my right, Commissioner Albert Brooke, Vice Chairman Pinkney Walker, Commissioner Rush Moody. Commissioner John Carver, I understand, was sending a note to the committee concerning his imminent resignation from the Commission, which precluded his participation here.

Chairman PROXMIRE. We are honored that the gentlemen are here and certainly honored to have you here.

Senator Percy.

Senator PERCY. Mr. Nassikas, I am certainly glad to see you and have you share your wisdom on a very tough problem. I would be most interested in your observations on what can be done to conserve energy. We can always put emphasis on creating new sources but what about conserving energy—cutting it down, although not necessarily eliminating electric toothbrushes and things like that at home which may or may not be necessary.

From the standpoint of, let us say, insulation in homes, could you describe the advisability of our natural energy policy, including very positive efforts to conserve energy through the use of, for example, improved insulation standards, smaller cars, et cetera? Statistics developed at the Bureau of Standards demonstrate that improved insulation in residential housing could result in accumulated savings in 20 years of 50 quintillion B.t.u.'s of accumulated costs in constant dollars, or more than \$80 billion. Is the Commission taking a look at ways we can conserve rather than use energy?

Mr. NASSIKAS. We are, Senator Percy, and I would like to state at the outset a national policy of energy conservation is not only essential but highly desirable in view of our shrinking resource base.

I would like to express my answer in terms of both the electric power industry which we regulate and also the gas industry secondarily.

With reference to the electric utility industry, our staff is conducting an overall review of methods of conserving power use and effecting its most efficient utilization, as delegated to us by the Congress. Under section 202(a) of the Federal Power Act, the Commission is charged with providing an abundant low cost reliable supply of power, and economic utilization of our power resources with a view toward conservation.

The National Power Survey which we recently completed, had some insights into conservation which were somewhat inadequate. The new National Power Survey, which we are about to institute, will have as one of its primary concerns the extent to which we can conserve electricity in the United States and still meet the essential demands for electric power that are needed for economic growth.

I would like to make a distinction there. Visionaries and prophets and some Cassandra's prophesy that we must reduce overall demand. We must have a static society, for instance, as the Club of Rome recently envisioned in its report.

I do not happen to agree with that concept. You can have more effective utilization of your energy resources and still meet demands with a nonstatic society.

People talk of exponential growth of demand and say, you cannot double demand every decade and then do this indefinitely.

Probably not. At the same time, you can attain what I would term exponential growth of an energy resource base if we have adequate research and development that can be developed to have a constantly expanding base, whether it is an improved technology for deeper drilling for gas or whether it is the breeder reactor. That is what I would like to say with regard to the power industry and conservation.

With regard to the natural gas industry, we have a series of both cases and rulemakings that we have promulgated which examine gas resources and their more productive uses. It should be noted that while

we are charged with having an abundant supply of electric power, as you know, 29 percent of all electric power generated in 1971, was by the use of natural gas. This is probably one of the most inefficient uses of natural gas that we could possibly employ because you utilize only about 30 percent of the energy. The rest of its goes up the stack as waste.

We feel that we must, if there are alternate sources of fuel available—and many utilities have converted to oil, some to coal that they have available—reallocate our gas resources more effectively. In effect, if we could double their thermal efficiency we could double a limited supply of gas.

Senator PERCY. Well, I wonder specifically if you could comment on what might be done in this area I mentioned of housing. If the potential is so great for conservation of energy resources in the building of 2½ million homes a year now, are the public relations departments of the energy companies working with the housing industry to point out to them the great potential?

Mr. NASSIKAS. Yes.

Senator PERCY. Are we trying to develop any incentives, any kind of procedures that can encourage construction of homes that will be well insulated so as to conserve fuel?

Mr. NASSIKAS. Yes. Conservation through more efficient building design, through insulation, and instead of central station generation of power, with the development of fuel cells, to have secondary sources of generation for building. The FPC staff has studied and evaluated this and in our National Power Survey we indicated the value of this.

The electric utility industry should do more in this respect in their communities. I also suggested that instead of simply urging and persuasion, I would like to see incorporated in building codes in all of our communities in the United States, minimum standards for insulation to avoid heat loss, both in the winter and in the summer, or air conditioning.

The architects—for whom I have considerable respect—can do a great deal more than they have done in the past in the design of buildings to use our solar energy, so to speak, and cooling characteristics.

Senator PERCY. Would you feel we have a national crisis in this area? Do you think that the Banking, Housing and Urban Affairs Committees of the Senate and House ought to give consideration to saying there is a requirement for certain specifications to be included before any Federal funds are put into housing?

It should certainly be a requirement for any Federal buildings that are constructed. Are we reaching the stage where we really have to do that?

Mr. NASSIKAS. I believe so. I think this would be highly desirable policy. In fact the Energy Policy Council and Housing—General Lincoln, who chairs the Joint Board on Fuel and Transport; I serve on both of these—is conducting an administration study of conservation and what recommendations can be made to the Congress specifically along with your suggestions.

Senator PERCY. I have just been apprised that HUD recently did come out with new regulations on federally insured housing which require insulation sufficient to insure heat loss of such building by a third to a fourth of a percent—so the potential is certainly there.

What proportion of housing is federally insured? What is it? 30 percent?

Chairman PROXMIRE. Probably higher than that.

Senator PERCY. So we have got to find that this is good national policy here. We have got to find some way of voluntary assistance to do it on the other side.

I would like your comments, Mr. Chairman, on a comment that was made yesterday by one of the witnesses who compared the power of the FPC in implementing national energy policy with the power of an ant to control the course of a barge down the river. Perhaps you heard that comment or knew about the comment.

Do you feel so impotent that—

Mr. NASSIKAS. Of course, I wish that we had the capacity that an ant has to carry 20 times its own weight. [Laughter.] We do not. We do not have that.

On the other hand, certainly there is truth in that observation. I did suggest in January 1970, at a hearing before the Senate Commerce Committee that the organizational structure of Government to cope with energy problems is not right.

It is too fractured and I will not labor my answer to point out that Interior has responsibilities, we have responsibilities.

For example, electricity. We regulate about 5 to 7 percent of all rates in the United States. These are bulk wholesale rates. The State regulatory commissions regulate the rest of them. We are charged by Congress with having a reliable and abundant supply of low cost power in the United States and yet we can do this only by voluntary persuasion. We have no sanctions to compel, except in isolated instances, the construction of generation facilities. We do have power regarding interconnections and our powers have been expended through two Supreme Court decisions since I became Chairman.

The Atomic Energy Commission, of course, has been a scientific agency. It is also a regulatory agency now. The administration's plant siting bill which relates to environmental as well as energy considerations and certificating of plants is a step forward. I think the President's Department of Natural Resources would be an important step forward, but I go further. I think we should have a National Energy Policy Council, which is on a par with a National Environmental Quality Council, through a congressional act, which will establish that council; that council will be responsible for implementing congressional policies as set forth in an energy policy act and to see to it that all agencies of Government carry out that mandate and to coordinate at the level as an adjunct to the President's office.

Then secondly, as a corollary to that, I have recommended a Federal energy commission that may be able to eliminate some of this impotence, as you describe it, and may be able to enable whoever is in charge of that type of an agency to carry out programs, and I emphasize this, to be accountable.

I think a Government representative that heads an agency, who works in an agency, has to be accountable, but the way it is now, too often we will concentrate on one energy sector, someone else on another energy sector, and the accountability is not there.

Senator PERCY. So, in other words, whereas industry may feel the FPC has a tremendous amount of power, from the standpoint of really

being held responsible for developing energy policy for the country, you call it the Federal "Powerless" Commission. We do not have the authority today to be able to comprehend and handle that problem; is that right?

Mr. NASSIKAS. In gas policy we have a lot more power than we do in electric power. In the recent decision on the United Gas Pipeline case sustained by the Supreme Court seven to zero, our powers were affirmed in curtailed procedure to allocate the end use of gas on direct industrial sales which were going to electric power companies. I was very pleased with the decision, by the way.

Senator PERCY. Thank you, Mr. Chairman.

Chairman PROXMIRE. Senator Bentsen.

Senator BENTSEN. Thank you, Mr. Chairman.

Chairman Nassikas, I am very pleased to have you and your distinguished associates testify on this problem. I know you will be pleased to hear that all three of the witnesses yesterday agreed that there was an acute gas shortage. These witnesses yesterday agreed with varying degrees of enthusiasm that there should be some increase in the price of gas in order to encourage the finding of new supplies, new reserves. But they did not agree with the proposed rule 441.

Would you elaborate how proposed rule 441 would apply and how it would work, if adopted?

Mr. NASSIKAS. With your indulgence, Senator Bentsen and Chairman Proxmire, I would like to discuss this matter in great depth with you. But due to the fact that this proceeding is pending before us and there are enormous issues that we are examining here that have been generated by perhaps 100 comments, I would like to defer, if may, in the answer to your question to General Counsel Gordon Gooch and then I will not be at some later date perhaps subject to a motion to be disqualified as a judge to pass on it.

Senator BENTSEN. That will be fine.

Mr. NASSIKAS. Thank you.

Mr. GOOCH. Senator Bentsen, if I may, sir, may I take a step backwards and kind of outline the situation as it exists today so I can relate it to R-441.

Senator BENTSEN. All right. Fine.

Mr. GOOCH. To put it in a nutshell, the conclusion which has to be reached on a review of regulation of wellhead sales of natural gas is that after 18 years of established jurisdiction over the wellhead sales of natural gas by independent producers, and after 11 years of purported regulation based on area rate concepts, there is perhaps only one area in the United States where the producers who sell gas in interstate commerce know for sure what rate they can collect for past or present sales. They do not know what rate they can collect for future sales and even if the Commission has set a policy for future sales, that is subject to change.

In some cases, particular sales may have a floor which would limit adjustment of the rate retrospectively, but in all cases any rate collected by a producer is subject to prospective reduction.

In the decade of the sixties in which the area rate concept was being tested, only one area rate was firmly established in the Permian Basin. In the last 2½ years the FPC has set area rates in the other major producing areas, Southern Louisiana, Texas Gulf Coast, Hugoton-Ana-

darko, and other southwest. Those are an appeal and those producers who sell gas have no way of knowing what price they are going to be selling their gas at in interstate commerce nor do they know what their refund obligations will be, with the uncertainties of requiring people to sell gas in interstate commerce without knowing what they are going to get for the product in the end.

The Commission in 1970 promulgated Docket R-389(a), which included a paragraph 12. In that proceeding the Commission set out to determine on a contract by contract basis in order to impart some certainty to the process under a line of Supreme Court cases that permits a permanent certificate, unconditioned, to set at least a refund floor for the producer.

The Commission then promulgated that rule making and did, in fact, issue a number of certificates for the sale of gas in interstate commerce with a floor, with a certain rate.

In some instances the issuance of the certificates were uncontested. In others they were contested but at the conclusion of the proceeding there was not even an appeal taken from that decision.

Now, in Docket R-441, the Commission has noticed for proposed adoption an optional procedure for issuing permanent certificates for new sales of natural gas in interstate commerce. There is ample authority in both Supreme Court decisions and in Docket R-389(a), as I previously outlined it for the Commission to have proceedings to determine at what rate initial sales of natural gas in interstate commerce should be certificated.

Senator BENTSEN. Let me understand this. The agreement between the producers and the pipeline insofar as prices would still be subject to the FPC approval.

Mr. GOOCH. Yes, sir; and that would depend on the record made in the particular proceeding where the producer and the pipeline tender their contracts for Commission approval and if it went to a hearing a record would be determined as to whether or not the public convenience and necessity required the certification of that particular contract.

Senator BENTSEN. So this is not a total deregulation.

Mr. GOOCH. In my view, it cannot be possibly construed as a deregulation proposal.

Senator BENTSEN. So this is some reaction to the market places but still controlled by the FPC on what the price will be.

Mr. GOOCH. Sir, we are under a positive mandate from the U.S. Courts of Appeals from the Fifth Circuit in the Southern Louisiana rate cases to consider the intrastate market and to consider many of the factors, both supply and demand, which were not a part of area rate decisions in the past.

Senator BENTSEN. Let me understand this, too. This would just apply to new gas reserves that were committed to the interstate market after April 6, 1972.

Mr. GOOCH. Yes, sir. I would call to your attention that under the Supreme Court's decision in the *Permian* case, which validated the area rate proceedings, the Commission is under a positive duty to give producers the opportunity for a hearing to show that the area rate, even as to flowing gas—gas already flowing—is inequitable to them and 441 reflects that. If it is adopted it will not cut off the rights

recognized by the Supreme Court in the Permian case as to special relief for producers of flowing gas where circumstances warrant.

Senator BENTSEN. Thank you very much.

You may recall, Mr. Nassikas, that I filed some comments on rule 441 and those comments contained a study by your chief economist, Don Murry, showing that a rather good competitive market existed between producers and the interstate pipeline companies. Has there been any followup on that study?

Mr. NASSIKAS. Yes. The study has been supplemented not only by Mr. Murry but there are studies by other members of our economic staff also which are reviewing the barrier to entry, how easily can producers enter into the production business, what kind of competition is there, is a market price a fair price considering all economic factors bearing upon it?

Like everything else, Senator Bentsen, while I am familiar, of course, with Mr. Murry's study, I do not want to give the Committee the impression that I am personally of the view that there is absolutely free competition among the producers in all producing areas of the United States.

Senator BENTSEN. Mr. Nassikas, would you say that there is an absence of free competition in the automobile industry, where one company controls about 50 percent of the production in this country, and in this instance, in this study, it showed the average largest producer in any major producing area controlled 16 percent of the market, the largest one in any major producing area was 35 percent.

The four largest producers together on the average comprise 37 percent of the market.

Now, I would like, Mr. Chairman, for the record to include that study.

Chairman PROXMIER. Yes. Without objection, it will be included. (The information referred to follows:)

NOVEMBER 3, 1971.

To: Commissioner WALKER.  
From: Office of Economics.

#### MARKET STRUCTURE OF GAS SALES TO PIPELINES

In response to your request of a market structure analysis of the natural gas industry, the attached tables are summaries of the computer survey of the Form 2 contract data between interstate pipelines and producers by identified production area for the year 1969. These data are summary data from computer runs of sales contracts data by individual procedures to individual pipelines. If more detailed information of the individual companies is of interest, that data is, of course, available from the computer print-out directly.

There is one important limit in observing and utilizing these figures which I should point out. The indicated percent total of non *et al.* contracts indicates the percent of *et al.* contracts which exists. These data thereby show the likelihood that gas sold under *et al.* contracts should be attributed actually to separately identified producers in the top eight producer category. Notably, the Illinois Basin, Texas RR District No. 3, Texas RR District No. 9, and Montana-Dakota had low non *et al.* sales percentages, and the percent of *et al.* contracts could account for considerable amount of gas disguised in this fashion. Fortunately, however, only one of these areas, Texas RR District No. 3, is a very large producing area. To verify the significance or insignificance of the *et al.* contracts to the concentration ratio as calculated by the volumes sales, I have requested informally from the Data Processing Center a listing of all parties listed on *et al.* contracts. If the listing identifies firms that are among the leading percentage producers in the area are selling considerable volumes of gas under *et al.* contracts, say, in the Texas RR District No. 3, then by allocating that gas in accord-

ance with sales contracts could appreciably change the concentration ratio in that area.

I believe these data are especially consistent among production areas: that is, the market power, such as it is, seems to favor the pipelines. For example, in 20 of the 24 producing areas, four pipelines purchased over 75% of the interstate gas sold by producers to interstate pipeline companies. In 19 of the 24 producing areas, four independent producers sold less than 50% of the interstate gas purchased.

I received your request of October 28 concerning comparative data from an earlier time period. We have begun steps for a computer run for another period for which producer sales data should be available. That year hopefully will be 1964.

If I can clarify any of the above comments or any other information, please let me know.

DONALD A. MURRY,  
Chief, Division of Economic Studies.

Attachment.

CONCENTRATION RATIOS FOR INTERSTATE SALES

Production area, non et al. volumes	Concentration ratio—	
	Producer (interstate production)	Purchaser (pipeline interstate purchaser)
<b>Illinois Basin:</b>		
Largest 1 firm.....	9.7	100
Largest 2 firms.....	17.3	
Largest 4 firms.....	29.6	
Largest 8 firms.....	42.9	
Total, percent of non et al. contracts.....		48.1
Total, area volumes sold (thousand cubic feet).....		10,748,559
<b>Mississippi:</b>		
Largest 1 firm.....	12.5	68.7
Largest 2 firms.....	24.3	96.6
Largest 4 firms.....	33.1	99.6
Largest 8 firms.....	45.6	100.0
Total, percent of non et al. contracts.....		63.7
Total, area volumes sold (thousand cubic feet).....		146,265,265
<b>North Louisiana:</b>		
Largest 1 firm.....	7.7	29.6
Largest 2 firms.....	13.6	48.5
Largest 4 firms.....	22.0	79.9
Largest 8 firms.....	30.9	96.1
Total, percent of non et al. contracts.....		59.5
Total, area volumes sold (thousand cubic feet).....		290,284,409
<b>South Louisiana:</b>		
Largest 1 firm.....	11.4	18.3
Largest 2 firms.....	20.2	35.0
Largest 4 firms.....	33.8	60.1
Largest 8 firms.....	54.9	88.3
Total, percent of non et al. contracts.....		90.3
Total, area volumes sold (thousand cubic feet).....		4,930,194,237
<b>East Texas-Arkansas:</b>		
Largest 1 firm.....	13.0	26.8
Largest 2 firms.....	23.0	47.0
Largest 4 firms.....	35.8	79.2
Largest 8 firms.....	50.9	99.7
Total, percent of non et al. contracts.....		74.2
Total, area volumes sold (thousand cubic feet).....		196,688,471

## CONCENTRATION RATIOS FOR INTERSTATE SALES—Continued

Production area, non et al. volumes	Concentration ratio—	
	Producer (interstate production)	Purchaser (pipeline interstate purchaser)
<b>Texas RR. District No. 2:</b>		
Largest 1 firm .....	18.0	34.2
Largest 2 firms .....	26.2	57.4
Largest 4 firms .....	36.7	86.0
Largest 8 firms .....	51.6	99.9
Total, percent of non et al. contracts .....	73.8	
Total, area volumes sold (thousand cubic feet) .....	233,946,458	
<b>Texas RR. District No. 3:</b>		
Largest 1 firm .....	13.9	24.4
Largest 2 firms .....	19.1	48.3
Largest 4 firms .....	27.4	73.7
Largest 8 firms .....	36.1	98.8
Total, percent of non et al. contracts .....	58.5	
Total, area volumes sold (thousand cubic feet) .....	369,923,261	
<b>Texas RR. District No. 4:</b>		
Largest 1 firm .....	16.2	25.0
Largest 2 firms .....	25.5	48.4
Largest 4 firms .....	41.1	66.2
Largest 8 firms .....	58.0	83.7
Total, percent of non et al. contracts .....	87.0	
Total, area volumes sold (thousand cubic feet) .....	817,231,364	
<b>Texas RR. District No. 1:</b>		
Largest 1 firm .....	20.3	88.5
Largest 2 firms .....	33.4	94.7
Largest 4 firms .....	53.5	100.0
Largest 8 firms .....	70.3	
Total, percent of non et al. contracts .....	79.2	
Total, area volumes sold (thousand cubic feet) .....	32,890,129	
<b>Texas RR. District No. 9:</b>		
Largest 1 firm .....	4.6	88.0
Largest 2 firms .....	7.0	100.0
Largest 4 firms .....	10.0	
Largest 8 firms .....	13.0	
Total, percent of non et al. contracts .....	15.0	
Total, area volumes sold (thousand cubic feet) .....	56,493,365	
<b>Texas RR. District No. 10:</b>		
Largest 1 firm .....	35.3	23.4
Largest 2 firms .....	45.8	42.9
Largest 4 firms .....	56.9	70.1
Largest 8 firms .....	70.2	99.2
Total, percent of non et al. contracts .....	95.2	
Total, area volumes sold (thousand cubic feet) .....	612,166,866	
<b>Permian Basin:</b>		
Largest 1 firm .....	15.5	50.1
Largest 2 firms .....	23.9	75.4
Largest 4 firms .....	39.0	96.4
Largest 8 firms .....	58.2	100.0
Total, percent of non et al. contracts .....	91.0	
Total, area volumes sold (thousand cubic feet) .....	1,610,331,394	
<b>Oklahoma Panhandle:</b>		
Largest 1 firm .....	8.6	21.5
Largest 2 firms .....	16.0	41.4
Largest 4 firms .....	28.6	73.6
Largest 8 firms .....	43.1	98.4
Total, percent of non et al. contracts .....	92.2	
Total, area volumes sold (thousand cubic feet) .....	536,619,630	

## CONCENTRATION RATIOS FOR INTERSTATE SALES—Continued

Production area, non et al. volumes	Concentration ratio—	
	Producer (interstate production)	Purchaser (pipeline interstate purchaser)
<b>Oklahoma-Anadarko:</b>		
Largest 1 firm.....	10.1	40.0
Largest 2 firms.....	19.2	57.7
Largest 4 firms.....	29.2	80.6
Largest 8 firms.....	45.6	100.0
Total, percent of non et al. contracts.....	83.7	
Total, area volumes sold (thousand cubic feet).....	285,047,315	
<b>Other Oklahoma-Arkansas:</b>		
Largest 1 firm.....	13.4	61.5
Largest 2 firms.....	20.6	74.2
Largest 4 firms.....	31.4	94.0
Largest 8 firms.....	46.9	100.0
Total, percent of non et al. contracts.....	88.2	
Total, area volumes sold (thousand cubic feet).....	274,003,022	
<b>Kansas:</b>		
Largest 1 firm.....	20.3	42.2
Largest 2 firms.....	34.8	66.4
Largest 4 firms.....	57.4	92.7
Largest 8 firms.....	74.3	99.8
Total, percent of non et al. contracts.....	98.0	
Total, area volumes sold (thousand cubic feet).....	589,575,357	
<b>Appalachian North:</b>		
Largest 1 firm.....	8.3	43.7
Largest 2 firms.....	15.9	61.8
Largest 4 firms.....	28.7	80.4
Largest 8 firms.....	41.8	97.7
Total, percent of non et al. contracts.....	73.9	
Total, area volumes sold (thousands cubic feet).....	11,605,006	
<b>Appalachian South:</b>		
Largest 1 firm.....	13.6	39.7
Largest 2 firms.....	25.5	69.7
Largest 4 firms.....	35.6	91.6
Largest 8 firms.....	44.6	99.5
Total, percent of non et al. contracts.....	94.4	
Total, area volumes sold (thousand cubic feet).....	113,325,762	
<b>Aneth Field:</b>		
Largest 1 firm.....	14.4	100.0
Largest 2 firms.....	27.1	
Largest 4 firms.....	42.6	
Largest 8 firms.....	57.0	
Total, percent of non et al. contracts.....	62.0	
Total, area volumes sold (thousand cubic feet).....	6,952,064	
<b>San Juan Basin:</b>		
Largest 1 firm.....	22.8	100.0
Largest 2 firms.....	39.8	
Largest 4 firms.....	47.3	
Largest 8 firms.....	59.0	
Total, percent of non et al. contracts.....	87.2	
Total, area volumes sold (thousand cubic feet).....	310,819,087	
<b>Uintah-Green River Basin:</b>		
Largest 1 firm.....	18.6	46.1
Largest 2 firms.....	36.0	68.6
Largest 4 firms.....	51.6	97.5
Largest 8 firms.....	68.3	100.0
Total, percent of non et al. contracts.....	98.3	
Total, area volumes sold (thousand cubic feet).....	185,099,956	

## CONCENTRATION RATIOS FOR INTERSTATE SALES—Continued

Production area, non et al. volumes	Concentration ratio—	
	Producer (interstate production)	Purchaser (pipeline interstate purchaser)
<b>Colorado-Julesburg Basin:</b>		
Largest 1 firm .....	47.4	47.4
Largest 2 firms .....	65.5	84.3
Largest 4 firms .....	78.7	99.6
Largest 8 firms .....	90.8	100.0
Total, percent of non et al. contracts .....		92.4
Total, area volumes sold (thousand cubic feet) .....		6,651,947
<b>Montana-Wyoming:</b>		
Largest 1 firm .....	19.8	44.2
Largest 2 firms .....	33.1	75.1
Largest 4 firms .....	45.0	100.0
Largest 8 firms .....	60.4	
Total, percent of non et al. contracts .....		67.9
Total, area volumes sold (thousand cubic feet) .....		78,076,372
<b>Montana-Dakota:</b>		
Largest 1 firm .....	6.3	100.0
Largest 2 firms .....	9.3	
Largest 4 firms .....	11.1	
Largest 8 firms .....		
Total, percent of non et al. contracts .....		11.1
Total, area volumes sold (thousand cubic feet) .....		18,629,850

Senator BENTSEN. Let me ask you another one, Mr. Nassikas. You stated that there should be some tax policies to encourage exploration.

Mr. NASSIKAS. Yes, sir.

Senator BENTSEN. Now, in 1969 the Congress reduced depletion allowance from 27½ percent to 22 percent.

Mr. NASSIKAS. Yes, sir.

Senator BENTSEN. What do you think would be the effect on exploration of a further reduction of the depletion allowance?

Mr. NASSIKAS. I think it will further dry up exploration and development. To me it is rather obvious that the lower the depletion allowance, the less cash there is available to renew the depleted resource; the less exploration and development there will be. So I believe the tax policy is definitely an instrument of energy policy.

Senator BENTSEN. Mr. Nassikas, one other question and then I will be through. You stated that pipelines were not able to satisfy the needs of their customers last winter.

Mr. NASSIKAS. Yes, sir.

Senator BENTSEN. Would you estimate the problems of the forthcoming winter?

Mr. NASSIKAS. Yes. While we have some improvements in renewing storage fields, which have to be renewed in the summer months when the demands are lower, we are keeping a close monitor on that, and while liquefied gas imports will assist, I do not believe that the situation next winter will improve. If anything, I think it will degenerate because of the fact that we do not have large amounts of new gas dedications to the interstate market, and I believe that the situation

will get somewhat worse this winter, although the human needs should be met.

As for interruptible contracts, some of these may have to be interrupted. Some of our cases involving allocating the resource to higher uses should have an impact, but overall we are talking about a devastating gas supply shortage that developed over the sixties and it is going to take a long time to turn around the errors of a decade, in my opinion.

Senator BENTSEN. Mr. Nassikas, I was intrigued by your comments about gasification of coal. I agree with you wholeheartedly that that is one that we should exert further effort on, and research, because it looks like a good basis for substantial dividends in the way of gas supplies.

Mr. NASSIKAS. Yes, sir.

Senator BENTSEN. Thank you, Mr. Chairman.

Chairman PROXMIRE. Chairman Nassikas, we have two other witnesses following. I have a whole series of questions and I am going to ask you to make your responses as terse and limited as you can and then you can elaborate for the record, if you would like.

Mr. NASSIKAS. Yes, sir.

Chairman PROXMIRE. We did have some powerful testimony from able people yesterday against 441.

Mr. Gooch, would you take a look at the transcript of yesterday because I think it was very, very convincing—maybe I am wrong—and give us your view—

Mr. GOOCH. Yes.

Chairman PROXMIRE (continuing). On 441 so we can have a balanced picture.

Chairman Nassikas, is not the increased demand for natural gas due in large measure to the shortage of low sulfur fuels caused by the oil import quota program?

Mr. NASSIKAS. No, sir.

Chairman PROXMIRE. It is not?

Mr. NASSIKAS. No, sir. I happen to endorse the quota system and I did endorse it as a member of the President's Cabinet task force that reviewed the oil import question.

I think, in part, obviously an increase in demand for gas is created by a shortage of low sulfur fuels, but even before you had the shortage of low sulfur fuels there was a shortage of gas.

Chairman PROXMIRE. Oh, yes. I am not saying it is the only reason. I am saying it is not in large measure or significant part, a contributor to this? I would not say it is the fundamental reason but I say does it not contribute to it?

Mr. NASSIKAS. It is a contributor but not significant. This is my view. The oil import program I do not think can be considered as the proximate cause.

Chairman PROXMIRE. Supposing you think about this and maybe when you revise your remarks you will give me some notion of what you mean, whether it is 10 percent, 20 percent, 1 percent.

Mr. NASSIKAS. Yes.<sup>1</sup>

Chairman PROXMIRE. Secondly, how many times in the last 5 years have industrial users with interruptible gas contracts actually had their supplies stopped for a period?

<sup>1</sup> See memorandum to Chairman Nassikas, dated June 26, 1972, p. 143.

Mr. NASSIKAS. Very limited, and I would like to submit an exact estimate for the record.<sup>1</sup>

Chairman PROXMIRE. All right. I am delighted that the Supreme Court decision of yesterday does give you a power you sought, as I understand, a unanimous decision, and the testimony we had yesterday that a differential applying to industrial users would be appropriate and would be something you might consider that might be very helpful in providing the gas facilities necessary for residential users.

Mr. NASSIKAS. On that point I think it is very significant, Mr. Chairman. The further utilization of rate design in order to allocate the resource I agree with.

Chairman PROXMIRE. Do not the existing rate structures which provide lower costs to industrial users work against ordinary consumers who have no alternative but to heat their own homes with gas?

Mr. NASSIKAS. I do not. That is really more complicated than it seems. Some people claim that the residential consumer is not getting fair treatment by subsidizing in effect, the industry. I think a good case could be made for the reverse proposition. It is complicated and it depends on analysis, really, of each system, what its load characteristics are, what its efficiencies are, and I do not think I can generalize my answer to that.

Chairman PROXMIRE. To the extent that lower rates encourage greater use of natural gas it obviously uses this very limited supply and puts the residential user into a disadvantageous position. Would you submit for the record, any statement you may have to contradict that?

Mr. NASSIKAS. I will be glad to.<sup>2</sup>

Chairman PROXMIRE. Is it not true that a trans-Alaskan oil and gas pipeline will provide this Nation with more energy more quickly than would a trans-Canadian pipeline?

Mr. NASSIKAS. You said trans-Canadian pipeline?

Chairman PROXMIRE. I will read it again. A trans-Canadian oil and gas pipeline would provide this Nation with more energy more quickly than would a trans-Alaskan pipeline and then a Canadian gas pipeline?

Mr. NASSIKAS. I do not know the answer to that question. I believe the Interior Department has concluded otherwise. From the standpoint of gas, any gas pipeline that has been proposed informally that our staff has studied would propose to come down Alaska through Canada, of course, with options to the Midwest and to the Pacific Far West, possibly both, generally following the route of the Mackenzie River Valley, and generally again, being available to implement a downstream flow of gas by Canadian sources. But as to whether overall energy would be received faster and in greater quantities by an oil and gas pipeline through Canada, I do not know. I would doubt frankly, because the estimates that I have seen regarding the development of gas alone indicates that you have got to develop that oil resource and develop it fast.

As I understand it, it would take a lot longer to develop an oil pipeline down through Canada but I do not want to judge this one. That is the Department of the Interior's problem.

Chairman PROXMIRE. If you have any information that it would take longer or why, in addition to what the Interior Department has concluded, we would be happy to have it.

<sup>1</sup> See memorandum to Chairman Nassikas, dated June 26, 1972, p. 143.

<sup>2</sup> See report entitled "Competitive Characteristics of the Natural Gas Producing Industry," p. 148.

Why does not the latest estimate of natural gas reserve include the recent offshore Louisiana gas field?

Mr. NASSIKAS. I do not understand that question, sir.

Chairman PROXMIRE. Why does not the latest estimate of natural gas reserves include the recent offshore Louisiana gas field?

Mr. NASSIKAS. Table 4, which I have reproduced as part of my prepared statement, cites that some reserves resulting from drilling in south Louisiana at least are not included because of insufficient data.

In our independent analysis of reserves—while our cutoff date is December of 1970, which would not currently include what was developed after that time—we have every intention of determining the status of gas reserves which will include south Louisiana, but it is simply a question of prohibitions of time and our approach to the problem.

Chairman PROXMIRE. When will that be?

Mr. NASSIKAS. Our entire gas reserve analysis should be finished before the end of this year and if we can possibly examine through an accurate or reliable review of south Louisiana, I would certainly try to include that as part of our analysis.

Chairman PROXMIRE. I hope so. This could make some difference.

Mr. NASSIKAS. Indeed it could.

Chairman PROXMIRE. Do you know why the information to draft a satisfactory environmental impact statement for the offshore Louisiana gas fields was not available? Has not this lack of information contributed to the delay in bringing this gas to market?

Mr. NASSIKAS. That was the December 1971 sale that was stopped by court action. I think that is the one you have in mind.

I want to be responsive to your question but I know that what has stopped the further development of the Gulf has been litigation under NEPA which stopped the December 1971 sale that was badly needed to implement our gas reserves.

Chairman PROXMIRE. You do know the information to draft this statement was not available. It should have been.

Mr. NASSIKAS. I guess I have no insight into the background of it. I will be glad to study it.<sup>1</sup>

Chairman PROXMIRE. If you will do that for the record.

Why does the productive capacity exceed the actual production of natural gas even during peak periods? I understand there is some question as to whether or not the FPC has implemented a decent delivery system.

Mr. NASSIKAS. I would like to respond to that question for the record. I think I know what you have in mind there, but it does require a technical evaluation by the Bureau of Natural Gas and we will submit it, sir.

Chairman PROXMIRE. That is that?

Mr. NASSIKAS. I say it does require technical evaluation by our Bureau of Natural Gas and—

Chairman PROXMIRE. Supply us with that and also supply the Committee with the 55-page analysis by your Bureau of Economics for this hearing.

Mr. NASSIKAS. I would be very happy to.<sup>2</sup>

<sup>1</sup> See Civil Action No. 2397-71, p. 163.

<sup>2</sup> See report entitled "Competitive Characteristics of the Natural Gas Producing Industry," p. 148.

Chairman PROXMIRE. In examining the reserve estimates published by the American Gas Association, we find that most of the decline in reserve additions since 1969 is the result of statistical revisions in the association's own estimates. Moreover, the association has revised reserve estimates down since 1967 while consistently revised estimates up before 1967. Many interested parties are concerned that the Association is creating some of the current gas shortage, although we acknowledge there certainly is a shortage.

Our witnesses yesterday and the committee members agreed the Federal Government needs better information. What are you doing and what do you think we should do to get that information?

Mr. NASSIKAS. I think our National Gas Survey which, of course, is the first comprehensive gas survey conducted by any agency of government is the number one priority and we undertook this survey with funds appropriated by the Congress in December 1970. We started the survey 2 weeks after we received the funds. We are currently conducting an independent evaluation of gas reserves throughout the United States. The U.S. Geologic Survey has undertaken the responsibility for the reserve evaluation of the Outer Continental Shelf, which would include south Louisiana.

We are working on this in conjunction with the staff of the Federal Power Commission. We have a total of over 40 people, experts assigned, geologists, petroleum engineers and others, through the FPC, through the Department of the Interior's Geologic Survey and also some State geologists and academicians, and I want to emphasize that this study is our own independent evaluation. There are no industry members on the committee. The estimates are being made in accordance with procedures which we have outlined in detail, and so far the records that we feel are necessary for our forecast have been made available to us, our staff, on a voluntary basis by the industry.

I expect that that will continue.

Chairman PROXMIRE. Will you give us the names of the members of that Commission?

Mr. NASSIKAS. I will be happy to. I have it with me but it is too extensive to read. We will submit it for the record.<sup>1</sup>

Chairman PROXMIRE. Yesterday a former chairman of the FPC, a man who preceded you by a few years, Lee White, came out publicly for a public corporation in the gas area. He argued such a corporation could develop gas reserves on public lands, give the Government better information on gas supply, and provide healthy competition to private industry. Should, in your view, Congress seriously consider a gas TVA?

Mr. NASSIKAS. I do not believe that a gas TVA will result in the same kind of efficient resource development as our own free enterprise system will under appropriate regulation.

Chairman PROXMIRE. I agree wholeheartedly on the course of the free enterprise system, very, very strongly. I am just wondering if it should be supplemented in this way. After all, we do have the TVA in the public utility field and privately owned public utilities. It seems to me a healthy relationship and most people now feel that TVA was a useful contributor.

<sup>1</sup> See memorandum to Chairman Nassikas, dated June 26, 1972, p. 143.

Mr. NASSIKAS. It was very useful. I fully endorse TVA, but if you remember your history, that was founded primarily to develop an economically depressed region at the bottom of the depression.

Chairman PROXMIRE. Now we have a dramatic need for additional energy resources.

Mr. NASSIKAS. Yes.

Chairman PROXMIRE. Especially in the natural gas area. So the former FPC Commissioner White is suggesting this, I would agree, rather radical move.

Mr. NASSIKAS. I am very divergent in this respect. I think Mr. White believes in extended and expanded Federal bureaucratic controls. I do not. I think we should have Government policies which will enable business enterprise to develop resources, not set up a Government controlled TVA in order to do it. I think it will be inefficient and I do not think it is in the national interest.

Chairman PROXMIRE. My time is up now and I would appreciate it if I could pursue with one other question—yesterday's witnesses were skeptical about being able to predict a relationship between higher gas prices and discovery of additional gas reserves and pointed out that in recent times gas prices have gone up and reserves have declined. I mentioned this in my opening statement, if you will recall. Yet, your basic policy seems to be to establish higher prices as an incentive to increase gas supply.

First, what is your evidence that higher gas prices lead to significant increases in gas supply?

Mr. NASSIKAS. This issue is, of course, pending in south Louisiana, so I would like to generalize rather than get into the specifics of it.

I have a table that I have appended to my prepared statement which shows the drilling statistics for the first quarter of 1972 compared to 1971 and back. It is really premature at this stage to judge on the basis of very sketchy drilling statistics as to whether our policies have effected a turn around in gas exploration and development. Nevertheless, we do find that we have an increase in exploration and development even though very little time has elapsed between our major area rate decisions throughout the United States which are all on appeal to the courts at the present time.

The uncertainties that are involved in any capital commitment where a reviewing court might overturn a decision, of course, have an impact upon whether capital will be committed.

Let me say this, though, Mr. Chairman. The general lease sale of December 1970, in south Louisiana, attracted about \$850 million, just short of a billion dollars. Most of these funds were directed toward the search for gas, although, of course, there was oil there also. The pipeline companies themselves, as a result of policies which were instituted by our Commission in 1970, made advance payments and commitments for the exploration and development in south Louisiana upwards of \$325 million, according to our own staff's analysis.

There are other commitments that have been made by both the pipeline industry and the producing industry in other parts of the United States as a result of our policies, so that I have very little doubt that our policies will in fact, and have in fact, stimulated greater exploration and development than could possibly have been experienced had we adopted the policies of some of my predecessors.

Chairman PROXMIRE. Let me just ask one other question in relation to that same thing. Of course, the price increases we have been talking about and anticipate under less regulation seem to completely disregard the price stabilization program which this committee is very interested in—more extensive hearings in the other committee on the Hill. Mr. White indicated that removing FPC regulation would violate the criteria of the Price Commission for public utility price increases. Two of the major criteria are as follows:

Number 1, the increase must be cost-justified and should not reflect future inflationary expectations.

Number 2, the increase is the minimum required to insure continued, adequate and safe service to provide for necessary expansion to meet future requirements. Are not these criteria directly violated if we make the regulation of new gas sales optional?

Mr. NASSIKAS. Number 1, with reference to Price Commission regulations, we are in process of responding to a letter sent to me by Chairman Grayson suggesting that we consider certain additional guidelines in addition to our policy statement on implementing the economic stabilization measure. That is in process. We hope that within the next few days this will be completed and I certainly will submit it to you.

Chairman PROXMIRE. Will you send us a copy for the record?

Mr. NASSIKAS. Yes, sir.<sup>1</sup> We have not violated the Price Commission regulations and have worked cooperatively with that Commission since it started.

Chairman PROXMIRE. Yes. I asked whether or not it means these two criteria, number 1, that the increase is cost-justified and does not reflect future inflationary expectations; and number 2, the minimum required to assure continued, adequate and safe service to provide the necessary expansions to meet future requirements.

Mr. NASSIKAS. We have, of course, some exceptions with reference to taking a bare cost base situation. As to independent producers, for example, we determine producer rates under our area procedure on a composite basis rather than an individual basis. The small independent producers are exempt from area ceilings and cost considerations.

We believe that our policies, of course, on future inflationary expectations are directly designed to avoid inflation, to stimulate the economy, stimulate employment by having adequate energy resources available to improve the economy and improve productivity.

I will submit to you, Mr. Chairman, as I say, our price regulations and our order and this will set this out precisely.<sup>1</sup>

Chairman PROXMIRE. We would like to receive it.

Senator JAVITS.

Senator JAVITS. Thank you, Mr. Chairman. Senator Percy very kindly offered to waive his time to me. I will take a very short time.

Mr. Nassikas, I am interested in the aspect of your work which relates to the impending heavy reliance upon overseas sources for energy which goes into the foreign relations of the United States with which I am particularly concerned. Indeed, both Senator Percy and I are members of the Foreign Relations Committee. The implications are enormous and the thing that troubles me is this.

<sup>1</sup> See Docket No. R-440, Order No. 451A, issued June 9, 1972, p. 165.

We understand, without disclosing any national secrets, that there is a dependence upon oil as a source of energy, especially from Middle Eastern sources, as you go through this decade and into the next decade. Is that true?

Mr. NASSIKAS. Yes, sir.

Senator JAVITS. This, therefore, involves the energy needs of the country in an unusual degree with the stability of the Middle East and the accessibility of the Middle East through the Mediterranean, does it not?

Mr. NASSIKAS. Yes, sir.

Senator JAVITS. So that there is a critical impact on our country of everything that takes place there, including, for example, the nationalization of oil resources in Iraq, the negotiations of the consortium of oil producing companies of the Middle East with the major oil companies of the world, and the continuing exasperating Arab-Israel struggle; is that correct?

Mr. NASSIKAS. I agree with you, and those are among the reasons that I filed a separate statement along with Secretaries Stans and Hickel on the oil import question.

Senator JAVITS. Mr. Chairman, for the record, may we make a note of that book so we can have access to it?

Chairman PROXMIRE. Yes, indeed. We would like to have that. Will you give that to us?

Mr. NASSIKAS. Yes. What I will do is submit a paperback if I may, to the staff of the Committee and then you will have it. May I do that?

Chairman PROXMIRE. I appreciate this excellent example of economy in Government.

Mr. NASSIKAS. Thank you.

Senator JAVITS. Will you also submit such inserts from that book as part of your testimony, keeping them as brief as possible to show this pyramiding of dependence upon Middle East oil?

Mr. NASSIKAS. Yes, sir.<sup>1</sup>

Senator JAVITS. Under these circumstances I would like to ask you two things that I would like you to explore. One, you say in your prepared statement:

Nuclear facilities during the next 20 years and the breeder reactor thereof will be relied upon to provide a major portion of our prospective energy needs.

The figures I have seen indicate that even in 20 years we cannot look to nuclear power for more than something in the area of 25 percent of our power needs. Now, will you straighten me out on that?

Mr. NASSIKAS. The projected gross consumption of energy in the United States, 1980 to 1990, compared to the present time, which I outlined in a hearing before the Committee on Interior and Insular Affairs of the House on April 19, figure 1 there notes this. In 1971 we relied on coal for 18.3 percent of our total energy.

Senator JAVITS. How much was that?

Mr. NASSIKAS. Coal, 18.3. Gas, 32.9. Oil, 44.2. Hydro, 4.0. Nuclear, 0.6 percent.

In 1980 these percentages increase and I will submit this table.<sup>2</sup> But in 1980 coal becomes 18.9 percent and in total, increases to 18 quadrillion B.t.u.'s compared to 12.6 quadrillion B.t.u.'s. Gas, while it

<sup>1</sup> The information referred to may be found in the committee room files.

<sup>2</sup> The table referred to was not available at time of printing the hearings.

becomes a lesser percentage, 27.9 percent in 1980, nevertheless should increase in its B.t.u. equivalent to 26.5 quadrillion B.t.u.'s. Oil reduces relatively to 40 percent from 44 percent, yet it increases in quantity to 38 quadrillion B.t.u.'s and hydro remains about the same, 3.2 percent of the total.

Nuclear has a substantial increase to ten percent of the total and almost 10 quadrillion B.t.u.'s. 1990 is where you get a tremendous impact of nuclear where nuclear will then comprise 23 percent of our total energy, or 32 quadrillion B.t.u.'s. Hydro is 2.6 percent of the total, remaining relatively constant at 3.6 quadrillion B.t.u.'s. Oil still is responsible, as you say, Senator Javits, for 50 quadrillion B.t.u.'s, 35.7 percent of the total. Gas at 35.7 quadrillion, 25.5 percent. A quick calculation will indicate that petroleum, gas and oil, is still 60 percent of the total in 1990. Coal diminishes to 13.2 percent but still is at 18.5 quadrillion B.t.u.'s compared to 12.6 in 1971.

Senator JAVITS. It is a fact, is it not, that, therefore, this strategic danger to the United States goes right on practically until the end of this century?

Mr. NASSIKAS. That is my opinion. I agree with you.

Senator JAVITS. Naturally we are all deeply interested in accelerating the availability of oil and gas from the North Slope of Alaska and it is critically important because it is cranked into your figures, it is not the answer to this problem.

Mr. NASSIKAS. It is not the answer but it is indispensable to the development of our continental resource base.

Senator JAVITS. I thoroughly agree but I did want to be sure about it being the solution. It is not.

Under these circumstances, therefore, I lead you now to the next point, and that is all that I have. Senator Percy and Senator Proxmire, and my colleague, Congressman Brown, will develop other points.

As you look to the next point "Industry has made increasing commitments of risk capital to develop supplementary gas resources, gas imports, coal gasification, synthetic gas plants, Alaskan and Canadian gas resource development," what I would like to ask you is this. Would you recommend to us what you think we must do governmentally in order to be forehanded about meeting this grave strategic danger which we face of having heavy dependence upon an area of the world in which already we have tremendous notice of instability, and with the absolute forecast of brownouts and blackouts from here in right through the end of this century because of insufficiencies in energy supplies, undoubtedly growing so great as perhaps to jeopardize public health and safety if we do not get on the ball as to other sources?

Now, we know, for example, that some money is being spent on shale near the mountain States, but why, therefore, the statement here that industry has made increasing commitments? What is the role of the United States Government in order to assure its people of some greater sense of security than your own figures show they have any right to have?

Mr. NASSIKAS. As I stated earlier, Senator Javits, I believe that the first imperative of a national energy policy is to concentrate on developing all of our continental resource base, to avoid insofar as may be feasible, increasing reliance on imports from various foreign nations.

I did not mention earlier that the OPEC nations, as we know, are not confined solely to the Middle Eastern countries, so that we cannot concentrate on countries besides the Middle East in order to hedge the risk, so to speak, because Liberia and Algeria, of course, are included. Venezuela is, and then we span the next hemisphere and get to Indonesia and who knows who may become part of the OPEC nations as selling countries with a seller's market for the first time in the history of the petroleum industry, and what will then happen to the reliability of that source of supply?

And a second point that we have to be mindful of is that it is not only the United States that is competing for that energy resource in the Middle East and elsewhere but it is the European Common Market, Japan, and other very advanced technological nations.

So that we concentrate on the development of our energy resource base in the United States and not only expand the development of our fossil fuel resources under the oceans, in deeper horizons than we ever dreamed we might have to go to, recognizing that there may be increases in cost because of less productivity in terms of dollars invested, that we must have tax policies which will endorse and support the policy of developing our continental resource base, and finally, as I said a bit earlier, a research and development program that will expand our energy resources not only for nuclear but other exotic forms in time to meet the growth of our society and as it bears on national security.

Now, I do not want to underestimate Alaska. It is not an answer. But Alaska's potential is about a third of the potential of the entire lower 48 States, according to present estimates for natural gas, and for oil extremely substantial. I cannot give you the exact percentage but it is very high there. And the gas and oil in my opinion, because this is our State, and it is in this Hemisphere, does offer us national security considerations as well as meeting some of our environmental problems through the gas particularly in the lower 48 States.

In 1971, 54 percent of total United States crude oil imports came from OPEC countries.

Now, I do not want to confine that to the Middle East. We have a very small percentage actually, of our crude oil today imported from the Middle Eastern OPEC countries, but your thesis and what I agree with is that this is destined to increase proportionately and I do not think that this is desirable policy from the standpoint of our national security.

Senator JAVITS. Thank you very much. My time is up. I thank Senator Percy for his courtesy.

Chairman PROXMIER. Before I call on Senator Percy, I might say we have two distinguished witnesses with us today. It is a rare privilege for this Committee to have the Chairman of the FPC before us and, therefore, the members who want to continue to ask questions can do so but I hope we can limit it as much as possible.

Senator Percy.

Senator PERCY. Thank you, Mr. Chairman, I have just three questions that I would like to get answers on.

We are facing a crunch and I would like to just reiterate two phases of it, Mr. Nassikas, that you are certainly familiar with.

In your own prepared statement you indicate that we are going to be relying during the next 20 years on nuclear facilities and the

breeder reactor thereafter for a major portion of our energy needs, and yet we do know that nuclear reactors and generating capacity have been growing on line very slowly in the past few years and breeder reactors are a long way from being completed. Where will we be in 20 years if the nuclear program is not advanced on schedule? We are faced with the price of crude oil going up, generating annual payments in the range of \$20 million a year, and our witnesses yesterday estimated we would be paying \$7 to \$8 a barrel in the seventies. Do you believe we should be devoting additional substantial resources to solar energy development, to MHD, to coal gasification and oil shale and other areas of developing energy resources? Are we giving proper priority to those areas now?

Mr. NASSIKAS. Yes. I think coal gasification offers great promise for the near term. I consider the near term 1980, about a decade. When you talk of MHD and solar energy, we are talking of developing these resources really for 50 years and beyond from now. Most scientists say that fusion, for example, could become a reality in anywhere from 40 to 100 years, depending on which scientist you talk to.

We must indeed concentrate on developing our supplementary sources, domestically, and yet when you consider that this year we had 22 trillion cubic feet of gas produced, coal gasification as projected might possibly add a trillion cubic feet 10 years from now.

Gas from Alaska is projected to bring down a trillion cubic feet, 6 to 7 years from now. All of our liquefied natural gas imports that are pending before us for decision by the Commission, primarily from Algeria—there is one from Libya—would be in the order of magnitude of 750 billion cubic feet annually as of about six to seven years from now if the Commission were to certify all projects.

So that I do not want to belittle in any way a trillion cubic feet of gas. It is a lot of gas. At the same time, when you consider the demand which is then projected to reach 35 trillion cubic feet about 6 or 7 years from now, the question is where will we find it and can we get it from secure sources?

I claim that the source of our gas as an energy form is the United States including the Outer Continental Shelf. This is the most prolific, safest, and also probably by far the least expensive expedient for the consumer.

Senator PERCY. In the event you would like to expend your comments, you can probably move on and do it for the record.

Mr. NASSIKAS. If we do develop that nuclear program as forecasted we are heading for a potential disaster. It has got to be developed.

Senator PERCY. The way we are going now do you think we are going to stay on schedule?

Mr. NASSIKAS. We are going to have chronic interruptions in our schedule. I think overall we are going to meet our schedule. Right now we are experiencing very grave problems. Out of 29 nuclear plants which were scheduled to go on line this summer, only one has a full operating license from the AEC. One. And that is about 800 megawatts.

Senator PERCY. I will just limit myself to one further question. It pertains to legislation you have asked us to enact in your prepared statement. Could you explain to us how sanctity of contract legisla-

tion which you do support and ask us to enact would actually work? How would it affect the price and supply of natural gas?

Mr. NASSIKAS. I will say just briefly, because I know your time is limited, and I will submit supplementary remarks, if I may, for the record,<sup>1</sup> that sanctity of contract will, by a congressional act, then assure that a contract once entered into for a dedication of new gas, to the interstate markets will remain firm and cannot be changed by future Commissions.

As it is, under our proposed optional pricing procedure we do not have legal authority to bind a future commission, nor would we attempt to so bind a future commission. So that sanctity of contract will in effect preserve the integrity of a contract that is entered into to dedicate new gas. It should overall result in a lower price than the absence of a sanctified contract would because part of the risk is gone and an element of price is risk, of course.

Then secondly, because the regulatory process is extremely complex, it took 8 years before I became chairman to get one area rate case out of the way. We got the rest completed in two. But it is a cumbersome process. And under sanctity of contract procedures we would be free to determine the level of rates that was needed to attract capital to production investment and exploration without using so-called utility concepts of rate base or cost of service.

We could consider all relevant factors but we would not be chained, so to speak, to a straightjacket of costs which is part of the problem.

Senator PERCY. Thank you very much, Mr. Chairman.

Chairman PROXMIER. Mr. Brown.

Representative BROWN. Mr. Chairman, I am delighted to see our witness before us this morning. I serve on the Interstate and Foreign Commerce Committee of the House and would ordinarily have an opportunity to have exchanges with our witness in the Subcommittee on Communications and Power, but unfortunately, we do not seem in the House to be giving at least in that committee, the attention to this problem which I personally think it deserves, so I am delighted to have this opportunity to visit with you.

With reference to the Alaskan gas availability, the important thing I suppose, is to get that to market where it can be utilized and to get it there in the most efficient way or the least costly way if we are going to make the most beneficial use of it.

One of the things is orienting our markets and our supplies so that they are efficient. What is the situation with reference to the Alaskan gas reserves in that regard?

Mr. NASSIKAS. According to estimates filed with us, about 26 trillion cubic feet of gas in Prudhoe Bay, although there is a little over 31 trillion feet of proved reserves in Alaska.

Now, the potential there is about 327 trillion cubic feet. We have various proposals still in the informal stages. We have no formal application yet before us for an Alaskan pipeline, which would project deliveries of up to a billion or even 2 billion cubic feet daily to mid-western and far western markets. Even if TAPS were finally to get the clearance as the Secretary of the Interior has indicated he intends

<sup>1</sup> The information referred to was not available at time of printing the hearings.

to, and the court dissolves the restraining order, let us say, today, it would still require at least 5 years until gas was flowing to the lower 48 States, in this order of magnitude, say, 2 billion cubic feet daily.

The estimated cost of those projects is \$2½-\$5 billion. The development of the reserves is indispensable in my opinion, to improving our gas resource base which has been depleted. Over the course of the past four years we have produced twice the gas that has been found. We cannot do this indefinitely and we have reached the stage now of curtailments, so that we have got to develop that resource base and national security considerations, of course, are far more favorable in my opinion, coming down from Alaska, even though we go through Canada under a common carrier concept as has been proposed than, shall we say, the importation of gas which has various other considerations that may relate to our national security.

Representative BROWN. You would suggest that we attempt to balance the location of this raw material with the markets, I assume.

Mr. NASSIKAS. I would, Mr. Brown.

Representative BROWN. Let me ask you a little bit about the impact on foreign policy. You mentioned our dependence and the fact that we must assure our supplies domestically. Is it not true that Japan is even more dependent upon outside-its-own-borders fuel sources or power sources than we are?

Mr. NASSIKAS. Yes.

Representative BROWN. Much of the Japanese oil, for instance, comes through the Straits of Singapore from both the Middle Eastern and from the Far Eastern fields.

Mr. NASSIKAS. Japan imports over 90 percent. In fact, I think it is over 95 percent of her energy requirements.

Representative BROWN. One ship every 12 minutes, or every 15 minutes, a tanker, has to go into Japan to keep that operation going.

Mr. NASSIKAS. And Japan, at least from my studies, is attempting to not only increase her developed resources with long-term commitments and the commitment of risk capital to the development of resources in various nations but is also attempting to improve her nuclear capability to have less reliance and this seems to be the trend, incidentally, in the European countries also in the Common Market.

Representative BROWN. Well, for the sanctity of Japan's national being I suppose research in some of these other sources than fossil fuels is most significant but while fossil fuels are still the significant power source it seems to me who controls the Straits of Singapore may very well turn the valve on Japan. Is that not about right? At least, make for less efficient delivery of that oil to Japan.

Mr. NASSIKAS. I would not feel very comfortable if I had a great reliance on oil coming in to that degree into the United States.

Representative BROWN. Well, it might have something to do with our policy and Japanese policy in the Far East and Southeast area. It seems to me if the Russians, for instance, had control of the Straits of Singapore and wanted to bring Japan to its knees from a power standpoint, it could do so. I think a lot of our policy hinges on the fuel supplies that are available and the method by which they are available to some of these countries.

Let me switch to another point. Should we have in the United States some of central body which is determining power policy in all

areas of power such as the Office of Telecommunications Policy attempts to move in the communications field or the Council of Economic or Environmental Advisers attempt to move in those two fields?

Mr. NASSIKAS. I would like to answer that in this way. I stated earlier that I have advocated a National Energy Resources Council which would centralize the decisional authority in an office attached to the Office of the President, similar to the National Environmental Quality Council, under guidelines set forth by the Congress.

Representative BROWN. Will you distinguish between the similarity to the Environmental Quality Council and the similarity to the Office of Telecommunications Policy for me, please?

Mr. NASSIKAS. On telecommunications policy I am not quite certain of the relationship between that policy and, let us say, the Federal Communications Commission. I do not know which overrides which or whether they simply dovetail, so that I really do not feel qualified to comment on your question in those terms.

But I do feel qualified to say that there certainly should be a central decisional authority at the Federal level not only on power matters but I would like to make it broader, on energy matters, because power is simply a secondary use or conversion process of primary energy and you have got to burn something in order to produce the power.

Representative BROWN. Would you suggest that this body have some recommendation possibilities or powers with reference to such things as the efficient use of powers in our society such as the control of building codes so we can get away from some of these glass edifices that have to be cooled in the summer and heated in the winter and are not particularly efficient?

Mr. NASSIKAS. I believe the FPC itself has done some excellent staff studies and our new National Power Survey is going to come out with something more definitive than we have done at the present. Certainly, we can do a great deal more with making recommendations and come out with legislation which will make it mandatory. As we discussed earlier, in building codes, you have certain insulation standards and under FHA funds are insured. There may be as has been done by HUD, which has been mentioned earlier already, some restrictions with regard to conservation. There are a lot of studies that have gone on and we are going to make more, as to how to improve the production and transmission efficiency of power.

In the last decade our efficiencies in powerplants have gone up about 1 percent. In the decade before that they were substantially increased, and in production and transmission we have a very fertile field for the development of conservation practices, more fertile in my opinion, than trying to restrict use by residential consumers.

Representative BROWN. Finally, in that regard, with reference to the environmental problems that are obvious follow-ons to our increasing consumption of power, I assume that you would favor a broad-gauged research effort in such areas as solar energy and magnetohydrodynamics. Is that right?

Mr. NASSIKAS. That is right.

Representative BROWN. And some other areas—

Mr. NASSIKAS. Fusion.

Representative BROWN (continuing). That are less environmentally polluting than the use of fossil fuels.

Mr. NASSIKAS. Yes, sir.

Representative BROWN. If that is done, we are going to have to find the tax resources or some method to do it. It seems to me that relating the tax resource to the consumption of the energy may have some sense and ought to be given at least some consideration; but without getting into that, if there is not the opportunity to make the attack as broad as it ought to be made, I assume from what you have testified that your preference is for continuing concentration in fusion power sources. Is that right?

Mr. NASSIKAS. Fission, to start with, nuclear programs and the fast breeder reactor. Then the next form, I think, in the 21st century is fusion or magnetohydrodynamics or some other direct conversion process. The fuel cell is already in being and the question whether it will be commercially useful we will know next year and fusion offers great promise as an area of power, and also nonpolluting. Efficient up to 90 percent.

Representative BROWN. Can you give us—I would like—I did not see this in your testimony. It may be in there. If it is not I wonder if you would submit to us some kind of analysis, brief—if you can put it in a tabular form it will be very helpful—of the various potential sources of power, the environmental factors involved with those, the costs involved in their development and the time table in terms of the potential accomplishments. I would like to see this because I get varying viewpoints and I would like to have yours as to where we ought to be giving our concentration.

Mr. NASSIKAS. We will submit whatever we have in that time.<sup>1</sup>

Representative BROWN. And sometime when we have more time to talk I would like to know about that.

Mr. NASSIKAS. That is an excellent topic and, of course, the industry I might say, recently through the Electric Research Council and also a research institute which they have established, committed themselves through a unanimous vote of their Board of Directors, as of yesterday and the day before, Edison Electric Institute, to an increased level of spending at a rate of about 0.67 mills per kilowatt hour which translates to about \$90 million of direct research in the year 1973, increasing to over \$100 million after that, and between now and the end of the century a very imaginative program that would commit something like \$28 billion to research and development, all raised through funding by industry with all sectors participating—public, federally owned, cooperative owned, and, of course, the investor-owned utilities.

The funding I know, is a specialized study but I thought I had better mention this, that industry itself is trying to do something about it. I think they should be encouraged, although they may not have the final answer.

Representative BROWN. I believe it comes thoroughly not only from the industry but Government sources. It has been nice to see you. Come see us some time at the Interstate and Foreign Commerce Committee.

Mr. NASSIKAS. I would like to very much.

Representative BROWN. I would love to have you there.

<sup>1</sup> See response entitled "Long Range Prospects for New Power Sources," p. 169.

Chairman PROXMIER. Thank you very much, Mr. Nassikas. We appreciate your testimony. You have been very responsive and helpful and we very much appreciate your testimony here this morning.

(The following information was subsequently supplied for the record by Mr. Nassikas:)

JUNE 26, 1972.

Memorandum to : Chairman Nassikas.

From : Chief, Bureau of Natural Gas.

Subject : Supplement to Joint Economic Committee Hearing.

(1) Question. What is the impact upon natural gas demand of the Oil Import Program in quantitative terms?

Answer. The Oil Import Program probably has little impact upon natural gas demand.

The Oil Import Program places limitations on the flow of foreign crude oil and products into this country. If all energy forms were in adequate supply and all were completely interchangeable, and if the price of all energy forms were subject only to free market competition, and if all other factors were equal, the consequence of the Program would be to increase gas demand to satisfy the energy deficit resulting from the import restrictions on the supply of oil. However, so many other factors are integrally related and involved that in reality the Program affects gas demand very little.

About 53 percent (on a BTU basis) of all oil consumed as fuel in this country is utilized in transportation related fields; only 4 percent of the natural gas is consumed by this sector. Clearly the energy consuming sector most affected by the availability and price of petroleum products is one in which natural gas is non-competitive and in which demand for gas is already very low.

Thus, only 47 percent of the oil in this country is utilized in energy consuming sectors in which gas is a significant competitor. These sectors are examined below.

Electricity generation accounts for 18 percent of the natural gas and only 8 percent of the oil consumed in the country (all percents being expressed on a BTU basis). Gas demand would be decreased if oil could assume a greater role in electricity generation. The Oil Import Program, however, does not influence or prevent this from occurring. Power utilities use residual fuel oil. In most parts of the country, natural gas has a competitive edge over residual fuel oil because of its low price and proximity to markets. In District I (Atlantic states where most residual fuel oil is consumed) residual fuel oil is competitive with gas because of the high pipeline transmission costs incurred by gas. District I, however, is exempt from controls of residual fuel oil imports under the existing Program.

Increased imports of residual oil for power generation could reduce the pressure for additional supplies of natural gas in the Chicago market area and the Los Angeles Basin. However, the pipelines serving these areas already face curtailments. The potential curtailment coupled with FPC efforts to discourage the use of gas for boiler fuel purposes indicate that gas availability for power plants will be supply limited.

If imports of petroleum products or light oil suitable for petrochemical feedstocks were increased there might be some diminution of the demand for natural gas as a petrochemical feedstock. However, this development would be largely limited to new plants designed and built to use liquid feedstocks so the effect of this change would not be felt for several years.

Another large energy consuming sector is the household-commercial category. About 32 percent and 21 percent, respectively, of the gas and oil consumed annually is utilized in this sector. In most cases building contractors are not only concerned with the price or supply of various energy sources. They are interested, however, in cutting expenses. Household gas burning equipment, for example, is about \$200 cheaper than oil burning equipment. Because initial cost is such an important factor in selling a house, the gas burning equipment will probably be installed where practicable. Increased supplies of oil by relaxing restrictions on oil imports will not alter the price of equipment or the attitude of contractors who install gas equipment. Furthermore, gas demand would remain high because of its clean burning qualities and cooking performance. However, greater availability of imported home heating oil, if it remains cheaper than natural gas, could slow the rate of conversion of home heating units from oil to gas.

Over the longer term, increased availability of oil via changes in the Import Program would affect the demand for gas, particularly if it induced lower prices for heating oil. Theoretical demand (that which assumes that supply is unlimited) for gas would, of course, remain unchanged in the absence of stronger price inducements to prefer gas over alternate fuels. However, as long as gas consumption is limited by constraints on supply rather than theoretical demand, the increased availability of oil would assist in meeting the unsatisfied demand for gas without reducing the amount of gas consumed.

Finally, the restriction of oil imports has had a positive effect on the supply-demand deficit. The Import Program represents a domestic exploration incentive. The result of this incentive, namely increased exploration and thus the potential for increased supply, does help to meet gas demand. Without this incentive, supply would probably be less and the gas supply shortfall would be greater. In that respect, the present Program helps to meet demand.<sup>1</sup>

(2) Question. How many times have interruptible customers been shut-off during the 1971-72 heating season? (Tr. 145)

Answer. Although the Federal Power Commission does not compile statistics on the number of times that interruptible customers service is interrupted, it does have on file information as to which pipeline companies have filed curtailment plans (see attachment A).

The Federal Power Commission does not require interstate pipeline companies to submit data on the number of times that interruptible customers service is curtailed. In return for lower gas prices, interruptible customers expect to be curtailed during the colder months when firm customers demand is at a peak.

The volume of interruptible sales has decreased somewhat over the past five years. Because of the present gas shortage, such a decrease would be expected, and it would probably have been greater except for the fact that the past winter was unseasonably mild in most areas.

Anticipated deficiencies for the 1972-73 season, as reported to the Federal Power Commission are listed in Attachment B.

(3) Question. Information on how lower rates to industrials harm the residential user in terms of higher prices, to subsidize industrial use? (Tr. 145)

Answer. Normally, rates for sales of natural gas to large volume industrial users are lower than the unit rates charged to smaller volume residential and commercial customers.

Many factors affect variations in rate levels for different classes of service. Among these are the character of the load, the annual load factor, seasonal or daily variations in the connected load, and variations in "customer" costs such as main, services, regulators and meters, customer service costs, and customer accounting and billing costs. These factors are reflected in the efficiency of utilization of the facilities and manpower which are required to serve the customer. For example, the dollar investment in facilities per unit of gas sold is normally lower for a large volume industrial consumer with a high load factor than with a small volume residential customer who must still have metering and regulation facilities even though he buys a much lower annual volume of gas on a much lower load factor basis. Thus, an industrial customer may pay his full share of all operating and investment costs and still pay a lower unit cost for energy.

The Federal Power Commission jurisdiction over the design of rates is limited to those rates charged by the pipelines to their distribution customers which subsequently resell gas to the ultimate consumer. While this limits the direct market impact which the rate design capabilities of the FPC may have, nevertheless, the Commission has indicated that it is extending every effort to use both its cost allocation and rate design prerogatives to direct the use of gas to the residential and commercial consumer. In Opinion 600-A, the Commission stated "We therefore propose to carry out a searching reappraisal of the question of cost classification and allocation in light of the present increasing need for gas and the current shortage as well as an overall review of rate design. Our purpose will be to arrive at a method of cost classification and allocation and rate design which will produce a strong economic pressure toward a more efficient allocation of our fuel reserves. This will be directed particularly to conserving gas for residential, commercial and other uses for which this clean fuel is greatly needed and discouraging the use of gas for large volume industrial and boiler fuel purposes."

<sup>1</sup> See Supplementary Views of Chairman Nassikas. The Oil Import Question, pp. 369-393.

(4) Question. Would an oil pipeline through Canada take longer than TAPS?

Answer. An oil pipeline through Canada would take longer to approve and build than would TAPS.

The Department of Interior has determined that a delay of 3 to 5 years could be involved if an oil pipeline is built through Canada instead of through Alaska. This estimate is derived from studies conducted in conjunction with the trans-Alaska pipeline environmental impact statement prepared by Interior. The Canadian Minister of Energy, Mines and Resources, Donald S. MacDonald, has stated that the time lag in delivery of oil to United States markets via a Canadian route would be 2 to 4 years.

If court action involving the Alaskan route is completed this year, construction may begin in the spring of 1973. Because approximately three years are necessary to complete the Alaskan pipeline, oil could first begin to flow through TAPS by 1976. This time table will be delayed, of course, if the issue is not settled in the courts this year or early next year.

The most optimistic estimate for delivery of oil via a Canadian route is 1977. The Canadian government could begin to accept applications for a Canadian oil pipeline route by the end of this year. Allowing about one year for the application to be processed and approved, the earliest possible construction date would be in 1974. If the line can be built in 3 years, oil could be delivered in 1977. Because the Canadian route is longer, however, a 4 year construction time is probably more realistic. Thus, oil would most likely begin to flow through a Canadian line in 1978, or two years later than through the Alaskan line.

The two year delay involved with the delivery of oil by the Canadian line is predicated on the assumption that no procedural delays will be encountered. There are attendant problems, however, which might cause additional delays.

Some of these problems are as follows:

(1) There are presently no serious applicants for a Canadian oil pipeline. The major producing companies are heavily committed in time and money to TAPS, and they are proceeding on the assumption that TAPS will be approved. If the courts or Interior decide that the Alaskan line cannot be constructed, a delay will probably be involved while the companies assess the feasibility of a Canadian line.

(2) Agreements will have to be reached between the United States and Canadian governments and the companies. The involvement of a third party may delay the proceedings.

(3) New environmental studies must be initiated to replace the completed and on-going studies associated with the Alaskan route.

(4) In order to better protect their own interests, Canadian natives are not desirous to settle land claims rapidly. This "go-slow" approach is beginning to surface now in discussions of a gas pipeline.

(5) Some economists have questioned whether Canadian capital could finance to the extent required by government policy, both a gas line *and* an oil line.

(6) Court actions to stop the pipeline are possible.

On the positive side, however, many of the delays encountered by TAPS might not be issues for the Canadian line. The Canadian government is proceeding this summer with the construction of a road along the proposed Canadian pipeline corridor even if the oil pipeline is not built. Also, the conservation groups that have opposed and delayed the Alaskan line are strongly supporting the Canadian route as long as appropriate construction safeguards are observed. Some of the data derived from the Alaskan environmental studies would be applicable to the Canadian line.

(5) Question. What was our inputs into the environmental statement on the cancelled December 1971 lease sale? (Supply your court affidavit). (Tr. 149)

Answer. The Commission and staff participated in the following manner:

(1) August, 1971—Received copy of Draft Environmental Statement.

(2) August 25, 1971—Provided comments to Department of the Interior regarding Draft Environmental Statement.

(3) September 8, 1971—Commission letter sent to Rogers C. B. Morton, supporting offshore lease sale.

(4) September 8, 1971—Thomas J. Joyce testified at New Orleans hearings in support of lease sale.

(5) December 14, 1971—Affidavit of T. J. Joyce in support of lease sale filed with U.S. District Court for District of Columbia. (attached)

(6) Question. Why does gas productive capacity exceed production even when gas is in short supply? (Tr. 149)

Answer. In 1970, the Federal Power Commission required, for the first time, reporting of productive capacity as part of the Form 15 reporting schedule. The FPC, API, and A.G.A. all use essentially the same definition of productive capacity for natural gas.<sup>2</sup> The Committee on Natural Gas Reserves of the A.G.A. defines natural gas production capacity at pages 106, 107 and 108 of their 1970 Annual Report entitled "Reserves of Crude Oil, Natural Gas Liquids, and Natural Gas in the United States Productive Capacity as of December 31, 1970". The definition in part is as follows:

"The productive capacity of natural gas from non-associated gas reservoirs is defined by the Committee as the maximum sustainable rate at which existing gas wells completed in such reservoirs can be produced under present conditions to an unlimited market *without specific regard to the capacity of existing surface producing equipment and pipelines or established allocables.* It should be noted that the capacity of a non-associated gas well is considered to be the maximum safe rate at which such well is capable of producing through its producing string of pipe and appurtenant fixed down hole equipment against back pressures usually maintained during the period for which the determination is made. . . . the Committee's concept of productive capacity represents potential production rather than immediate or instantaneous production or open flow potential and is *an estimate of the maximum rate of production which can be obtained at any time and from time to time during the heating season* of the subject year, estimated to extend about ninety days from January 1, *without regard to limitations of markets, transportation and processing facilities.*

Gas, after leaving the well, can only be carried to the market in large volumes through pipelines. Utilization of apparent excess gas capacity would require advance planning. Each proposed use would require special studies involving market demand and existing pipeline facilities serving the geographical area in which the new use is located. Therefore, *productive capacity of natural gas, as used in this report, is not a measure of current availability of gas for consumption, as present available facilities limit the quality of gas that could be produced and transported for use.* Any substantial increase in daily production would require adequate markets and the installation of additional pipelines, compression and other facilities with allowances for the time and material required for such installation.

*It is not expected that gas would be required or produced at full capacity on every day of the heating season, but that such capacity would be available throughout the season in question.*

It should also be noted that the productive capacity of non-associated gas differs greatly from that of associated-dissolved gas in that the first is available throughout the heating season, and the second will not be available *until* oil is being produced at its full capacity." (Emphasis added throughout)

An examination of the definition reveals several important things:

(a) The productive capacity is the capacity to produce at the well head. This does not mean that there are adequate facilities for condensation separation, dehydration, gathering, natural gas liquid removal, mainline pipe capacity, compression or an equitable geographical distribution of well capacity, connecting pipelines and demanding markets.

(b) The maximum productive capacity is available at any time or from time to time during the heating season but, would not be available at the same rate for the entire year. The capability of a well to produce declines as the reservoir depletes and is a function of the state of depletion of the reservoir. This simply means that if you produced a well at full capacity, the capacity would decrease as the reservoir depleted. The amount of the decrease would depend on the rate of production and the size of the reservoir. The definition states that this is the productive capacity estimated to exist the first ninety days from January 1 of a given year and not a capacity rate for the full year.

(c) Associated-dissolved gas production, which accounts for about 22 percent of total gas production, is dependent on the rate of oil production. The MERs

<sup>2</sup> The Gas Supplies of Interstate Pipeline Companies—1970, Federal Power Commission, February 1972, page 55.

set by the states are rates of oil production which result in maximizing the utilization of reservoir energy to obtain the maximum recovery of oil. Since natural gas dissolved in oil, by expansion, is a driving force in oil production and also, gas in solution reduces the viscosity of the oil, gas conservation is essential in oil production. Oil allowables are usually set at rates that result in the minimum production of dissolved gas along with the oil production.

In summary, maximum productive capacity as used by the FPC, A.G.A. and API, is more of an index to compare from year to year than a gauge of excess available gas above that which is being produced.

(7) Question. Supply names of National Gas Survey members, as to reserve analysis program. (Tr. 151)

Answer. Attached is a list of the government employees who have been assigned to serve as members of the independent reserves analysis teams to prepare independent estimates of natural gas reserves.

THOMAS J. JOYCE.

#### MEMBERS OF GAS RESERVES ANALYSIS FIELD TEAMS

*Office of Naval Petroleum and Oil Shale Reserves.*—Messrs. Herb Klemme and Maurice Fishburn.

*United States Geological Survey.*—Messrs. John Ward, Gary Horton, Bud Danenburger, Steinmuller, Davidson, Melancon, McIntosh, Parish, Brian, Jones, and Bennett.

*Federal Power Commission.*—Messrs: Wayne Thompson, James New, Bill Howard, Bernard Karp, George Burgess, Wayne Guest, David Mari, Russell Lindvall, Charles Cook, Fred Wikander, Larry Hamby, Tommie Hillis, Sam Hazou, Dave Maldonado, Frank Olson, John Olson, Frank Baker, Serafin Guevara, James Kilpatrick, David McMunn, Dan Plumb, Larry Mangen, Paul Root, David Craig, Phillip Oakes, Doug Howard, Dennie Fox, Cliff DeLauche, Wilbur Daub, Angel Garcia, Charles Bailey, and Bruce Wamsley.

#### ATTACHMENT A

##### *Curtailment Plans Filed With the Federal Power Commission*

<i>Company</i>	<i>Docket Nos.</i>
1. Bluefield Gas Co.....	RP72-94
2. Natural Gas Pipeline Co. of America.....	RP70-42
3. United Gas Pipeline Co.....	RP71-29 and RP71-120
4. Trunkline Gas Co.....	RP71-100
5. Northern Natural Gas Co.....	RP71-107
6. Granite State Gas Transmission Co.....	RP71-116
7. Michigan Wisconsin Pipe Line Co.....	RP71-117
8. Transcontinental Gas Pipe Line Corp.....	RP72-99
9. Panhandle Eastern Pipe Line Co.....	RP71-119
10. Eastern Shore Natural Gas Co.....	RP71-121 and RP72-21
11. Arkansas Louisiana Gas Co.....	RP71-122
12. Consolidated Natural Gas System.....	RP71-127 and RP72-47
13. Florida Gas Transmission Co.....	RP71-128
14. Cities Service Gas Co.....	RP71-129
15. Texas Eastern Transmission Corp.....	RP71-130
16. Algonquin Gas Transmission Co.....	RP71-131
17. Great Lakes Gas Transmission Co.....	RP71-134
18. Colorado Interstate Gas Co.....	RP72-122
19. Alabama-Tennessee Natural Gas Co.....	RP71-138
20. Mid Louisiana Gas Co.....	RP71-139
21. Shenandoah Gas Co.....	RP71-141
22. El Paso Natural Gas Co. (Southern Division).....	RP72-6
23. Louisiana Nevada Transit Co.....	RP72-13
24. Lone Star Gas Co.....	RP-72-15
25. Texas Gas Transmission Corp.....	RP72-64
26. Southern Natural Gas Co.....	RP72-74
27. Columbia Gas Transmission Co.....	RP72-89

## ATTACHMENT B

## FIRM REQUIREMENT DEFICIENCIES REPORTED BY PIPELINE COMPANIES TO THE FEDERAL POWER COMMISSION STAFF

Company	Firm deficiencies in billions of cubic feet	
	Actual, April 1971 to March 1972	Projected, April 1972 to March 1973
Algonquin Gas Transmission Co.....	2.144	13.483
Arkansas Louisiana Gas Co.....	75.237	149.093
Cities Service Gas Co.....	<sup>1</sup> 38.0	<sup>1</sup> 28.0
Colorado Interstate Gas Co.....	None	1.8
Consolidated Natural Gas System.....	None	<sup>2</sup> 23.853
Eastern Shore Natural Gas Co.....	None	.083
El Paso Natural Gas Co.....	None	33.1
Great Lakes Transmission Co.....	<sup>3</sup> .36	None
Mississippi River Transmission Corp.....	None	6.5
Natural Gas Pipeline Co. of America.....	<sup>4</sup> 83.9	149.8
Northern Natural Gas Co.....	None	<sup>2</sup> 6.262
Panhandle Eastern Pipe Line Co.....		25.5
Texas Eastern Transmission Corp.....	18.66	90.910
Transcontinental Gas Pipe Line Corp.....	88.091	96.16
Trunkline Gas Co.....	43.435	97.599
United Gas Pipe Line Co.....	154.321	348.370

<sup>1</sup> Cities Service Gas Co. describes these as "normal".

<sup>2</sup> Alternate lower figures were also reported.

<sup>3</sup> Deficiency due to mechanical difficulties.

<sup>4</sup> Summertime curtailments.

Note: These figures should not be added because of duplications among companies.

COMPETITIVE CHARACTERISTICS OF THE NATURAL GAS PRODUCING INDUSTRY<sup>1</sup>

## I. STRUCTURE OF THE INDUSTRY

The basic question in assessing an industry's structure is whether a single firm or a limited group of firms within the industry has sufficient economic power relative to the industry as a whole to enable it to exert noncompetitive influences in product markets. The ability to establish prices above a competitive level is perhaps the ultimate test of the degree of noncompetitiveness.

Concentration ratios are frequently used as a partial indicator of market power in industry structure studies. A familiar rule of thumb is that in industries where the eight largest firms have at least 50 percent of the sales, normal, unrestrained market forces are likely to be an insufficient guarantee against the exercise of monopoly power.<sup>2</sup> Such industries are referred to as "structural oligopolies," and may, depending on other factors, require attentive public scrutiny of one form or another in order to assure adequate economic performance consistent with the public interest. Whether intensive control such as price regulation or some lesser measure (e.g., vigilant enforcement of the anti-trust laws) is necessary depends on how "tight" the oligopoly is and the degree to which competitive forces have been subdued by the prevailing structural and behavioral conditions.

While concentration ratios are usually calculated from annual sales or production data, that procedure would not provide a valid measure of market concentration or potential competitiveness in the natural gas production industry. Most interstate gas supplies are sold on the basis of 20 year contracts. Consequently the greater portion of gas production in any given year was

<sup>1</sup> This discussion does not focus on the OEC memorandum referred to in Senator Bentsen's submittal in R-441. I am advised by the author of that memorandum that it was strictly a preliminary report of some statistical information which does not support deregulation recommendations. In the author's final memorandum, dated May 15, 1972, it was clearly stated that "There is an important barrier to workable competition on the purchaser-pipeline side of the market because of weak bargaining incentives: this weakness appears sufficient to preclude competitive performance during shortage periods."

<sup>2</sup> Carl Kaysen and Donald F. Turner, *Antitrust Policy: An Economic and Legal Analysis*, (Cambridge: Harvard University Press), 1965, pp. 26-30.

actually "sold" long before the physical transaction took place. Similarly, neither is the ownership of proved reserves a valid indicator of prospective competition; they too are, for the most part, already "sold." The relevant concentration ratio pertains to the market for available, uncommitted reserves. This is what buyers have to choose from.

The ownership of uncommitted reserves is likely to be more concentrated than ownership of reserves in general. It has been common knowledge in the oil industry that small independent producers generally press for as rapid a rate of output as possible. Because capital is more difficult for these small operators to obtain, money is more costly to them, and they are therefore under greater pressure to obtain as quick a payout as possible. A manifestation of this is the fact that small producers have often opposed agreements for the operation of oil reservoirs as units when they had reason to fear that the larger and wealthier companies, which are typically selected as unit operators, would draw the oil out of the ground too slowly.

While adequate information about the ownership of uncommitted reserves is unavailable, a recent OEC study of new vintage gas contracts dated between 1964 and 1969 demonstrate quite conclusively that the natural gas industry is a structural oligopoly. Table 1 shows the percentage of new gas sold to interstate pipelines in the Southern Louisiana, Permian Basin, and Texas Gulf Coast producing areas, as accounted for by the single largest, four largest, and eight largest producers annually in each area.

The concentration ratios presented here, no doubt, tend to *underestimate* actual market concentration. One obvious problem is that they treat each vintage gas contract as though it represents an individual transaction between a buyer and seller, and it is well known that this is not always the case. It was demonstrated repeatedly in the Southern Louisiana Area Rate Case (AR61-2) that producers often act collectively in both the production and marketing of their product. That is largely attributable to the fact that pipelines require long term, large volume commitments in order to assure service to new or expanding markets. These reserves must be obtained before new capacity is constructed.

As the Staff noted in its brief in AR61-2:

In this connection, the institution of the standard "Operating Agreement" in the oil and gas industry is of particular significance. Under this arrangement operators or agents market a stream of commingled gas which is the output of many producers, rather than packages of individual production. The agreement authorizes the operator to collect and sell the gas for the owner; and the operator makes payment to the owner in proportion to his percentage interest in the commingled stream of gas that is sold to the pipe line.

Under these joint marketing arrangements the pipeline typically enters into identical contracts with each individual producer. An example cited in the Southern Louisiana Case was an application filed by Tennessee Gas Transmission for entry into the California market (Docket Nos. CP63-204, CP64-91, CP63-223, CP64-76). Tennessee was to obtain its gas supply by simultaneously entering into identical gas purchase contracts with some 30 independent producers located in the Katy and Pledger fields in Texas. Among those producers were Humble, Amerada, Atlantic, Pan American, Shell, Sinclair, Mobil, Sun, Texas Gulf, and Tidewater. Despite the fact that independent contracts were involved, this was clearly a joint venture. The concentration ratios presented here treat these contracts as individual, competitive transactions, and that, quite obviously, depicts the industry as being more competitive than it actually is.

A second problem is that by computing concentration ratios on the basis of annual sales we are probably covering too long a period of time.

Under present circumstances it seems doubtful that an interstate pipeline which has decided that there is a need to purchase new reserves will be content or able to sit patiently for 12 months playing one producer off against another. Since there is little evidence to suggest that producers now have to go begging for buyers for lengthy periods of time, gas that was offered for sale at the beginning of the year is, in all probability, gone within less than 12 months. Moreover, as distribution markets grow, gas utility companies will probably attempt to acquire new supplies from the first gas pipeline in the region which is able to commit new supplies at reasonable prices. Therefore, it seems logical to conclude that the true measure of concentration is related to supplies available at the time that a purchase decision is made. Consequently, annual vintage gas sales should be thought of as a minimum estimate of market concentration.

A third reason for believing that the ratios presented here may tend to underestimate concentration is that the percentages reported represent only those volumes sold under "non *et al.*" contracts. To the extent that the large producers were parties to *et al.* contracts the ratios would increase. Preliminary indications are that this may not be a very important factor in Southern Louisiana, but it could be quite significant in other regions where *et al.* sales are a substantial portion of the total. Finally, as mentioned above, since there are reasons to believe that small producers are under greater economic pressure to maximize current cash flow, sales probably tend to overestimate their share of total reserve holdings.

It has been argued by some observers that because large interstate pipelines often reach into more than one producing area, multi-area or national concentration ratios would be more appropriate. That argument seems doubtful in that it ignores certain critical real-world factors that are unique to the natural gas industry. Let us say that a pipeline has gathering facilities in both Southern Louisiana and Texas. Because pipelines are high fixed cost investments there are obvious economic reasons for operating as close to full capacity as possible. If the distribution systems and interstate industrial customers of this pipeline desire more gas and there is additional unused capacity in the Louisiana gathering system while the Texas spur and gathering facilities are fully occupied, Louisiana is the only relevant market. In fact, a geographic subsector may be even more appropriate.

In short, the market structure of this industry is unusual in that proper evaluation requires relatively strict constraints in terms of both time and geography. Areawide annual concentration ratios are therefore likely to produce a significant underestimate of sellers' market power. Rather than a true structural measure, they are, more accurately, minimum base values that require some upward adjustment.

In addition to these annual concentration ratios the OEC study demonstrates the following:

1. In the Permian Basin, Mobil and Humble accounted for nearly  $\frac{1}{3}$  of all the vintage gas sold during the last half of the decade (1965-1969). In addition, while there were 310 vintage gas contracts over these years, 19 of them accounted for over 50 percent of the gas and 7 of these represented 32 percent of the total.

PERCENTAGE OF ALL VINTAGE GAS ACCOUNTED FOR BY THE LARGEST, 4 LARGEST, AND 8 LARGEST PRODUCERS  
IN 3 MAJOR GAS PRODUCING REGIONS<sup>1</sup>

	Southern Louisiana	Permian	Texas Gulf
Largest:			
1965	20.6	70.3	86.6
1966	42.9	22.3	34.4
1967	19.9	43.6	21.3
1968	10.7	14.9	( <sup>2</sup> )
1969	11.1	21.1	21.9
4 largest:			
1965	48.1	76.0	93.0
1966	66.1	57.8	66.7
1967	44.7	52.5	46.3
1968	35.1	36.7	( <sup>2</sup> )
1969	38.4	57.8	62.6
8 largest:			
1965	62.3	80.5	95.9
1966	74.1	71.2	83.7
1967	59.7	58.8	50.5
1968	51.3	56.8	( <sup>2</sup> )
1969	63.7	71.5	71.5

<sup>1</sup> The percentages are calculated from non *et al.* contracts. To the extent that these producers were parties to *et al.* contracts the concentration ratios would be higher.

<sup>2</sup> Not reported because *et al.* contracts accounted for over 80 percent of the total.

2. In the Texas Gulf Coast area, Humble alone accounted for over 30% of the gas sold during the period, and while there were 138 individual contracts, five of these accounted for  $\frac{1}{2}$  of the sales.

3. In Southern Louisiana the top 5 producers accounted for  $\frac{1}{3}$  of all vintage gas sold between 1965 and 1969, and 33 out of more than 400 contracts represented  $\frac{1}{3}$  of the total gas volume.

4. For all three areas combined, Mobil, Humble and Texaco had over 27 percent of the total sales, and 44 out of 853 contracts (or about 5 percent) accounted for 34 percent of all the vintage gas sold to interstate pipelines. Mobil, Humble, and Texaco accounted for over half of these large volume contracts.

The dominant role of the large firms in connection with large volume contracts is particularly significant. Since large volume contracts are the necessary element in constructing new pipeline capacity, one could argue persuasively that in order to assess competitive potential the relevant market should be confined to uncommitted large volume reserves within a given geographic region and within the limited period of time when a pipeline is searching for major new supplies.

Quite obviously then, by almost any measure, the natural gas producing industry is a structural oligopoly. But that in itself does not necessarily mandate price regulation. In their study based on the 1954 Census of Manufactures, Kaysen and Turner concluded that a substantial number of U.S. manufacturing industries were at least equally concentrated.

The basic explanation for natural gas field price regulation in an economy where other industries with similar concentration ratios are not equally regulated stems from the fact that concentration ratios are only one of many elements which determine whether an industry's structure is workably competitive. Furthermore, industry structure is itself only one facet of competitiveness. Established patterns of conduct are at least equally important in determining whether unregulated economic performance will prove acceptable. In summary, concentration ratios are an appropriate starting point; nothing more. An apparent disregard for this fundamental fact has been the fatal flaw in most recent studies supporting deregulation on grounds that there are some unregulated industries with equivalent or higher concentration ratios.

The discussion below sets forth some of the specific reasons why the natural gas producing industry requires special treatment under present economic circumstances.

## II. ECONOMIC ADJUSTMENTS TO PRICE CHANGES

When markets are imperfectly competitive, the process by which supply adjusts to demand and demand to supply is sometimes so slow, inexact, and painful that substantial social costs are imposed. In these instances, government intervention to supplement or even supplant the unregulated price system may be essential even in the absence of obvious monopoly power.

In the past there were occasions when the government restricted prices regardless of industry structure. During World War II various minerals such as non-ferrous metals ran into short supply in the face of mounting demands. That induced the government to clamp a ceiling on their prices and offer bonuses to induce output expansion rather than letting prices rise to market clearing levels. When demand is urgent and increasing and short-run supply is highly inelastic, temporary artificial ceilings may be in order while long-run adjustments are made. This should merit special consideration in the natural gas industry where 20-year contracts entered under crisis conditions would lock-in current market clearing price levels for very long periods of time.

Short-run adjustments in these markets, even in response to substantial price increases, are likely to be small. Our *supply* experience following the Southern Louisiana price increase is consistent with this view, and it seems at least equally clear that *demand* is not price elastic in the short run either.

Demand is inelastic first because the field price is only a fraction of the total cost to ultimate consumers. If an ultimate consumer now pays \$1.00 per Mcf based on a 20¢ field price, a 100 percent increase to producers would result in only a 20 percent total price increase to the ultimate consumer. Under these circumstances, it is extremely unlikely that an increase in field prices will have a proportional impact on final demand.

Additional reasons why gas demand is not likely to be price elastic (especially in the short run) include the following:

(1) Consumers have incurred substantial sunk costs in gas burning equipment. Even if natural gas price increases are substantial, consumers will be unlikely to shift to other fuels if that entails buying new equipment or appliances.

(2) Environmental concerns have placed a special emphasis on burning clean fuel. Many industrial customers will feel that these pressures force them to use gas even at considerably higher prices.

(3) Since alternative fuels (especially oil) are also sold in imperfect markets, an increase in the price of natural gas is likely to spur other energy price

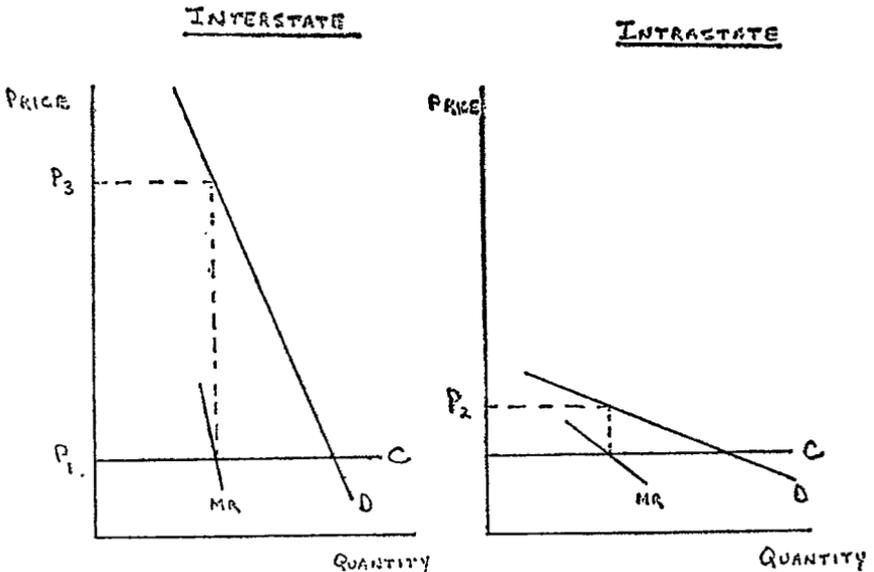
increases. This is, perhaps, particularly evident in what would happen to electric power rates where gas is the basic boiler fuel. These parallel price increases would, in turn, inhibit shifts to likely alternatives, thus sustaining gas demand. For reasons such as these, many observers have concluded that field prices could double or even triple without triggering immediate widespread reductions in the demand for natural gas.

There are similar reasons why the *supply* of natural gas is not likely to be price elastic. A detailed discussion of supply elasticity is presented below in a separate section on the relationship between price and exploration and exploration and development.

### III. INCOME DISTRIBUTION CONSIDERATIONS

Even to the extent that long-run adjustments are feasible, it is by no means clear that deregulation would produce an acceptable long-run result. Deregulation would, most certainly, result in very substantial economic rents to the owners of the better gas producing properties (i.e., where gas is obtainable at less than marginal cost), and this introduces a number of income distribution questions that have no simple or obvious answers. In the absence of a rent tax, price regulation to curtail this "unearned increment" may add more to the sum of total economic welfare than it would diminish welfare by interfering with the competitive pricing system. Which tendency would dominate is largely speculative.

In addition, it is quite logical to expect that unregulated prices would tend to favor *low priority users* with elastic demands over high priority users with inelastic demands. This is already manifest to some degree by the fact that cost differentials do not fully explain the fact that residential gas is priced considerably higher than industrial gas. Unregulated field prices would, no doubt, create a greater burden for economically superior interstate residential users and a lesser burden for inferior intrastate industrial users whose demand functions are likely to be more elastic and who therefore cannot be made to pay as high a price. Consider the following hypothetical illustration.



If C is the cost of providing gas in a market where producers have monopoly power, effective price regulation will set the interstate price at  $P_1$  while the unregulated intrastate price will be set at the maximum profit level,  $P_2$ . If regulation is lifted and profit maximizing monopolistic prices ensue in interstate markets as well (i.e., at the  $P_3$  level where  $MR=MC$ ), clearly interstate buyers will be subjected to the largest price increases.

## IV. INTERINDUSTRY COMPARISONS

It was noted above that while the natural gas producing industry is obviously a structural oligopoly there are a variety of other less regulated industries in our economy with concentration ratios that are probably at least as high. It is argued here that this type of simple comparison grossly overstates the relative competitiveness of the gas industry.

First, most manufactured industrial goods are *durable* and the demands for them are postponable. Natural gas, however, once it is extracted from the ground, is not durable except insofar as adequate storage capacity exists, and demands are not postponable. Consequently, crisis situations in which prices could rise very rapidly tend to be far less common in markets for manufactured industrial goods. Furthermore, in many concentrated industries (e.g., automobiles, primary metals, electrical appliances, machinery, etc.) the producers of new goods must compete with a large supply of second hand goods. Thus, the concentration ratios in manufacturing tend to exaggerate the market power of the producers.

Second, the market structure problem in the natural gas industry is heightened because of the structure of the interstate gas pipeline industry. It has been argued that some of the competitive imperfections of the gas producing industry could tend to be offset by the countervailing market power of their customers, the interstate pipelines. That is simply a false theory. John Kenneth Galbraith, the economist who popularized the countervailing power thesis, was most emphatic in stressing that the concept is inoperative in a period of short supply and rising prices. When a steel company or an automobile manufacturer has a large backlog of orders and can sell all that is produced, it is far less prone to quibble with labor unions over excessive wage demands than when product demand is slack and inventories are piling up. Similarly, pipelines are unlikely adversaries of higher field prices when they can sell all the gas that they can get, and regulatory rules permit them to pass the higher costs on to their customers. Thus, most economists would agree that, during periods of excess demand and short supply, the threat of excessive price increases is strongest in markets characterized by bilateral oligopoly.

Perhaps even more significant is the fact that many pipeline companies have direct or subsidiary interests in the natural gas production business. Since the unregulated price of their own gas would be the same as the market price they establish for purchased gas, it is quite evident that they may have equivocal interests in bargaining hard to hold down the prices paid to independent producers.

If we continue to regulate pipelines under cost of service rules which allow them to set prices based on not only what they purchase but what they produce as well, they may find it quite profitable to expand their own production efforts and to bid up the purchase price in order to increase the realized earnings on their own output. This tendency will be greatest during periods of excess demand, and it will be magnified in the petroleum industry where the taxes on income derived from producing the natural resource are far less than taxes on income earned at other horizontal levels of the product chain.

## V. SUMMARY

The inescapable conclusion drawn from the foregoing discussion is that the natural gas producing industry is not sufficiently competitive to justify deregulation—especially in a period of supply-demand imbalance. *First*, the data available on new vintage gas contracts signed during the late 1960's provide a clear indication that the industry is a structural oligopoly. *Second*, inelastic supply and demand conditions have created a short-run crisis environment in which prices could be forced up very dramatically without a substantial lessening of the supply-demand imbalance. *Third*, two substantial income distribution problems—one involving unearned increments of economic rent and another involving the likely potential for price discrimination in favor of low priority uses—suggest that price regulation, even if it distorts the competitive norm, may add more to total economic welfare than it subtracts. *Fourth*, the natural gas producing industry's potential competitiveness is underestimated by simply comparing concentration ratios with those in manufacturing industries: gas is not a durable good, its demand is essentially non-postponable, there are no second-hand supplies, producers can speculate and force prices up by simply keeping the finite depletable resource underground, and the great bulk of supplies is already sewed up under long-term contracts.

*Fifth*, the bilateral oligopoly that exists in conjunction with the interstate pipeline industry further deteriorates the limited competitive tendencies: the pipelines cannot be expected to be tough bargainers during periods of supply shortage and, in fact, to the extent that they have interests in the production business they may find it to their positive advantage to promote price increases. *Sixth*, the economic history of the petroleum industry is replete with numerous examples of anticompetitive conduct, and a multitude of antitrust complaints.<sup>3</sup> Since the famous 1911 Standard Oil Trust divestiture, the major firms in the industry have conspired to block entry, limit output, and fix prices. In addition they have attempted to enforce illegal full line forcing requirements and they have employed price squeezes against smaller independents. In short, this industry has not exemplified the finer aspects of competitive free enterprise capitalism.

In general, when the opportunity was present, there was a pronounced tendency for the major petroleum companies to act in concert rather than as vigorous independent competitors. Given the fact that, by-in-large, it is these same firms which dominate the natural gas production industry and recognizing the substantial degree of interdependence and jointness of many of their operations, even the most confirmed optimist could be forgiven if he foresaw little chance of workable and effective competition among gas producers. All of these reasons suggest that effective regulation is even *more* essential today than it was during less critical periods in the past.

### *The Relationship Between the Price and Supply of Natural Gas*

Three recent econometric studies have attempted to measure the historical relationship between field prices and the amount of natural gas supplied. Unfortunately, however, none of these provide an adequate basis for estimating *future* supply responses to increases in area rates. The discussion below consists of a brief assessment of the econometric studies by Khazzoom, Erickson and Spann, and MacAvoy, and some general observations on future supply increases.<sup>1</sup> While all of the models discussed have significant deficiencies, this analysis places special emphasis on Khazzoom's work because it is the only study which has received serious consideration in actual rate proceedings. Although his regression results for the 1960's were statistically significant, there are a variety of reasons why his elasticity estimates are inappropriate for projections in the 1970's.

#### THE ECONOMETRIC MODELS

(A) *Khazzoom's Model*.—The so-called "FPC Gas Model" developed by J. Daniel Khazzoom was presented as an exhibit in the Southern Louisiana Area Rate Proceeding (Docket No. AR69-1). This model predicts that substantial increases in the supply of natural gas will occur in response to relatively modest increases in area rates. For example, simulation results indicated that a 5¢ increase over 1969 prices would lead to a doubling of annual new gas discoveries within 10 years, and a 10¢ increase could be expected to induce a quadrupling by 1980.<sup>2</sup>

Perhaps the most serious apparent defect in Khazzoom's study is the fact that his price-quantity estimates are based entirely on actual historical experience in the 1961-1969 period. During these years area rates were, for the most part, held constant. Consequently, *real* prices tended to decline in inverse proportion to general inflationary pressures.

New discoveries, quite predictably, tended to drop off under these conditions. Although this experience is consistent with the general proposition that price and quantity supplied are positively correlated, one should probably not expect that the numerical supply-price relationship would assume the same functional form under conditions of rising real prices. In short, there is little to sup-

<sup>3</sup> See, for example, *Standard Oil of New Jersey v. U.S.*, 221 U.S. 1 (1911); *Standard Oil Co. of Indiana v. U.S.*, 283 U.S. 163 (1931); *U.S. v. Socony-Vacuum Oil Co.*, 310 U.S. 150 (1940); *Standard Oil of California and Standard Stations v. U.S.*, 337 U.S. 293 (1949); *U.S. v. Standard Oil Co., et al.*, Criminal action No. 2197, October 7, 1958, U.S. Dist. Ct., Northern Dist. of Indiana; and *U.S. v. Arkansas Fuel Oil Corp., et al.*, Criminal action No. 3450, May 29, 1958, U.S. Dist. Ct. for Eastern Dist. of Virginia.

<sup>1</sup> A technical illustration which indicates some of the difficulties with Khazzoom's long-run supply elasticity estimates has also been prepared and is available.

<sup>2</sup> Projected increases in Southern Louisiana were more modest than the national estimates due to the more thoroughly developed characteristics of that area as of 1969. It was estimated that a 10¢ increase in Southern Louisiana would roughly double the annual discovery rate after ten years.

port Khazzoom's assumption that rising production and rates in the 1970's would tend to mirror falling production and rates in the 1960's. The other investigators (Erickson-Spann and MacAvoy) avoided making that assumption by deriving their estimates from the experience of the 1950's, but that is also of doubtful value.

A *second* equally serious drawback to using Khazzoom's model for estimating future supply increases (especially if large rate increases are contemplated) is his implicit assumption that the long-run discovery response to higher gas prices is linear. That is, his model implies that a field price increase from 25¢ to 30¢ will have precisely the same long-run incremental impact on discoveries as an increase from 65¢ to 70¢. That assumption along with his stipulation of a negative intercept arbitrarily constrains the outcome in a way that assures price elastic results in the long-run. Coupled with the fact that lagged discoveries are specified as an independent variable in his output model, this creates a seemingly illogical cumulative effect stemming from a single area rate increase. The consequent estimating error will tend to be especially large when contemplated price increases are substantial.

A *third* unsatisfactory feature of Khazzoom's model is his conclusion that the price of oil is a negative determinant of new gas discoveries; i.e., he concluded that higher oil prices result in less gas discovery. The rationalization offered for this apparent statistical curiosity was that directionality in petroleum exploration is so good (and capital markets are so bad) that higher oil prices tend to shift resources out of gas and into oil.

That line of reasoning is imaginative and not implausible given his assumptions about directionality and ineffective capital markets. On the other hand, it seems more likely that rising oil prices and falling gas discoveries were causally independent of each other, or that the causal chain actually ran in the opposite direction. For example, it seems conceivable that real gas prices fell simply because of the imposition of area rate ceilings during a period of price inflation, while oil prices were rising in response to generally rising energy demands. Or, it may be that because gas prices were held constant and output did not grow rapidly, oil demand (and prices) increased more than would have been the case otherwise. In any event, the reasons for the negative statistical relationship between oil prices and gas discoveries are sufficiently tenuous as to cast serious doubt on the value of this parameter in predicting future supply relationships.

A *fourth* problem and one which is important but rather technical, concerns the lagged dependent variable on the righthand side of the estimating equation. The stated rationale for putting it there is unexceptionable; i.e., there would be fewer gas discoveries in year  $n$  if there were no geological information obtained as a result of discoveries made in year  $n-1$ . But in Khazzoom's regression model, which encompasses 21 widely divergent gas producing regions, it seems rather likely that the lagged dependent variable acts primarily as a regional "proxy" instead of fulfilling its intended purpose. This could serve to greatly distort the calculated price coefficients.

*Finally*, Khazzoom's model was admittedly weakest in the matter of estimating "extensions and revisions," and these are a major element in total new reserves. Conceivably extension decisions could be responsive (i.e., elastic) to changes in area price ceilings. At the present time there is no doubt that petroleum exploration in general takes place largely in response to oil prices. If, say, associated gas is expected to be found in a ratio of 2.5 Mcf per barrel of oil and the price of oil is \$4.00 per barrel while gas sells for 25¢ per Mcf, a doubling of gas prices will cause total reservoir value to rise less than 15 percent ( $5.25 \div 4.63 = 1.13$ )—hardly a relationship that would lead one to expect that petroleum exploration activities will respond elastically to gas price increases.

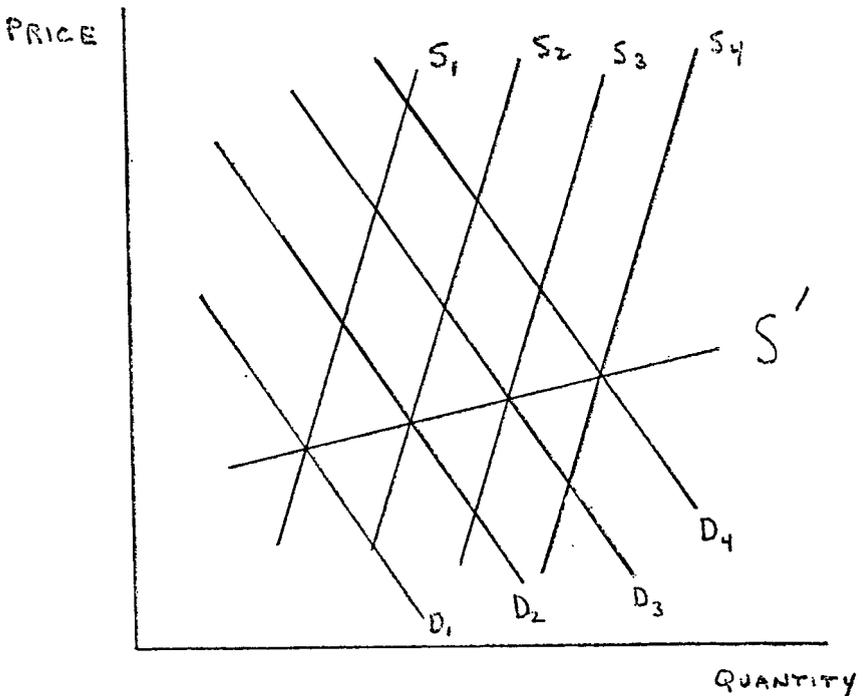
But extensions might be another matter. The decision process is not as heavily dependent on oil values, and therefore could be somewhat more price elastic. The fact that Khazzoom was unable to estimate the price responsiveness of this important element of total supply is disappointing but understandable, given the inadequate industry-supplied data that he had to work with.

(B) *The Other Econometric Models.*—The models constructed by Erickson-Spann and MacAvoy also probably tend to overstate present supply elasticity. These authors, whose studies were based on data from the 1950's, concluded that even in that earlier period supply was not price elastic, and today it is likely to be even less so.

There are several persuasive reasons for believing this. First, during the 1950's there existed a substantial stock of "semi-discovered" reserves which were readily available as demand necessitated. Throughout the years prior to the 1950's oil men were, more often than not, quite disinterested in natural gas discoveries. There were often no pipelines to carry it to urban markets, and when it stood in the way of oil extraction it was frequently flared and destroyed. Yet many gas discoveries were made as an inadvertent consequence of the search for oil. When these reserves were not associated with oil finds they were often simply abandoned.

Subsequently, in the 1950's, when a natural gas market developed and became profitable, oil men had a great deal of preacquired knowledge regarding the whereabouts of major available gas supplies. As a consequence, price increases often prompted relatively easy "new discoveries." But even under these circumstances Erickson, Spann, and MacAvoy found that gas supply was not price elastic (i.e., percentage increases in gas supply were less than percentage increases in price). Because the "semi-discovered" reserves have long since disappeared, these authors have concluded that supplies are likely to be considerably less price elastic today.

A second reason why even these empirical studies may have tended to overstate price elasticity is illustrated below. Assume that during the 1950's as pipeline networks expanded, gas demands increased as from  $D_1$  to  $D_2$  to  $D_3$  and so on. Similarly, assume that the supply function shifted to the right during these same years because of the exogenous technological and market forces which tend to be greatest in the early stages of an industry's growth.



Given these circumstances, it is not unlikely that the actual price and quantity values observed over time tended to fall along a line such as  $S'$  rather than along a true supply price function. If that is so, clearly the elasticity calculations based on actual historical data would tend to be exaggerated for this reason as well.

In addition to these rather apparent reasons for not adopting either of the alternative econometric models to estimate future supply responses to area rate increases, one is also confronted with the fact that the statistical significance of the derived regression coefficients (especially Erickson's and Spann's) was far less than desirable.

In summary, Khazzoom's study is an unacceptable guide to the future because (1) there is little basis for predicting what will happen as a result of price increases in the 1970's from what actually occurred in conjunction with real price reductions in the 1960's; (2) his model was based on an inadequate data base which may have distorted the price-quantity relationship; (3) there is insufficient evidence to conclude that higher oil prices have a negative impact on gas discovery; (4) the inclusion of a lagged dependent variable on the righthand side of the equation tends to serve as a regional proxy, and it distorts the price coefficients; and (5) the model is admittedly inadequate in estimating extensions and revisions. The alternative econometric studies are not really much better since they are based on the 1950's (a period in which the physical availability of natural gas was much different than today), and the statistical significance of the end results is so low as to signal the need for great caution.

#### SOME GENERAL COMMENTS

All this need not signify overwhelming pessimism about our ability to elicit new gas supplies. These econometric models relied exclusively on our historical experience in obtaining "natural" gas from conventional sources. Other alternatives are likely in the future. For example, informed analysts have maintained that substantial synthetic gas supplies are a feasible economic alternative.<sup>3</sup> In all probability substantial efforts in the area of coal gasification and the naphtha opportunities stemming from the impending shift to lead-free gasolines will encourage further progress toward lower SNG costs. In addition, there are several steps which can be taken to "force" or "shift" the natural gas supply curve into a more elastic posture.

The econometric models discussed above simply accepted things as they actually were and tried to measure them. In a nutshell what the authors did was to take a series of gas prices over certain years, along with corresponding quantities of output (i.e., gas discovery), and then find the relevant trend, other things considered. In general, the trends indicate that more gas was forthcoming at higher prices. Whether supply was judged to be elastic or inelastic depends on whether the calculations showed that a price increase produced a big (i.e., more than proportional) or small (i.e., less than proportional) increase in quantity. The suggestion advanced here is that rather than simply accepting all things as they have been there are some steps which can be taken in an effort to induce a more significant response to price increases.

First, supply will tend to become more price elastic if the speculative fervor that now grips the gas producing industry can be suppressed. Even the most cursory review of the recent editions of almost any petroleum industry trade publication demonstrates that "everyone" is anticipating significant increases in the field price of natural gas. While these expectations are now reaching heroic proportions, uncertainty about the long-run stability of area rates has existed for some time. Whether this has been justified or not is not the point. The fact is that, in any event, this situation inevitably reduces supply elasticity.

In technical terms, as long as a producer suspects that the rate of price increase in the future may exceed present interest rates, there will be good economic reasons for him to hold his resource for the future rather than producing and selling it today. For example, if geological information suggests that I may have \$10 million worth of gas deposits on my land at present area rates of 20¢ per Mcf, and I have the option of producing and selling it now and reinvesting the proceeds in an asset or enterprise that will yield a 10% return or holding the gas in anticipation of a 5¢ increase in gas prices for each year that I hold off, I will not find it in my economic interest to sell until the price rises to more than 50¢

<sup>3</sup> See, for example, Irwin M. Stelzer and Charles H. Frazier, "Industry Economics—A Time for Realism by Gas Men," *Public Utilities Fortnightly*, December 23, 1971.

per Mcf.<sup>4</sup> The annual increments from 20¢ to 25¢ to 30¢ and so on will not persuade me as long as I believe that the process will continue—and the analysts will conclude that “the supply is inelastic.”

But if, somehow, my speculative expectations are dampened so that I anticipate only a 3¢ per year gas price increase, I will decide to sell at 30¢. If my anticipation is 2¢ or less, I will sell now at 20¢—and the analysts will conclude that “exogenous factor have prompted an increase in supply elasticity.” In short, as speculative anticipations increase, supply becomes less elastic and as they decrease, it becomes more elastic. Given the chain of events since the Southern Louisiana area rate decision it is not surprising that we have seen little new gas forthcoming.<sup>5</sup> Thus, in order for the area rate approach to be workable, there must be some reasonable degree of confidence (in the minds of producers) that, whatever rate is established, it will be reasonably stable for an appreciable period of time.

In addition to curbing speculation, there are some other government actions which could serve to increase supply elasticity. First, an intensive effort toward the development of economical coal gasification would, if successful, greatly increase supply elasticity. The effect would be to render supply highly elastic at the level of coal gasification costs. Second, a public exploration company could tend to force additional elasticity into the supply market if it were perceived as a serious competitive threat. Even if only limited amounts of gas were produced, public access to geological information on potential reserves could spur new development in the industry. Third, leases for gas exploration and production on public lands could carry more restrictive provisions concerning forfeiture without adequate production.<sup>6</sup>

In summary, the supply of natural gas does not appear to be price elastic. It seems virtually certain that in the short-run prices could rise very substantially without closing the “demand gap.” Looking to the long-run, it appears that an acceptable economic solution depends upon (1) curbing speculative expectations and (2) developing new unconventional gas sources. A more detailed discussion on closing the demand gap is offered below in the concluding section of this analysis.

#### *Why Exempt Independent Gas Producers From Price Commission Control?*<sup>1</sup>

There are at least two significant economic arguments that can be advanced in support of a special Price Commission exemption for FPC regulated natural gas field prices:

1. Field price regulation is based on the area rate concept. This is totally different from the price control approach which is now being implemented by the Price Commission. A system of control based on the profits and costs of individual firms is unworkable and would lead to substantial diseconomies in the natural gas industry. In order to achieve economic efficiency in conjunction with price control, the Price Commission must either establish a special modified system for dealing with gas producers (along with a specialized technical staff to evaluate FPC decision), or it must delegate ultimate authority to the FPC.

<sup>4</sup> In reality, the calculation is more complex than suggested here since I get my \$10 million over, say, 20 years rather than in an immediate lump-sum payment. Consequently, I will actually be in a position to hold the gas even at prices considerably above 50¢. Precisely, I will not sell until

$$\frac{R_1}{1+i} + \frac{R_2}{(1+i)^2} + \dots + \frac{R_{20}}{(1+i)^{20}} > (1+g) \left( \frac{R_1}{(1+i)^2} + \frac{R_2}{(1+i)^3} + \dots + \frac{R_{20}}{(1+i)^{21}} \right)$$

Where R is the annual revenue, i is the interest rate, and g is the anticipated annual rate of increase in area rates.

<sup>5</sup> For example, The Council of Economic Advisers' statements that the FPC has not set gas prices high enough, the FPC's willingness to approve emergency sales at rates considerably above area ceilings, various speeches by government officials which imply that there may be favorable sentiment for higher prices and an end to the area rates concept, and several Congressional bills calling for higher prices and an end to the area rates concept.

<sup>6</sup> It should be noted that, other things equal, bonus bidding tends to be more conducive to supply elasticity than does royalty bidding since the bonus payer has immediate costs and therefore a more pressing need for cash flow. On the other hand if royalty bidding permits more small firms to enter the market, that could induce greater competitiveness culminating in greater production.

<sup>1</sup> This is not intended as a comprehensive analysis of whether Price Commission Control is or is not desirable. The arguments presented here are those which the writer believes would be most effective in advocating an exemption.

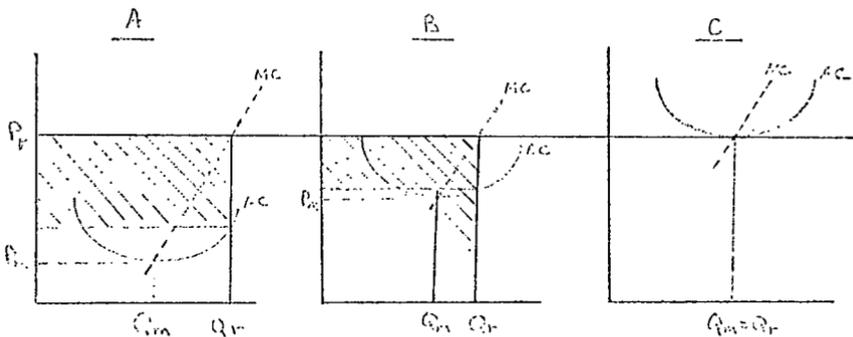
2. Whereas optimal prices in competitive manufacturing or service sectors of the economy are properly based on the cost of production, cost determined prices are not necessarily optimal in the natural gas industry. In general, prices play two roles: (1) they call forth supply, and (2) they ration demand. In most sectors of the economy the simultaneous achievement of optimal supply and demand conditions occurs in such a way that price is clearly based on costs; i.e., when demand grows, scarcity forces prices to rise, which encourages industry growth, which leads to greater output, which restrains price increases. In the long-run prices cannot rise much above costs without triggering this natural chain of events. But in the natural gas industry, where a current shortage condition exists, the finite and depletable nature of the product limits output growth or, at least, permits growth only at higher prices. If actual gas reserves are insufficient as compared to actual demand it may be necessary, in the interest of attracting new supplies and providing for allocative efficiency, to permit an increase in new gas prices to levels that are substantially above those justified by historical average costs.

In short, where normal output expansion at reasonably constant costs is the natural economic response to increased demand, the Price Commission's "cost-plus" pricing approach can be an effective method of price control. But in today's natural gas industry the economic problem entails setting prices that will balance supply and demand. Because gas resources exist in relatively fixed quantities, finding an equilibrium price is a more formidable and complex task than merely matching prices with costs and letting the market mechanism equate supply and demand at that level.

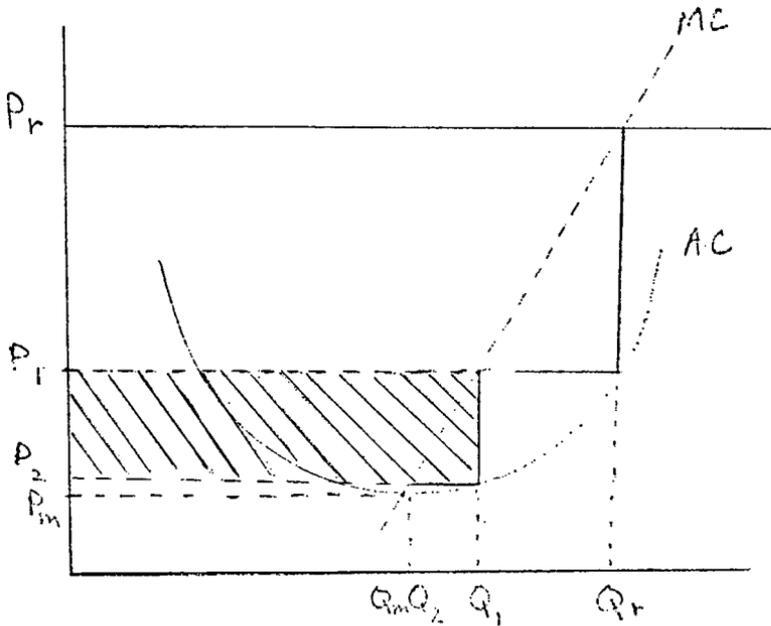
#### AREA RATES

Natural gas, like other natural endowed resources (e.g., soil fertility), exists in broad quality gradations (i.e., ease of extraction). As such, premium earnings are a natural economic phenomenon wherever the resource endowment is exceptionally good.

The area rate approach recognizes this fundamental fact in that it allows all producers, regardless of individual costs incurred, to charge the same ceiling rate. As illustrated below, that will result in relatively high earnings for low cost operators and lower earnings as costs increase.



This series of graphs depicts alternative output results for three gas producers.  $Q_r$  is the amount of gas that will be forthcoming from each producer under an area rate system in which the area rate is set equal to  $P_r$ .  $Q_m$  is the amount that will be supplied if each individual producer is held to a rate that corresponds to cost ( $P_m$ ). Under an area rate system the low cost producers (A and to a lesser extent B) will receive "excessive profits" (i.e., rents) because of the quality (i.e., low cost of extraction) of their resource. But attempts to prevent that windfall will serve to reduce gas production; e.g., if we attempt to reduce A's price down to the average cost level ( $P_1$ ), A will produce only  $Q_1$  quantity of gas in an effort to retain some economic profit (the shaded area); if, subsequently, we reduce price to  $P_2$  (the cost-justified price at output level  $Q_1$ ) he will reduce output to  $Q_2$ , and so on until in the end a stable equilibrium is attained at quantity and price levels  $Q_m$  and  $P_m$ .



Thus, application of Price Commission rules which limit price on the basis of cost would be very tedious if applied on a producer-by-producer basis and, perhaps more importantly, it would serve to hold gas production below the level of output attainable under a system of area rates.

In addition, the Price Commission would have to regulate *all* producers—not just those with annual revenues exceeding \$50 million. In manufacturing and service industries this technique can work, but under present supply-demand conditions in the natural gas industry it will not be effective. If small producers are free of price controls they will be able to sell gas at prices above the cost-justified level. The likely end result will be for the big firms to sell real estate or leases (which are not subject to control) to new small firms at prices reflecting large capital gains, and for these smaller operators to produce and sell gas at whatever price the market will bear.<sup>2</sup>

#### BALANCING SUPPLY AND DEMAND

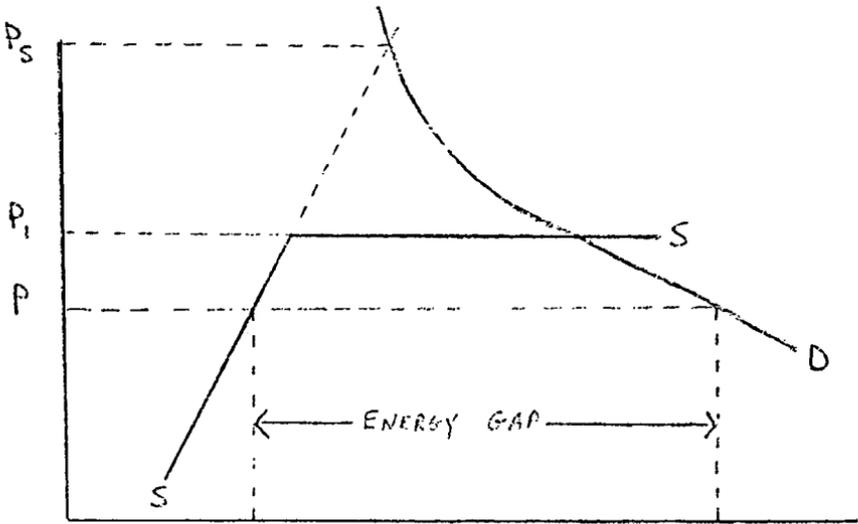
When demand exceeds supply that means that consumers would like to buy more of a given product *at the current price* than there is then available *at that price*. Price is the key. Higher prices will normally tend to rectify the imbalance. First, in competitive markets, price increases will encourage additional production. Second, consumers will tend to demand less of a more expensive product.

In the natural gas industry, the fact that supply and demand both tend to be inelastic under present circumstances indicates that very large price increases may be necessary in order to close the present gap. Empirical research on markets for manufactured goods indicates that for most industries the long run supply curve is horizontal or, given technological advancement, even slightly downward sloping. In the absence of inflation, prices based on historical costs are therefore likely to be sufficient to attract new output as demand grows.

The long-run gas supply function, however, is likely to be quite different; e.g., with the "kink" occurring at the coal gasification price ( $P_1$ ).<sup>3</sup> Historical costs

<sup>2</sup> This scenario does not apply equally to manufacturing industries. If it were attempted, the conversion of the industry into a large number of small operators would stimulate competition. Consequently, no single seller would be able to set prices above costs. As concerns natural gas, the market price will be established along a steeply sloping marginal cost function and substantial profits (rents) will accrue. In the end, the big firms will, no doubt, reap the lion's of the windfall via capital gains on the land and lease sales.

<sup>3</sup> Note that in the short-run the price without regulation could rise to  $P_1$ . Effective regulation, in this case, could provide for a smoother transition to the long-run equilibrium level ( $P_1$ ).



are the key to neither short-run nor long-run equilibrium prices. In the long-run it is probable that an equilibrium will be attained at a price level ( $P_i$ ) which permits large and efficiently produced quantities of synthetic gas. In the interim the Federal Power Commission may want to allow temporary price ceilings that are considerably above levels that would be justified by Price Commission guidelines in order to "weed out" the least urgent demands (i.e., those that would be withdrawn at higher prices), and to provide an incentive for the development of new supplies.

This, of course, was the intent of R-441. Perhaps the general approach described there could be improved by specifying a *precise* "emergency price" ceiling (e.g., 50¢ per Mcf) only for contracts of a *fixed length* (e.g., 5 years) after which automatic abandonment would be granted. This would, in effect, tend to undermine short-term speculation (the deleterious effect of which was discussed in a preceding section). Moreover, it would be significant enough to (1) encourage serious intensive efforts at improving coal gasification technology, (2) redirect a substantial quantity of gas away from economically inferior intrastate markets (as well as subduing inferior interstate demands), and (3) stimulate some additional exploration and drilling—especially offshore. Finally, it would provide some breathing room (time) in which to acquire more complete knowledge about potential natural gas supplies (and extraction costs); it would provide time for the development of efficient SNG alternatives, and it would not necessarily lock consumers into exceedingly high gas prices for unreasonably long periods of time.

But in order to tailor this type of solution to our current shortage difficulties and exemption from Price Commission rules is essential. The prices proposed here are "demand justified" only; they are not "cost justified." In order to solve the critical economic problem in this sector of the economy, we are going to have to look well beyond the confines of historical costs.

#### *The Changing Cost of Energy*

The following table depicts various energy cost trends during the past 12 years. Over this period coal, oil, and gas costs rose moderately, while electricity prices fell until 1968 and then began to increase. Substantial cost increases have occurred in all categories since 1969.

Although it is instructive to compare the price *changes* of the various fuels, great caution and restraint must be exercised in comparing prices directly. That is, while it may be meaningful to observe that light fuel oil costs have increased at a compounded annual rate of 1.9% since 1969 while electricity prices rose at a 5.1% rate, one should *not* conclude that in 1971 electricity costs were six times as high as light fuel oil costs (75 cents per btu as opposed to 480 cents

per Btu). The latter comparison is totally spurious for several reasons. First, electricity costs are those actually paid by the final consumer while light fuel oil costs are calculated from wholesale prices in eight major refinery markets. Before the product actually gets to the consumer, transportation and jobber costs must be added to the total. Second, even after it is delivered to the user electricity and petroleum prices are not directly comparable. A study by Gordon Corey of Commonwealth Edison indicates that space heating customers are able to utilize nearly 100 percent of the electricity Btu's that they purchase, but about 50 percent of the Btu content of oil and gas purchases is lost or wasted in burning. Industrial utilization rates, according to Corey, are even more dramatic: an electric motor utilizes 94 percent of the Btu electric input (perhaps even this could be increased with optimal capacitor installation), while a diesel engine utilizes only 34 percent, and a gas turbine has an efficiency of only 22 percent. Third, the capital costs associated with electricity use are generally much smaller than those required for fossil fuel consumption. For example, while electricity generally is priced considerably higher than natural gas for home heating purposes, it does not entail the costs of a furnace, ducts, pipes, radiators, fans, and pumps. The equipment that the homeowner must purchase is considerably less. This is one of the major reasons why we find that there are large numbers of electrically heated homes in Florida despite high electricity prices. Although electricity costs more than gas or oil, space heating is required on such a limited basis that many consumers have decided that it is more economical to install the least expensive home heating equipment even though its operating cost is higher when in use.

In summary, while it is useful to observe relative cost trends over time, one cannot obtain an accurate measure of the cost of electricity as opposed to other fuel costs from these data. Cross sectional comparisons of a sort are possible between the coal, oil, and gas prices in the first three columns. These are the "as burned" fuel costs in electricity generation. But in order to obtain a realistic picture of interfuel cost differences (including electricity) to the energy using public, more complex calculations are necessary.

	Coal <sup>1</sup>	Wholesale gas <sup>1</sup>	Oil <sup>1</sup>	Crude oil <sup>2</sup>	Heavy fuel oil <sup>2</sup>	Light fuel oil <sup>2</sup>	Retail gas <sup>3</sup>	Electricity <sup>4</sup>
1971-----	\$ 35.7	¢ (30.4)	¢ (39.2)	25.4	49.0	75.3	134	¢ (480)
1970-----	31.1	27.0	36.6	23.8	40.6	73.8	119	445
1969-----	26.6	25.4	31.9	23.1	28.1	72.5	117	434
1968-----	25.5	25.1	32.8	22.0	28.7	71.0	112	433
1967-----	25.2	24.7	32.2	21.8	30.3	70.0	113	443
1966-----	24.7	25.0	32.4	21.6	31.6	65.5	113	445
1965-----	24.4	25.0	33.1	21.4	32.1	65.2	112	457
1964-----	24.6	25.3	32.6	21.5	30.0	62.4	117	469
1963-----	25.0	25.9	33.5	21.7	30.8	66.2	-----	478
1962-----	25.6	26.4	34.5	21.7	31.9	65.7	-----	487
1961-----	25.8	25.1	35.5	21.6	32.4	65.6	-----	492
1960-----	26.0	23.8	34.5	21.6	32.6	63.4	-----	495
1959-----	26.5	22.3	35.2	21.7	32.0	67.1	-----	498

COMPOUNDED ANNUAL RATES OF CHANGE

1971-61----	3.3	1.9	1.1	1.6	4.2	1.4	¢ 2.0	¢ (0.2)
1971-69----	15.9	9.4	6.0	4.9	32.0	1.9	7.0	5.1

<sup>1</sup> National Coal Association, "Steam-Electric Plant Factors," 1959-71, Washington, D.C. This is the average price of coal, oil, and gas (as burned) at major electricity generating plants in the United States.

<sup>2</sup> Independent Petroleum Association of America. Crude oil price data from U.S. Bureau of Mines. Refined product prices based on low quotations from Platt's Oilgram Price Service. Individual product prices weighted as follows: Oklahoma (16.8 percent), Midwestern Group 3 (20.8 percent), New York Harbor (11.2 percent), Philadelphia (4.8 percent), Jacksonville (2.4 percent), Boston (2.4 percent), gulf coast (22.4 percent), and Los Angeles (20 percent).

<sup>3</sup> Based on an average of gas prices to gas heating customers in the following markets: Baltimore, Boston, Chicago, Detroit, New York, St. Louis, Philadelphia, Washington, St. Paul, and Seattle. Data from U.S. Department of Labor, Bureau of Labor Statistics.

<sup>4</sup> Computed from "Statistics of Electric Utilities in the U.S., Privately Owned," FPC, Washington, 1959-70.

<sup>5</sup> Actual 1971 figure was not available. Estimates based on price increases at the major generating plants of: Commonwealth Edison, Philadelphia Electric, Union Electric, and Virginia Electric Power Co.

<sup>6</sup> Actual figures were not available. These are rough estimates based on gas and electricity price increases in the cities listed in footnote 3.

<sup>7</sup> Actual 1971 figure was not available. This is an estimate based on the increase in crude oil prices between 1970 and 1971. See footnote 2.

<sup>8</sup> Rate of change is for years 1971-64.

<sup>9</sup> Rate of change indicates decrease.

IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF  
COLUMBIA

NATURAL RESOURCES DEFENSE COUNCIL, *et al.*, PLAINTIFFS, v. ROGERS C. B.  
MORTON, *et al.*, DEFENDANTS,

Civil Action No. 2397-71

AFFIDAVIT OF THOMAS J. JOYCE IN OPPOSITION TO MOTION FOR PRELIMINARY  
INJUNCTION

CITY OF WASHINGTON }  
District of Columbia } ss:

Thomas J. Joyce, being duly sworn, deposes and says as follows:

1. I am Thomas J. Joyce, Chief of the Bureau of Natural Gas, of the Federal Power Commission.

2. As Chief of the Bureau of Natural Gas, I serve as principal advisor and consultant to the Commission with respect to natural gas matters, including their relationship to the alternative energy resources and the national economy. In addition, I am responsible for directing my staff in work related to processing of applications for certificates of public convenience and necessity, for construction and operation of interstate pipelines and for providing staff work necessary to establishment of rates for sales for resale of natural gas in interstate commerce, including sales by producers to pipelines.

3. Data reported to the Federal Power Commission continues to establish a growing supply problem with respect to natural gas. The FPC requires interstate pipeline companies to submit in an annual report, Form 15, data on gas reserves and deliverability. Deliverability, as used for Form 15 reporting purposes, represents the number of future years during which a pipeline company will be able to meet its annual requirements for its presently certificated delivery capacity from presently committed sources of supply. The availability of gas from these sources of supply is governed by the physical capabilities of these sources to deliver gas, by the terms of existing gas-purchase contracts and limitations imposed by state or federal regulatory agencies. The Form 15 reports cover gas supplies dedicated to interstate markets, a segment comprising approximately two-thirds of all gas produced, and disclose gas reserve data on a reservoir-by-reservoir and field-by-field basis. These Form 15 schedules are available to the public and may be inspected at the Commission's Office of Public Information.

4. The compilation of Form 15 data has been published for each year starting in 1963 in the Commission publication, "The Gas Supplies of Interstate Natural Gas Pipeline Companies." As reported in this publication, for the first time reserves owned or controlled by the interstate natural gas pipeline companies suffered a net decline of 3.4 trillion cubic feet in 1968. Reserves again declined in 1969 by 7.3 trillion cubic feet. Preliminary analysis indicates that interstate reserves declined by about 17.8 trillion cubic feet in 1970.

With respect to deliverability, the January 1970 edition of "The Gas Supplies of Interstate Natural Gas Pipeline Companies" which is prepared under my supervision states:

"The trend of increasingly sharper rates of decline in deliveries occurring earlier in each twenty year projection indicates that the past and present trend of reserve additions is insufficient to offset the declining deliverability of the older reserves and at the same time satisfy rapidly increasing market requirements for extended periods of time. Over the past six years the number of years that scheduled deliveries from year-end reserves were sufficient to meet the presently certificated sales and company use requirements has been declining consistently."

Assuming a continuation of current trends of reserve additions and increasing market requirements, a 10 percent deficiency is indicated in the ability of the interstate pipeline companies to meet requirements on an annual basis as early as 1974. While the level of the deficiency would vary from company to company, it is indicative of a general tightening of supplies. A preliminary analysis of data submitted for 1970 on revisions and additions to gas reserves shows that this trend of declining deliverability has continued.

5. There is constantly increasing evidence that the gas supply situation is worsening. Increasing applications to the FPC for authority to import gas from Canada and other foreign sources along with receipt of several applications

to synthesize natural gas substitutes indicate that domestic demand is not being met by domestic supply. Additionally, numerous gas utility companies have been forced, or expect to be forced, to impose sales restrictions on their customers. Appendix A, attached hereto and incorporated herein by this reference, is a list of nine jurisdictional companies which have indicated a limitation of sales volumes to existing levels in compliance with Commission Order No. 431 in Docket No. R-418. This order provided that where emergency gas purchases are made and/or a curtailment program is instituted, the pipeline should place, or already have in effect, volumetric limitations on sales at current levels.

6. Order No. 431 also directed jurisdictional pipelines to take all steps necessary for the protection of as reliable and adequate service as present supplies and capacities will permit during the 1971-72 heating season and thereafter, including adequate injection into storage. As a result, jurisdictional pipelines have filed curtailment plans with the Federal Power Commission. Some of these have been approved and have become a part of pipeline company tariffs; others are now in hearing, while some are yet to be heard. At the present time, six major interstate pipelines are curtailing deliveries to their customers below their contractual level. These include United Gas Pipeline Company, Transcontinental Gas Pipe Line Company, Arkansas-Louisiana Gas Company, Trunkline Gas Company, Texas Eastern Transmission Corporation, and Algonquin Gas Transmission Company. All but one of these pipelines obtains its supplies of gas primarily from the Southern Louisiana area.

7. Further evidence of the worsening supply situation being faced by the interstate pipelines is provided by the fact that almost three-quarters of a billion dollars have been advanced or committed to producers by the pipelines for the purpose of exploring for and developing new gas reserves. Appendices B and C, attached hereto and incorporated herein by this reference, show breakdowns of this total by pipelines and by major producing areas, respectively. It may be noted that advances for activities in the Southern Louisiana area account for 44.7% of the total.

8. Finally, it should also be noted in this connection that, according to information furnished to the Federal Power Commission and placed in its public files, there is substantial excess capacity in the existing lines in the Offshore Louisiana area. The figures for individual pipeline companies are contained in Appendix D, attached hereto and incorporated herein by this reference, and represent over 90% of the total pipeline footage in the offshore area. Moreover, three of the pipelines shown on Appendix D, Texas Eastern Transmission Company, Trunkline Gas Company and Southern Natural Gas Company, have lines in the immediate area of the lease sale which is the subject of these proceedings. Each of these companies show substantial excess capacity in their existing offshore lines, and it has already been pointed out that two of the three companies mentioned have had to curtail gas deliveries to their customers. The figures for excess capacity are minimum figures, inasmuch as additional compression on the lines would increase their capacity for additional gas.

9. The importance of the Southern Louisiana production area to the nation's natural gas supply position cannot be over-emphasized. In terms of production, this area which contributed about 13 percent of the gas produced domestically in 1956, had increased to about 34 percent of all gas sold in the interstate market by 1970, as shown by Form 15 compilations. Moreover, it is estimated that, in 1970, just over 10 percent of total U.S. oil and condensate production and nearly 11 percent of total U.S. gas production was produced from Federal outer continental shelf waters. About 92 percent of these liquids and 94 percent of this gas was produced from the Federal domain off Louisiana. The major role played by Louisiana's offshore Federal domain is also easily seen in the fact that it contains more than 92 percent of the Nation's 1970 productive OCS acreage, about 78% of 1970 OCS leases and more than 96 percent of 1970 active OCS oil and gas wells.

10. In their quest to alleviate the problem of decreasing gas supplies, several major pipeline companies have developed plans for using new methods of obtaining gas. These methods, which include the importation of liquefied natural gas in cryogenic tankers, conversion of coal and other hydrocarbons into gas and the stimulation of tightly bound reserves in the Rocky Mountains through the use of nuclear energy, are referred to in the trade as supplemental sources, because they are as yet only stopgap or long-term possibilities for easing gas supply problems. Appendix E is a compilation of the projects which have been filed with the Federal Power Commission or announced in the press. The cost of gas produced by these methods will far exceed that which is attributable to gas presently flowing and obtainable by increased drilling in proven areas, such as

Offshore Louisiana. Because of the speculative and long-range nature of these possibilities, and their high cost, they should not be regarded as substitutes for new gas obtained from conventional wells. I believe we should recognize these as supplementary sources and make every effort to develop our indigenous in-the-ground gas reserves.

11. Natural gas is a clean-burning, sulfur-free fuel at the point of combustion. A commercially acceptable device for the removal of sulfur compounds from flue gases is not available, and to date, the best method of controlling emissions of sulfurous pollutants, is to burn low-sulfur fuels such as natural gas. While there is hope that stack devices for the removal of sulfurous pollutants from the flue gases of electric generating plants and other large volume fuel burning equipment may become available in the years ahead, it does not appear promising that such a device will in the near future be developed for individual residential space heating applications. A comparison of pollutants emitted when coal, oil and natural gas are used for residential heating during a representative heating season is given below. These are particularly sobering statistics when it is considered that during 1970 the increase in natural gas residential customers resulting from service to new homes, heating conversions in older homes, and extension of utility gas service to new areas, as reported by the American Gas Association, totaled 922,000.

COMPARISON OF COMBUSTION EMISSIONS IN DOMESTIC APPLICATIONS

[In pounds of pollutant per 150,000,000 B.t.u.]

	Coal <sup>1</sup> (6 tons)	Oil <sup>2</sup> (1,110 gallons)	Gas <sup>3</sup> (150,000 cubic feet)
Oxides of sulfur.....	225	177.0	0.06
Carbon monoxide.....	300	2.0	.06
Oxides of nitrogen.....	48	13.0	17.4
Particulates.....	120-300	8.9	2.85

<sup>1</sup> 1 percent sulfur and 10 percent ash by weight.

<sup>2</sup> 1 percent sulfur by weight; heating value—135,000 B.t.u. per gallon.

<sup>3</sup> Heating value—1,000 B.t.u. per cubic feet.

Thus, inasmuch as the state of present technology still leaves much of the burden for protecting the atmosphere to the utilization of low-sulfur fuels such as natural gas, it is apparent that this premium fuel must be kept flowing in order to stave off the more serious environmental consequences of resorting to less acceptable fuels.

In light of the foregoing, I believe that a postponement of the sale which is the subject of these proceedings would further complicate and aggravate the gas shortage presently being experienced by this country and would cause serious damage to the regulatory efforts which have been made in an attempt to alleviate this national problem.

THOMAS J. JOYCE.

Subscribed and sworn to before me this 14th day of December, 1971.

GILBERT A. MONCOK,  
Notary Public.

My Commission expires October 31, 1972.

UNITED STATES OF AMERICA, FEDERAL POWER COMMISSION

(18 CFR 35.13, 154.63)

Before Commissioners: John N. Nassikas, Chairman; Albert B. Brooke, Jr., Pinkney Walker, and Rush Moody, Jr.

Price Stabilization Criteria, Docket No. R-440, Order No. 451 A

ORDER ESTABLISHING PRICE STABILIZATION CRITERIA AND REQUIRING EXHIBIT

(Issued June 9, 1972)

On March 29, 1972, this Commission issued its Order No. 451 (37 F.R. 6852), establishing price stabilization criteria and requiring filing of a price stabilization exhibit. That order briefly recited the history of Commission actions pursuant

to the Economic Stabilization Act of 1970, as amended, and Executive Order Nos. 11615 and 11627 and the regulations thereunder. The order further points to the fact that on March 17, 1972, the Cost of Living Council amended Part 101—Coverage, Exemptions and Classification of Economic Units, to Chapter 1—Cost of Living Council, in Title 6—Economic Stabilization of the Code of Federal Regulations; and the Price Commission amended Part 300—Price Stabilization, to Chapter III—Price Commission in Title 6 of the Code of Federal Regulations, all set out in 37 F.R. 5700, March 18, 1972. Among other things these amendments added a new Section 300.16a, and called upon individual regulatory agencies to promulgate their own rules for implementing the Economic Stabilization Act in accordance with the criteria set forth in that Section.

The Commission therefore amended its regulations under both the Federal Power Act and the Natural Gas Act to require that all applications for rate increases shall be accompanied by a special Price Stabilization Exhibit. This exhibit was to contain all the necessary information by the Applicant to demonstrate that the filing complies with the intent and purposes of the Economic Stabilization Act of 1970, as amended, Executive Order Nos. 11615, 11627, 11640, and with criteria set out in amendments to the Commission's regulations. The exhibit, related testimony filed, and any rebuttal will be part of the case and will be considered by the Commission in its overall determination as to whether the rate increase should or should not be granted.

On May 10, 1972, Chairman Grayson of the Price Commission sent a letter to Chairman Nassikas of this Commission pointing out that the Cost of Living Council has amended its regulations to, among other things, exempt firms employing fewer than 60 employees from wage and price limitations. Chairman Grayson requested that this Commission delay the effectiveness of its Order No. 451 pending study by its staff and that of the Price Commission of the impact, if any, of the Cost of Living Council's amended regulations on that Order. This Commission is of the view that the change in regulations by the Cost of Living Council is inapplicable because it will not materially affect this Commission's exercise of its regulatory responsibilities.

With regard to Paragraph (A) (b) (4) concerning labor costs, Chairman Grayson pointed out that the "Price Commission policies referred to therein are that, in general, wage or salary increases in excess of 5.5 per cent per annum are not allowable unless the increase is required by a contract which become binding before November 8, 1972, or unless not to allow the excess cost would work an undue hardship on the employer." We are amending our regulations accordingly.

Chairman Grayson also made some observations about Order No. 451, particularly with respect to productivity gains. Specifically on Page 3 of his letter he stated:

1. An "expected" productivity gain is one which a utility is expected to realize over the time periods which a price increase will include. It should be fully taken into account in computing the costs upon which the price increase is based. If, however, a regulatory agency follows a "test year" or similar approach, in which neither productivity gains nor productivity losses are taken into account because the period for cost-accounting purposes is a past, "test," year, in which actual experience is used in place of estimates; and if, in the opinion of the regulatory agency, this approach is reasonably designed to achieve the goals of the Economic Stabilization Act, the inclusion or exclusion of expected productivity gains for price increase purposes may follow the procedure which the agency consistently uses for other cost aspects outside of the "test" year.

2. An "obtainable" productivity gain is one which a utility could obtain if it took reasonable steps to obtain it, consistent with the constitutional and statutory restraints, if any, which might prevent it from taking such steps. A regulatory agency which grants a price increase should accompany the grant of the increase with a finding that, in doing so, it has not allowed the increase to be supported by any costs which the utility evidently could have avoided, or could avoid, by productivity gains that were reasonably obtainable to it, subject to the constitutional and statutory restraints, if any, as aforesaid.

3. In order that utilities might have a financial incentive for discovering new measures to obtain productivity gains and for implementing whatever measures to that end they might have available already, a regulatory agency should, insofar as feasible, allow a utility which has obtained such gains in excess of expectations to retain at least a portion of them in the form of higher profits, for a short time, such as two or three years. The workability of this procedure is, of

course, crucially dependent upon the discretion and expertise of the regulatory agency concerned, and is to be utilized, subject to the agency's judgment. The Price Commission believes that the regulatory policies along these lines would serve the purposes of the Economic Stabilization Program by encouraging efficiency.

This Commission in Order No. 437 (36 F.R. 16902) stated its intention to comply with the policies of the Price Commission. Since this Commission follows a "test year" approach or an approach which adjusts costs and sales consistently and, therefore, reflects productivity gains and losses; and since this approach is, in the opinion of this Commission reasonably designed to achieve the goals of the Economic Stabilization Act, this Commission is in full compliance with the policies of the Price Commission and separation and specific measurement of expected productivity gains for price-increase purposes is neither appropriate nor necessary. With regard to "obtainable" productivity gains, this issue is already subject to Commission examination in rate cases under the test of reasonable costs. Prudence in the optimum utilization of facilities and service is considered in all proceedings, and departure therefrom requires findings as in any other contested issue. Thus, the objective of the Price Commission to offset cost increases to the maximum extent possible with productivity gains is consistent with FPC practice. We recognize that the Price Commission is also concerned with improving the productivity of American industry and labor by developing new techniques where possible. We deem it appropriate that such issues be raised in rate cases, if staff or any party has grounds to do so. We also note that the Price Commission recognizes that utilities should be allowed a financial incentive for implementing, new measures to increase productivity, and we deem it appropriate that such issues be raised in rate cases. In this manner we comply with the Natural Gas Act, the Federal Power Act, the Economic Stabilization Act, and the Administrative Procedure Act. Accordingly, we delete the requirement of filing Statement P(b) (5) and Q(b) (5), as hereinafter indicated.

Chairman Grayson also pointed out that Section 300.16d(3)(5)(c) was designed to supplement the interim criteria which immediately preceded it in the Price Commission's regulations where special circumstances made deviation from those criteria appropriate. Chairman Grayson then pointed out that "since the interim period for which these criteria were intended has now almost elapsed, and since it will certainly have elapsed when the Federal Power Commission makes its Stabilization Program regulations effective, the section mentioned is no longer needed. The Federal Power Commission might therefore consider dropping the section if, in its descretion, it no longer deems the section useful." Order No. 451 refers to this section of the Price Commission regulations in two places, in Paragraph (A) (c) of the Order and sections (B) (c) of the Order. Accordingly, we are deleting that section.

It is appropriate and in the public interest to modify the regulations set out in Order No. 451, primarily to elaborate on what constitutes labor costs under Price Commission policy, and to clarify the use of productivity gains as a criterion for allowing an increase in price. This order supersedes Order No. 451.

*The Commission finds:*

(1) It is appropriate and in the public interest to establish criteria for consideration of whether jurisdictional rate increases are consistent with the Economic Stabilization Act of 1970, as amended, and Executive Order Nos. 11615, 11627 and 11640.

(2) The requirements of 5 U.S.C. § 553 (b) and (c) for notice and hearing do not apply to this order.

(3) In addition, the provisions of 5 U.S.C. § 553 do not apply because notice and public procedure are impracticable and contrary to the public interest in light of the regulations promulgated by the Price Commission at 6 CFR 300.16a pursuant to the Economic Stabilization Act of 1970 as amended.

Pursuant to Sections 202, 205, 206, 301, 304, 307, and 309 of the Federal Power Act (49 Stat. 848, 851, 852, 854, 855, 856, 858; 16 U.S.C. 824a, 824d, 824e, 825, 825c, 825f, 825h) and Sections 4, 5, 7, 8, 10, 14, and 16 of the Natural Gas Act (52 Stat. 822, 76 Stat. 72; 52 Stat. 823, 824, 825, 826, 828, 830, 56 Stat. 83; 61 Stat. 459; 15 U.S.C. 717c, 717d, 717f, 717g, 717i, 717m, 717o), *the Commission orders:*

(A) Section 154.63(f) Part 154—Rate Schedules and Tariffs, of Subchapter E—Chapter I of Title 18 of the Code of Federal Regulations is amended by adding Statement Q as follows:

## STATEMENT Q—PRICE STABILIZATION EXHIBIT

(a) All applications for rate increases shall be accompanied by a special Price Stabilization Exhibit. This exhibit shall contain by cross reference or otherwise all of the necessary information by the applicant to demonstrate that the applicant's filing is in compliance with the intent and purposes of the Economic Stabilization Act of 1970, as amended, Executive Order Nos. 11615, 11627, 11640 and with the criteria as hereinafter set out in (b), except as provided in (c), (d), (e) and (f).

(b) These criteria are as follows:

(1) The increase is cost justified and does not reflect future inflationary expectations

(2) The increase is the minimum required to assure continued, adequate, and safe service or to provide for necessary expansion to meet future requirements.

(3) The increase will achieve the minimum rates of return needed to attract capital at reasonable costs and will not impair the credit of the applicant

(4) The increase does not reflect labor cost increases in excess of 5.5 per cent per annum, unless the increase is required by a contract which becomes binding before November 8, 1972, or unless not allowing the excess cost would work an undue hardship on the employer.

(c) Whenever an applicant is of the opinion that a requested increase is in conformity with the Economic Stabilization Program even though any or all of the criteria in (b) are not met, the exhibit shall:

(1) Set forth the criteria in (b) to the extent possible;

(2) Contain a statement by the applicant justifying its position that the requested increase is in conformity with the goals of the Economic Stabilization Program.

(d) Justification for price increases in conformity with the above criteria shall not be required for price increases resulting from the pass-through of special allowable costs including taxes (except income tax), purchased gas costs, and fuel cost. However, the criteria shall apply to labor cost unless otherwise specified by this Commission.

(e) The requirements for this exhibit shall not apply to any applicant's price increase where the rate base cost of service criteria are not the basis for assessing a price increase under the terms of the Natural Gas Act and the rules, regulations, and orders promulgated thereunder.

(f) Under existing Commission regulations and applicable law rate increases for producers of natural gas are determined on an area basis utilizing, *inter alia*, composite cost data after investigation and study of the various gas producing areas. This practice established by *Area Rate Proceeding, Docket No. AR 61-1, et al.* Opinion No. 468, 34 FPC 159 (1965), and affirmed by the Supreme Court in *Permian Basin Area Rate Cases*, 390 U.S. 747 (1968). Small producers will not be required to file the exhibit since they are regulated under Order No. 428 (36 F.R. 5598, March 25, 1971) and its amendments and will be monitored for Price Stabilization purposes by using reports submitted pursuant to Order No. 428 as amended and Section 154.104 of the Commission's Regulations Under the Natural Gas Act which requires filing of annual statements. Moreover, area maximum rates determined in conformity with the Natural Gas Act and intended to balance all interests are constitutionally permissible according to the U.S. Supreme Court. *Ibid.* Since the Commission will take into consideration the relationship between establishing an area ceiling and national economic stabilization goals in setting area rates, and because of the Price Commission Regulations, Section 300.16 (d) (5), the requirements for filing the Price Stabilization Exhibit shall not apply to producers of natural gas. Staff shall develop Price Stabilization data on a composite basis in all area cases commenced on or before June 1, 1972.

(B) Section 35.13 (b) (4) (iv), Part 35—Filing of Rate Schedules, of Subchapter B—Regulations under the Federal Power Act, as amended, of Chapter I of Title 18 of the Code of Federal Regulations is amended by adding Statement P as follows:

## STATEMENT P—PRICE STABILIZATION EXHIBIT

(a) All applications for rate increases shall be accompanied by a special Price Stabilization Exhibit. This exhibit shall contain by cross reference or otherwise

all of the necessary information by the applicant to demonstrate that the applicant's filing is in compliance with the intent and purposes of the Economic Stabilization Act of 1970, as amended, Executive Order Nos. 11615, 11627, 11640 and with the criteria as hereinafter set out in (b), except as provided in (c), (d), (e) and (f).

(b) These criteria are as follows:

(1) The increase is cost justified and does not reflect future inflationary expectations.

(2) The increase is the minimum required to assure continued, adequate and safe service or to provide for necessary expansion to meet future requirements.

(3) The increase will achieve the minimum rate of return needed to attract capital at reasonable costs and will not impair the credit of the applicant.

(4) The increase does not reflect labor costs increases in excess of 5.5 percent per annum, unless the increase is required by a contract which becomes binding before November 8, 1972, or unless not allowing the excess cost would work an undue hardship on the employer.

(c) Whenever an applicant is of the opinion that a requested increase is in conformity with the Economic Stabilization Program even though any or all of the criteria in (b) are not met, the exhibit shall:

(1) Set forth the criteria in (b) to the extent possible.

(2) Contain a statement by the applicant justifying its position that the requested increase is in conformity with the goals of the Economic Stabilization Program.

(d) Justification for price increases in conformity with the above criteria shall not be required for price increases resulting from the pass-through of special allowable costs including taxes (except income tax), purchases gas costs, and fuel cost. However, the criteria shall apply to labor cost unless otherwise specified by this Commission.

(e) The requirements for this exhibit shall not apply to any applicant's price where the rate base-cost of service criteria are not the basis for assessing a price increase under the terms of the Federal Power Act and rules, regulations, and orders promulgated thereunder.

(C) This order shall supersede Order No. 451, shall become effective ten days after issuance, shall terminate automatically when the price stabilization program is appropriately terminated by Executive Order or Act of Congress, and shall not apply to any cases filed prior to the effective date hereof.

By the Commission.

[SEAL]

KENNETH F. PLUMB,  
*Secretary.*

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#### LONG RANGE PROSPECTS FOR NEW POWER SOURCES

Electric power today is produced principally by steam and hydroelectric plants, accounting in 1970 for 81.9 and 16.4 percent respectively of the total contiguous United States generation. Although hydroelectric power will remain an important factor in the operation of electric power systems, the National Power Survey projects that the hydroelectric generation share will drop to 5.4 percent in 1990, reflecting the fact that most of the best sites are already in use as well as the high costs of new hydroelectric sites. At this time there are no developments in prospect which appear capable of significantly increasing the projected hydroelectric generation share.

Steam power is a category of thermal power generation, where a number of developments have the potential for significantly changing the future power source picture. Nuclear energy is now providing about 2.5 percent of the Nation's electric power supply and is projected by the Power Survey to supply almost 50 percent of the power supply in 1990. The Survey also projects that gas turbine generating capacity will almost equal hydroelectric capacity by 1990. In nuclear power two major developments are being intensively pursued, the fast breeder reactor and the fusion reactor. In fossil fueled generation, the major development efforts are directed to satisfying air pollution requirements with coal fuel and to increasing plant thermal efficiencies from the present maximum of about 42 percent to 50 percent or more. The chief approach for the latter is the use of high temperature "topping cycles", either gas turbines or magnetohydrodynamic (MHD) units, whose waste heat is used in the boilers of conventional steam plants.

There is active development of fuel cells directed toward their large scale application to point-of-use electricity generation. There are also exploratory research programs on the possibilities of large scale use of solar energy and geothermal energy for electricity, based on the very large amounts of energy available from these sources.

Chapter I-9 of the National Power Survey discusses these advanced concepts in some detail. Additional comments on the long range prospects, costs, timing and environmental impact of these concepts are as follows:

#### FAST BREEDER REACTORS

There is a high probability that commercial fast breeder reactors will be available in the mid-to-late 1980s. Total R&D investment by the AEC, the utilities and the manufacturers is now approaching \$1 billion, with an additional amount of comparable size expected to be spent by the time the first demonstration plant is in operation, in the 1980 period.

The significance of the fast breeder reactor is that it conserves uranium resources by extracting 30 times more energy than present reactors from the same amount of ore, at comparable costs, and will meet energy requirements for hundreds of years from presently known ore resources.

Positive FBR environmental impacts are: reduced waste heat discharge as compared to current reactors, and greatly reduced uranium mining requirements. The principal adverse environmental consequence of FBRs appears to be the presence in commerce and industry of large and growing quantities of the highly toxic material plutonium, with some possibility of inadvertent releases to the environment.

#### FUSION REACTORS

There is hope, but not certainty, that within the next decade or two a basic method will be discovered for sustaining a controlled thermonuclear reaction. Research is now concentrated on two processes, magnetic confinement and laser-pellets. Total R&D expenditures to date exceed \$400 million, with budgets now moving toward \$100 million per year.

Based on the experience with fission reactors, the interval between establishment of a basic process for a controlled thermonuclear reaction and the availability of commercial plants would be of the order of fifteen years and would involve the expenditure of billions of dollars. Consequently, commercial fusion reactors are not probable before the turn of the century.

The significance of the fusion reactor is that it can make available almost unlimited energy resources, while greatly reducing the radioactive waste problem.

Fusion reactor specific environmental impacts will not be clear until feasible reactor concepts have been established, but the principal effect will probably be a great reduction in the handling and processing of radioactive materials and in the production of radioactive waste.

#### MAGNETOHYDRODYNAMICS (MHD)

Although the technical principles and feasibility of MHD electricity generation have been demonstrated, much development work remains in the area of high temperature materials and systems to meet utility standards of durability and reliability. Also, assuming success in coal gasification, the steady improvement in gas turbines, should provide combined cycle efficiencies of 50 percent, using coal as the primary fuel. This is the same efficiency that has been the long-time goal of MHD, so there is some uncertainty as to the gains which will accrue from successful MHD development.

Expenditures to date on MHD R&D, including DOD and NASA efforts, are in the area of \$35 million. It has been estimated that another \$100 million will be required, over 5 or 6 years, to complete the basic work needed to design a pilot plant for the open cycle coal burning system. Building and testing the pilot plant would require another 5 years and about \$75 million. Consequently, assuming successful development, commercial MHD systems appear to be at least 15 years away.

The environmental impact of MHD appears to be principally a consequence of the increased cycle efficiency—less waste heat and less fuel required per unit of electricity. Although the high temperature combustion tends to produce more nitrogen oxides, further progress in combustion technology may eliminate this problem.

#### FUEL CELLS

The hydrogen-oxygen fuel cell, in a small size (3 kw), has been intensively developed for the Apollo space program. A joint gas industry-manufacturer program will have spent more than \$40 million by the end of 1972 toward development of a commercial fuel cell module of about 10 kw for residential and commercial application, fueled by natural gas. The basic problems are cost and durability. Space fuel cells cost in the area of \$30,000 per kw, but this must be brought well below \$1,000 per kw for commercial use, including the reformer needed to produce hydrogen fuel from natural gas. Although test installations are in operation, no estimates are available on the date when commercial models may be offered, or the additional cost to reach that point.

The significance of successful commercial fuel cells is in providing high efficiency conversion of fossil fuels to electricity and using piped gas distribution of energy to the point of use, instead of distribution by wire.

The environmental impact of fuel cells would include reduced central station capacity requirements, reduced electric transmission and distribution requirements, reduced fuel resource requirements, but increased requirements for facilities to produce gas from primary energy sources.

#### SOLAR POWER

Solar cells have been highly developed for space use but are far too expensive for commercial power use, with costs of the order of \$100,000 per kilowatt, without the necessary interconnecting wiring and equipment. Solar power research for terrestrial use includes work on lower cost photo voltaic cells, on selective heat absorbers which can produce temperatures high enough for reasonable heat engine efficiencies and on photo-synthesis of combustible organic materials (algae-methane) which could be used in conventional power plants. There is also some conceptual study of large orbiting solar collectors in space, transmitting power to earth by microwaves or lasers.

R&D expenditures for solar power total somewhere between \$50 and 100 million, almost all for space applications. The current R&D level is in the neighborhood of \$5 million/year.

The basic problem in utilizing solar energy to supply large quantities of power is its relatively low intensity, requiring approximately 10 square miles of collecting area in full sunlight to produce 1,000 MW of power, and the occurrence of night and cloudy periods when no power would be available. It is almost certain that none of the schemes now being studied could attain commercial usefulness in less than 20 years, with a longer period more probable. Development expenditures for a promising concept could be expected to be in the many hundreds of million of dollars.

Until specific solar power systems have been well defined, it is difficult to predict environmental impacts. However, the large land areas required which would be shaded by the solar collectors certainly would have some adverse effects.

#### GEOTHERMAL POWER

Use of geothermal heat to produce electric power has long been practiced in favorable areas. In the Geysers area of California, commercial use of dry steam will reach 600,000 kw by 1975. However, such natural steam areas are very limited, and the large scale use of geothermal power depends on the development of techniques to utilize the more abundant areas having high thermal capabilities at reasonable depths, but which lack the natural steam characteristics. Even with such techniques, it appears that the major sources would be in the western United States and could provide only a limited share of the electric supply.

Geothermal power research is currently at a level of about \$1 million per year, with projected expenditures rising to \$4-5 million per year within the next few years. It is reasonable to expect that a commercial demonstration of power production from one of the non-steam geothermal sources will be made within 10 to 20 years but, as noted, this would not indicate that large scale use of geothermal power would then take place.

The environmental impact of geothermal power, as with other power sources, depends on the specific system. For example, systems which use the heat of underground brine reservoirs will have to deal with the problems of brine disposal and surface subsidence. Systems which use nuclear explosives to increase the heat transfer from underground rock will have some radioactivity problems. Of course, all geothermal systems will cause essentially no air pollution.

T. A. PHILLIPS,  
Chief, Bureau of Power.

[Extract from "Separate Report on Oil Import Question by the Secretary of the Interior, the Secretary of Commerce, and the Chairman of the Federal Power Commission"]

## APPENDIX A

## COMPANIES LIMITING SALES TO CURRENT LEVELS UNDER ORDER NO. 431

- |   |                                   |
|---|-----------------------------------|
| 1. United Gas Pipe Line Co.             | 6. Arkansas Louisiana Gas Co.     |
| 2. Natural Gas Pipeline Co. of America. | 7. Panhandle Eastern Pipeline Co. |
| 3. Northern Natural Gas Co.             | 8. El Paso Natural Gas Co.        |
| 4. Transcontinental Gas Pipeline Corp.  | 9. Cities Service Gas Co.         |
| 5. Eastern Shore Natural Gas Co.        |                                   |

## APPENDIX B

## ADVANCE PAYMENTS BY PIPELINES (AS OF NOV. 30, 1971)

Pipeline company	Number of agreements	Advance payments	
		Fixed dollar	Indefinite
Cities Service Gas Co.....	6	\$5,797,000	
Colorado Interstate Gas Co.....	1	200,000	
	2		1½ cents/M c.f.
Columbia Gas Transmission Corp.....	3	200,045,000	
Consolidated Gas Supply Corp.....	1		1½ cents/M c.f.
Kansas-Nebraska Natural Gas Co., Inc.....	1	200,000	
	1		3 cents/M c.f.
Michigan-Wisconsin Pipeline Co.....	23	42,868,000	
	4		Cost cents/M c.f.
Natural Gas Pipeline Co. of America.....	25	109,805,000	
	3		\$1,000,000 well.
Northern Natural Gas Co.....	50	94,902,000	
	40		Cents/M c.f. and/dollar/well.
Panhandle Eastern Pipeline Co.....	13	22,932,000	
	1		Cost.
Southern Natural Gas Co.....	4	36,750,000	
Tennessee Gas Pipeline.....	5	6,689,000	
Texas Eastern Transmission Corp.....	10	106,500,000	
Texas Gas Transmission Corp.....	4	10,635,000	
Transcontinental Gas Pipeline Corp.....	18	41,112,000	
	1		Cost and cents/M c.f.
Transwestern Pipeline Co.....	2	5,250,000	
Trunkline Gas Co.....	6	10,065,000	
	1		Cost plus 1 M c.f.
United Fuel Gas Co.....	4	39,055,000	
United Gas Pipeline Co. <sup>1</sup> .....	5	8,400,000	
Total fixed dollar advance payments.....	180	741,205,000	
Indefinite advance payments.....	54		Cost, cents/Mc.f./dollar/well.

<sup>1</sup> One-half interest assigned to Southern Natural Gas Co

## APPENDIX C

## ADVANCE PAYMENTS—TOTALS BY AREAS (AS OF NOV. 30, 1971)

Area	Number of agreements	Fixed dollar amounts	Percent total dollar
Anadarko.....	30	\$12,304,000	1.7
South Louisiana.....	32	( <sup>1</sup> )	
Permian.....	63	331,715,000	44.7
Texas Gulf Coast.....	3	( <sup>1</sup> )	
Rocky Mountain.....	33	24,279,000	3.3
Other Southwest.....	10	( <sup>1</sup> )	
Appalachian—South.....	9	16,051,000	2.2
Alaska.....	20	18,012,000	2.4
Canada.....	6	( <sup>1</sup> )	
Alaska—Canada.....	2	1,135,000	.1
Anadarko, Permian, South Louisiana, Texas Gulf Coast and Other Southwest.....	2	45,000	
South Louisiana, Texas Gulf Coast and Other Southwest.....	1	200,000,000	27.0
Total fixed dollar advance payments, all areas indefinite advance payments.....	12	116,092,000	15.7
	1	( <sup>1</sup> )	
	2	( <sup>1</sup> )	
	3	7,797,000	1.0
	5	13,775,000	1.9
	180	741,205,000	100.0
	54	( <sup>1</sup> )	

<sup>1</sup> Indefinite

## APPENDIX D

Pipeline company	System area	Design million CFD	Peak M <sup>3</sup> /D	Excess capacity million CFD
1. Transcontinental Gas Pipeline.....	Southwest	480.12	<sup>1</sup> 365.19	114.93
	Central.....	811.63	507.02	309.61
	South Louisiana.....	1,686.88	1,177.46	509.42
2. Tidal Transmission.....		<sup>2</sup> 105.0	86.0	19.0
3. Texas Eastern.....	West Cameron.....	578.0	<sup>3</sup> 140.0	438.0
4. Trunkline.....	Ship shoal.....	550.0	375.0	175.0
	Vermillion.....	370.0	275.0	95.0
5. Sea Robin.....		568.0	322.0	246.0
6. Natural Gas Pipeline.....		100.0	50.0	50.0
7. Southern Natural Gas Transmission.....		951.50	621.24	330.26
8. Columbia Gulf Transmission.....		295.8	340.8	<sup>4</sup> (45.0)
9. Michigan-Wisconsin Pipeline.....		911.3	920.0	(8.7)
10. Tennessee Gas Transmission.....		2,500.0	2,500.0	None
Total.....		9,908.23	7,679.71	2,228.52

<sup>1</sup> BIK. 45 West Cameron Shut In.

<sup>2</sup> This includes new loop not used last season.

<sup>3</sup> Testimony I.D. Buffin RP79.

<sup>4</sup> This due to producers increasing well-head pressure above contract.

APPENDIX E

LIQUEFIED NATURAL GAS IMPORT APPLICATIONS (DEC. 1, 1971)

Number and applicant	Docket no.	Delivery point	Transport mode	Volume and price <sup>1</sup>		Date of authorization
				(MM c.f.)	(\$/M c.f.)	
CANADA						
Short term: <sup>2</sup>						
1. Willbros Terminal Co.....	CP70-194	Boston, Mass.....	Truck.....	266	2.20.....	Feb. 13 and May 12, 1970.
2. Fall River Gas Co.....	CP70-305	Fall River, Mass.....	do.....	150	1.12.....	July 2, July 17 and Sept. 22, 1970.
3. Lowell Gas Co.....	CP71-9	Tewksbury, Mass.....	do.....	630	1.25 for deliveries by Oct. 7, 1970.....	Aug. 28, 1970 and Mar. 15, 1971
					1.94 delivered Oct. 7, 1970 to Apr. 30, 1971.	
4. Boston Gas Co.....	CP71-61	Boston, Mass.....	do.....	220	1.25 delivered Oct. 19, 1970 to Nov. 1, 1970.....	Nov. 4, 1970.
					2.00 delivered Nov. 1, 1970 to Apr. 1, 1971.....	
5. Boston Gas Co.....	CP71-247	do.....	do.....	714	1.30 delivered Apr. 1 to Sept. 1, 1971 <sup>3</sup> .....	June 4, 1971.
					1.45 delivered Sept. 1 to Nov. 1, 1971 <sup>3</sup> .....	
					1.92 delivered Nov. 1, 1971 to Apr. 1, 1972 <sup>3</sup> .....	
6. Lowell Gas Co.....	CP72-10	Tewksbury, Mass.....	do.....	696	1.30-1.45 del. Apr. 1 to Oct. 31, 1971 <sup>3</sup> .....	Aug. 5, 1971.
					1.92 delivered Nov. 1, 1971 to Apr. 1, 1972 <sup>3</sup> .....	
7. Fall River Gas Co.....	CP72-18	Fall River, Mass.....	do.....	120	1.30 for deliveries by Aug. 31, 1971 <sup>3</sup> .....	Sept. 8, 1971.
					1.45 for deliveries by Oct. 31, 1971 <sup>3</sup> .....	
ALGERIA						
8. Boston Gas Co.....	CP69-112	Boston, Mass.....	Ship.....	200	1.14.....	Oct. 25, 1968.
9. Lowell Gas Co.....	CP70-143	do.....	do.....	374	1.52.....	Dec. 17, 1969 and Jan. 16, 1970.
10. Texas Eastern Transmission Corp.	CP70-208	Staten Island, N.Y.....	do.....	2,600	1.37.....	Mar. 16 and Apr. 8, 1970.
11. Boston Gas Co.....	CP70-291	Boston, Mass.....	do.....	1,600	1.70.....	July 14 and Nov. 16, 1970.
12. Boston Gas Co.....	CP71-248	do.....	do.....	1,250	1.66.....	June 4, 1971.

LIBYA							
13. Texas Eastern Transmission...	CP72-93	Staten Island, N.Y.	Ship	<sup>8</sup> 11,160	<sup>8</sup> .81		Pending.
ALGERIA							
Long term:							
14. Distrigas Corp.	CP70-196	Everett, Mass. and Staten Island, N.Y.	do.	<sup>7</sup> 6,600	.68 delivered Apr. 1 to Nov. 1 <sup>8</sup>		Do. <sup>9</sup>
					.70 delivered Nov. 1 to Dec. 1 <sup>8</sup>		
					.76 delivered Dec. 1 to Jan. 1 <sup>8</sup>		
					.85 delivered Jan. 1 to Mar. 1 <sup>8</sup>		
					.71 delivered Mar. 1 to Apr. 1 <sup>8</sup>		
					.68 year-round <sup>8</sup>		
				<sup>7</sup> 8,800			
				<sup>7</sup> 15,400			
Distrigas total							
15. Columbia LNG Corp.	CP71 68 <sup>10</sup>	Cove Point, Md. and Savannah, Ga.	Ship	<sup>7</sup> 390,000	.65 to .69 <sup>8</sup>		Do.

<sup>1</sup> Unless otherwise noted, volumes and prices are as reported in the respective applications filed with the FPC and have been rounded to the nearest MM c.f. and c/Mcf where necessary; delivery at shiprail or truckside.

<sup>2</sup> 1 year or less.

<sup>3</sup> Estimated from reported volumes delivered.

<sup>4</sup> Estimated from the original filing on basis of 83.3 c.f. per gallon.

<sup>5</sup> Volume is billion B.t.u. and price is \$/million B.t.u.

<sup>6</sup> Estimated from the original filing on basis of 52 M c.f. per metric ton.

<sup>7</sup> Per year. Volume is billion B.t.u. and price is \$/million B.t.u.

<sup>8</sup> 20-year term; annual price escalation of 0.6¢/MM B.t.u.; seasonal deliveries not related to any 1 year; startup 1971.

<sup>9</sup> On Oct. 22, 1971, FPC granted interim authorization for 1 shipload which was delivered Nov. 21, 1971.

<sup>10</sup> Lead docket number; consolidated with Southern Energy Co. CP71-151, CP71-264 and Consolidated System LNG Co. CP71-153, CP71-290 and Southern Natural Gas Co. CP71-276 and Columbia LNG Co./Consolidated System LNG Co. CP71-289.

<sup>11</sup> 25-year term; prices are based on 1971 construction and operating costs, subject to revision based on actual costs; volume rounded to nearest MMM c.f.; startup 1975.

PROPOSED<sup>1</sup> CONTIGUOUS UNITED STATES LNG IMPORT PROJECTS

Company	Source	Destination	Daily volume (MM c.f.)	Year
1. Distrigas Corp.	Algeria	U.S. east coast	120	1975
2. El Paso Natural Gas Co.	do	do	500	
3. Phillips Petroleum Co.	Nigeria or North Sea	do	1,000	
4. Shell International Oil Co.	Nigeria	do	650	1978
5. Standard Oil Co. (Indiana)	Trinidad	do	450	
6. Venezuelan Government	Venezuela	do	1,000	1975
7. Pacific Lighting Corp.	Alaska	U.S. west coast	400	1975

<sup>1</sup> Publicized in the trade press and having at least announced volumes and sources; for long-term projects which have been filed with the FPC see Nos. 14 and 15.

<sup>2</sup> Converted from 45,000,000,000 cubic feet per year based on a 365-day year; rounded to 10,000,000 cubic feet.

## PROPOSED PROJECTS FOR PRODUCTION OF SYNTHETIC PIPELINE QUALITY GAS FROM COAL

Company	Location	Process	Plant capacity (MM c.f. per day)	Anticipated cost of gas (dollars/M c.f.)	Project status
<b>Announced projects:</b>					
El Paso Natural Gas Co.	Northwestern New Mexico.	Lurgi	250	0.88-1.08	Sponsor states first deliveries could begin in 1976.
Texas Eastern Pacific, Lighting-Utah International.	Northwestern New Mexico.	Lurgi	250	( <sup>1</sup> )	Sponsor hopes for initial operation in 1975.
FMC Corp.	( <sup>2</sup> )	Cocas	250	0.75-0.90	Sponsor states could begin operation in 1976. Process produces synthetic crude oil as byproduct.
<b>Active pilot plant projects:</b>					
Institute of Gas Technology.	Chicago, Ill.	Hygas	1.5	0.50-0.85	Pilot plant in operation.
Consolidation Coal Co.	Rapid City, S. Dak.	CO <sub>2</sub> -acceptor	( <sup>2</sup> )	0.50-0.60	Pilot plant under construction.
Bituminous Coal Research Inc.	Homer City, Pa.	BI-GAS	2.0-3.0	0.60-0.90	Pilot plant in design stage. Could be ready in 1973.
U.S. Bureau of Mines	( <sup>2</sup> )	Synthane	2.0	0.55	Pilot plant in design stage.

<sup>1</sup> Not available, not announced.

<sup>2</sup> Not available.

PROPOSED<sup>1</sup> FACILITIES TO PRODUCE SYNTHETIC GAS FROM LIGHT LIQUID HYDROCARBONS

Company	Plant location	Capacity (M c.f. per day)	Anticipated cost of gas (dollar/M c.f.)	Source of feedstock	Completion date
Columbia LNG Corp. (FPC Docket No. CP72-8).	Green Springs, Ohio	250	1.12	Imported	1973
Algonquin SNG, Inc. (FPC Docket No. CP72-35).	Freetown, Mass.	120	1.41	Domestic	1973
Tecon Gasification Co. (FPC Docket No. CP72-100).	South Plainfield, N.J.	500	1.23	Domestic and imported.	1974
Consumers Power Co.	Marysville, Mich.	200	( <sup>2</sup> )	Imported	1973
Brooklyn Union Gas Co.	Brooklyn, N.Y.	50	( <sup>2</sup> )	Domestic	1973
Public Service Electric & Gas Co.	Newark, N.J.	125	( <sup>2</sup> )	Imported	1973
Boston Gas Co.	Everett, Mass.	40	( <sup>2</sup> )	( <sup>2</sup> )	1972
Transcontinental Gas Pipe Line Corp.	New York, N.Y.	250	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )
Panhandle Eastern Pipe Line Co.	Illinois	250	( <sup>2</sup> )	Imported	( <sup>2</sup> )
Continental Oil Co.	( <sup>3</sup> )	125	( <sup>2</sup> )	do	( <sup>2</sup> )
Northern Illinois Gas Co.	Illinois	150-250	( <sup>2</sup> )	Domestic	( <sup>2</sup> )

<sup>1</sup> Publicized in the trade press.

<sup>2</sup> Not available, not announced.

<sup>3</sup> Not available.

<sup>4</sup> Proposes 2 plants.

NUCLEAR GAS STIMULATION PROJECTS <sup>1</sup>

Name and location	Industrial sponsor	Firing date	Depth and size of service	Result	Present status	Estimated cost (millions)
Gasbuggy, northwest New Mexico.	El Paso Natural Gas Co.....	Dec. 10, 1967.....	4,240' 26 kilotons.....	5-8 fold increase in gas production.	Shut-in additional testing scheduled for 1972.	\$4.7
Rulison, northwest Colorado.....	Austral Oil Co.....	Sept. 10, 1969.....	8,426' 40 kilotons.....	5-10 fold increase in gas production.	Shut-in.....	8.3
Dragon Trail, northwest Colorado..	Continental Oil Co.....				Canceled.....	
Rio Blanco, northwest Colorado..._	Equity Oil Co. and CER Geonuclear Corp.	Fall of 1972 (tentative).	5,000-7,000' simultaneous detonations of 2 or 3 devices totaling about 90 kilotons.		Project definition work in progress.	3.5
Wagon Wheel, southwest Wyoming.	El Paso Natural Gas Co.....	1973 (tentative).....	9,000-12,000' sequential detonation of 5 devices each with a yield of about 100 kilotons.		Project definition work in progress.	14.5
Wasp, southwest Wyoming.....	Oil & Gas Futures, Inc.....				Potentially suitable areas are being surveyed.	

<sup>1</sup> Joint industry-Government projects being conducted under the Atomic Energy Commission's Plowshare program.

<sup>2</sup> Cost of first well. 2d phase would consist of 4 to 6 well stimulations at a cost of \$5 to \$10 million.

Note: 1 kiloton (kt) is equivalent to 1,000 tons of TNT.

Chairman PROXMIRE. Our next witness is David Freeman, who is research director of the national energy policy study of the Twentieth Century Fund.

I would also ask John O'Leary to come to the table so we can have the two witnesses at the table at the same time. Mr. O'Leary is formerly of the Department of the Interior and he has just been appointed as an energy consultant in what Oil Daily calls the key position of the Atomic Energy Commission, Director of Licensing.

Mr. Freeman, if you will go ahead. As you know, we have a timer here and we are going to give both you gentlemen 10 minutes or less and the prepared statements will be placed in full in the record.

**STATEMENT OF S. DAVID FREEMAN, RESEARCH DIRECTOR,  
NATIONAL ENERGY POLICY STUDY, TWENTIETH CENTURY  
FUND**

Mr. FREEMAN. Mr. Chairman, members of the committee, I believe it is altogether fitting that we focus on natural gas at the same hearing that assesses the wisdom of the recent decision by the Secretary of Interior to approve the trans-Alaska pipeline. For what was discovered at Prudhoe Bay was not just an oilfield but a reservoir of petroleum that included at least 26 trillion cubic feet of natural gas. And despite the acute shortage of natural gas available in the United States, a shortage much more acute than for oil, the Federal Government has approved the oil pipeline without any action as to the natural gas. I assume the Secretary of the Interior could well say "that is not my department" but this simply underscores the myopia of the decision-making process of the Government.

The Interior Department worked on the application filed by the oil companies but apparently no one has looked after the public's interest in alleviating the shortage of natural gas.

The decision to opt for transporting the North Slope oil across Alaska was justified, in part, because arrangements with Canada might cause delays. Yet, we are somehow assuming that the natural gas pipeline across Canada will be swiftly approved without any prior assurances. This reasoning is difficult to follow. But even worse, it gives a priority to oil supply when the shortage is in natural gas.

The President has recently succeeded in improving our relations with distant rivals, and we are even considering the purchase of natural gas from one of them, the Soviet Union. Surely, it is doubtful wisdom for his Secretary of Interior to persist in a go it alone policy vis-a-vis our closest neighbor, Canada. And to do so in the name of national security attempts to stretch the meaning of that rubber-like phrase beyond even its elastic limits.

In my view, the Canadian alternative route for the petroleum pipelines is not only environmentally superior and economically more attractive but it would materially strengthen our national security as compared with the trans-Alaskan route.

The Canadian route would provide the incentive and the means for marketing the vast oil and natural gas resources of the Canadian North, as well as those in Alaska, and thus lessen our future dependence on less secure Eastern Hemisphere sources. Rather than spurning this opportunity, we should seize it and work with the Canadian

Government in developing an energy power corridor across Canada that would serve the interests of both nations.

Any analysis quickly reveals that the Canadian alternative is environmentally superior.

The Canadian alternative will deliver Alaskan oil to the markets in the midwest and the east, where it is really needed, at a lower cost than the Alaskan route and may even result in savings to the taxpayer as well. There are indications there may be subsidies involved in the tankers that will have to move the oil from Alaska to the west coast.

National security—those magic words which mean so much but often reveal so little—has emerged as the only consideration advanced to override the obvious superiority of the Canadian route on environmental and economic grounds.

Canada is a secure source of oil. The Cabinet Committee on Oil Imports on which I participated with Chairman Nassikas and others, so found. We all agreed on that point.

The gravest danger lies not in this decade when Eastern Hemisphere imports are relatively small but rather in the 1980's when most oil companies now project that about half of U.S. supply will be imported from the Eastern Hemisphere.

Prudhoe Bay, where oil has been discovered in Alaska, is located near the western edge of a large number of petroleum provinces, many of which are located to the southeast in Canada.

Reliable, conservative estimates are that the Canadian Arctic contains some 44 billion barrels of oil resources, roughly about the same as the estimates for the entire oil resources of Alaska.

Total oil resources for Canada are estimated at over 100 billion barrels, not to mention the over 300 billion barrels in the Canadian tar sands. It is, therefore, of prime importance to our national security that we encourage the exploration and development of the rich petroleum resources in Canada, as well as those in the United States, and thus lessen our reliance on less secure imports from the Middle East.

The trans-Alaskan route, rather than moving through the oil and gas country in Canada, would go away from it. It would fail to provide the incentive and means for developing the Canadian petroleum and bringing it to U.S. markets. It would only tap the Alaskan oil and direct it toward the West Coast market where the market cannot even absorb all of it. Meanwhile, the large oil resource in the Canadian North would lie undeveloped for lack of a pipeline to market. And transportation of the Alaskan gas must remain a question mark.

The Canadian alternative would provide a pipeline corridor to bring all available North American oil and natural gas to the large U.S. markets in the midwest and the east. It could thus add several million barrels of oil per day to U.S. supplies over and above the trans-Alaskan route in the 1980's.

In addition, as the Interior Department's impact statement found, a land-based pipeline through Canada provides a safer route than the tankers from Alaska to the west coast in the event of hostilities or natural disasters.

The national security thus very much favors the Canadian alternative in the decade of the 1980's and beyond when the projections suggests the east coast and midwest will otherwise be heavily dependent on insecure Eastern Hemisphere imports. The one national security

consideration that could be considered as negative for the Canadian alternative would be if there were a problem during the relative short period of 2 to 4 years in the late 1970's when in theory Alaskan oil might be available through trans-Alaska while the Canadian line may not yet be completed.

There are a promising variety of alternatives that make clear there is no "national security" problem posed by the delay.

Canada has the resources to replace the volumes of oil that TAPS claims it would supply in the years until the pipeline corridor through Canada is completed. And there is time to bring those resources to market in the late 1970's. The Canadian Government has recently assured the U.S. Government that it would be willing to supply the U.S. with additional quantities of oil—statement by Canadian Minister of Energy and Resources, April 9, 1972.

Increased domestic production. Domestic production of oil could be increased substantially to replace the Alaskan oil during the several years of potential delay by price increases or other measures to permit secondary and tertiary recovery of oil wells, if that became necessary to meet essential civilian demands. Recovery, which averages only 30 percent in reservoirs could be increased to 50 or 60 percent by the late 1970's if measures were taken to cover the added costs. Thus, if a decision were made now that the national security really required additional domestic oil in the late 1970's, secondary and tertiary recovery could supply the oil. We could import the oil from other friendly nations such as Iran, Venezuela, Southern Ecuador, and Peru. Conservation of energy is another option which is extremely attractive. If we could stop just making speeches about conservation and implement a policy of energy conservation, we could easily displace the volumes needed in the late seventies from the Alaska pipeline and we would be that much better off in the eighties and beyond.

Mr. Chairman, just to wind up my testimony, I would like to say it is possible that the Secretary of Interior may have reasons for making his decision which have not been disclosed. But based upon the record to date, upon all the justifications that have been put forth for this decision, in my view, it cannot be justified and I strongly urge the Secretary to reverse his decision.

Chairman PROXMIRE. Thank you very much, Mr. Freeman.

(The prepared statement of Mr. Freeman follows:)

#### PREPARED STATEMENT OF S. DAVID FREEMAN

Mr. Chairman and Members of the Committee, I was pleased to accept your invitation to testify as part of this Committee's hearings on natural gas regulation and the trans-Alaska pipeline. My views are based on my experience in this area, and do not represent the opinion of the new Energy Policy Project I am directing which is still in an organizational status.

I believe it is altogether fitting that we focus on natural gas at the same hearing that assesses the wisdom of the recent decision by the Secretary of Interior to approve the trans-Alaska pipeline. For what was discovered at Prudhoe Bay was not just an oil field but a reservoir of petroleum that included at least 26 trillion cubic feet of natural gas. And despite the acute shortage of natural gas available in the United States, a shortage much more acute than for oil, the federal government has approved the oil pipeline without any action as to the natural gas. The decision to approve the Alaskan oil pipeline to my knowledge fails to make any definitive arrangements that will assure simultaneous delivery of the North Slope natural gas to U.S. markets.

The Secretary of Interior could well say "that's not my department" but this simply underscores the myopia of the decision-making process in government. The Interior Department worked on the application filed by the oil companies but apparently no one has looked after the public's interest in alleviating the shortage of natural gas.

The argument can be made that early approval of an oil pipeline across Alaska will facilitate earlier approval of a gas line. The problem with that view is that the natural gas pipeline must cross Canada and we have not exactly enhanced its prospects by spurning the Canadian governments overtures to cooperate on an energy corridor across Canada for both natural gas and oil pipelines.

The decision to opt for transporting the North Slope oil across Alaska was justified, in part, because arrangements with Canada might cause delays. Yet we are somehow assuming that the natural gas pipeline across Canada will be swiftly approved without any prior assurances. This reasoning is difficult to follow. But even worse, it gives a priority to oil supply when the shortage is in natural gas.

The President has recently succeeded in improving our relations with distant rivals, and we are even considering the purchase of natural gas from one of them (Russia). Surely it is doubtful wisdom for his Secretary of Interior to persist in a go it alone policy vis-a-vis our closest neighbor. And to do so in the name of national security attempts to stretch the meaning of that rubber-like phrase beyond even its elastic limits.

In my view the Canadian alternative route for the petroleum pipelines is not only environmentally superior and economically more attractive but it would materially strengthen our national security as compared with the trans-Alaskan route.

The Canadian route would provide the incentive and the means for marketing the vast oil and natural gas resources of the Canadian North, as well as those in Alaska, and thus lessen our future dependence on less secure Eastern Hemisphere sources.

We should seize this opportunity to work with the Canadian government in developing an energy corridor across Canada that would serve the interests of both nations.

Any analysis quickly reveals that the Canadian alternative is environmentally superior. It skirts the intense earthquake zone in Alaska, eliminates water transportation and consequent oil spills in the Pacific, avoids the unplanned development and probable desecration of the Alaskan North. And if the question of oil and gas are examined jointly, as they must, then by occupying the same right-of-way as the natural gas pipeline the oil line through Canada causes far less damage to the land than would the trans-Alaskan route. Ironically it is only if one assumes that the vitally needed natural gas pipeline will not be built on the same right-of-way can we understand the Secretary's conclusion that the longer trans-Canada route would cause greater environmental damage.

Neither is there much doubt as to which route can most economically transport the oil to the U.S. markets where it is most needed. I have made no independent cost calculation, but the Interior Department's own figures confirm that the "Transportation Costs" for the Canadian route are lower to Chicago and New York (Table C-2, p. C-17, Vol. 1—Summary). Even to the West Coast the Department's finding is that "Data does not exist to definitely state the relative efficiencies of TAPS and Mackenzie Valley pipeline system." Moreover, the transportation costs for the trans-Alaskan route may include a large Federal subsidy for the tankers to move the oil from Valdez to the West Coast. The Impact Statement reveals no information on this point.

The Canadian alternative will deliver Alaskan oil to the markets in the Midwest and the East, where it is really needed, at a lower cost than the Alaskan route and may even result in savings to the taxpayer as well.

National security—those magic words which mean so much but often reveal so little—has emerged as the only consideration advanced to override the obvious superiority of the Canadian route on environmental and economic grounds.

The vagueness of the term national security makes it essential that we define its meaning and then examine each alternative in light of that definition. The most recent, authoritative definition of national security in this context was set forth in President Nixon's Cabinet Committee Report on the Oil Import Question as:

"... protecting military and essential civilian demand against reasonably possible foreign supply interruptions that could not be overcome by feasible replacement measures in an emergency." (Section 115, p. 8.)

Imported oil is, of course, not an automatic threat to our national security and the Administration has recently increased the level of imports and rejected the notion that a certain "peril point" existed as an absolute ceiling on the percent of U.S. oil consumption we could safely import at any given time.

It is crucial to any discussion of national security to recognize that Canadian oil is considered secure (the Oil Import Question Section 335b, p. 94, p. 362.) It is imports from insecure Eastern Hemisphere nations which are said to pose a threat to our national security. The gravest danger lies not in this decade when Eastern Hemisphere imports are relatively small but rather in the 1980's when most oil companies now project that about half of U.S. supply will be imported from the Eastern Hemisphere.

Prudhoe Bay, where oil has been discovered in Alaska, is located near the Western edge of a large number of petroleum provinces to the southeast in Canada. Reliable, conservative estimates are that the Canadian Arctic contains some 44 billion barrels of oil resources, about the same as the estimates for the entire oil resources of Alaska.<sup>1</sup>

Total oil resources for Canada are estimated at over 100 billion barrels, not to mention the over 300 billion barrels in the Canadian Tar Sands. It is therefore of prime importance to our national security that we encourage the exploration and development of the rich petroleum resources in Canada, as well as those in the United States, and thus lessen our reliance on less secure imports from the Middle East.

Building a pipeline "land-bridge" from Alaska down the MacKenzie river valley would be the strongest possible measure to further the exploration and development of secure North American petroleum. It would thus succeed in strengthening our security of supply for the decades ahead by lessening our dependence on Arab petroleum and by bringing secure supplies to the areas most vulnerable, the East and Midwest.

The trans-Alaskan route, rather than moving through the oil and gas country in Canada, would go away from it. It would fail to provide the incentive and means for developing the Canadian petroleum and bringing it to U.S. markets. It would only tap the Alaskan oil and direct it toward the West Coast market which is not large enough to consume all of it. Meanwhile, the large oil resource in the Canadian North would lie undeveloped for lack of a pipeline to market. And transportation of the Alaskan gas must remain a question mark.

It might be suggested that if there is so much oil in Canada a Canadian pipeline will also be built. But the approval of trans-Alaska dampens the incentive for exploration in the Canadian North and no one can be sure when, or if, the Canadian oil would ever reach U.S. markets. Perhaps some day this would happen but in the intervening years the United States security of supply would suffer. And of course if a Canadian line is to be built anyway, why not bring the Alaskan oil along the same route now and avoid the grave threat to the environment of Alaska and the North Pacific?

The Canadian alternative would provide a pipeline corridor to bring all available North American oil and natural gas to the large U.S. markets in the Midwest and the East. It could thus add several million barrels of oil per day to U.S. supplies over and above the trans-Alaskan route in the 1980's.

In addition, as the Impact Statement found, a land-based pipeline through Canada provides a safer route than the tankers from Alaska to the West Coast in the event of hostilities or natural disasters.

The national security thus very much favors the Canadian alternative in the decade of the 1980's and beyond when the projections suggest the East Coast and Midwest will otherwise be heavily dependent on insecure Eastern Hemisphere imports. The only national security consideration that could be considered as negative for the Canadian alternative would be if there were a problem during the relative short period of 2 to 4 years in the late 1970's when in theory Alaskan oil might be available through trans-Alaska while the Canadian line may not yet be completed.

This consideration, even if it required more imports from insecure Eastern Hemisphere sources during the period, would be outweighed by the positive advantage of large Canadian supplies beginning in 1980 that would avoid much larger imports from these same sources.

The delay however poses no threat to our nation's security by any stretch of the imagination. This is true because, as we shall show, the delay doesn't pose

<sup>1</sup> DeGolyer and McNaughten. Report on Estimates of Additional Recoverable Reserves of Oil and Gas for the United States and Canada, June 1969, p. 17, 27.

any threat to "military and essential civilian demand" and in any event there are "feasible replacement measures" for the Alaskan oil during the period in question.

There are a promising variety of alternatives that make clear there is no "national security" problem posed by the delay:

(1) *Military needs.*—To place in perspective the quantities of oil which Alaska would supply, they would be about 4 percent of our total energy consumption when full capacity of 2 million barrels per day could be achieved. It would represent less than 10 percent of our total oil supply even if the delay stretched out 4 years to 1980. No one even claims the military needs for oil would be in question. Military needs are a small fraction of oil consumption and could not be affected by a delay in the Alaskan oil.

(2) *Imports from Canada.*—Alaskan oil could be replaced with additional imports from Canada until the Canadian pipeline is completed. The Impact Statement contains information that 2 million barrels per day of additional oil from Alberta in Canada could be obtained at a cost (not price but cost) of \$1.65 per barrel. (Vol. I—p. F-g). In addition to the oil resources in Alberta, new projects to produce oil from the Canadian Tar Sands could be completed in the late 1970's if it were clear there was a U.S. market for the oil and a decision to proceed were made promptly.

Canada has the resources to replace the volumes of oil that TAPS claims it would supply in the years until the pipeline corridor through Canada is completed. And there is time to bring those resources to market in the 1970's. The Canadian government has recently assured the U.S. government that it would be willing to supply the U.S. with additional quantities of oil (Statement by Canadian Minister of Energy and Resources, April 9, 1972).

(3) *Increased domestic production.*—Domestic production of oil could be increased substantially to replace the Alaskan oil during the several years of potential delay by price increases or other measures to permit secondary and tertiary recovery of oil wells, if that became necessary to meet essential civilian demands. Recovery, which averages only 30 percent in reservoirs could be doubled by the late 1970's if measures were taken to cover the added costs. Thus, if a decision were made now that the national security really required additional domestic oil in the late 1970's, secondary and tertiary recovery could supply the oil.

(4) *Stand-by reserves.*—The government could decide to enlarge the petroleum reserves it now owns and provide stand-by capacity through stockpiles or other means in the needed amounts so that essential civilian supplies would be met in an emergency. One such reserve—Elk Hills—already exists with a capacity of 350,000 barrels per day.

(5) *Additional imports.*—There are ample supplies of oil available for purchase from friendly nations that could replace the Alaskan oil for the 2 to 4 year period of possible delay. Venezuela, Iran, Indonesia, and other nations have proven to be secure suppliers. Ecuador and Peru are promising new sources for the West Coast market. In combination they could easily supply the oil to replace TAPS for this limited period. Diversifying the imports from a variety of nations combined with an enlarged stockpile for emergencies would make imports a most secure alternative from a national security perspective.

(6) *Conservation of energy.*—It is quite plain that "military and essential civilian demand" for energy could be met without the Alaskan oil for several more years if we began to practice what we are preaching about energy conservation. A government policy of saving energy could easily reduce demand by the 4 percent of total energy which the Alaskan oil would supply during the interim. The national security is not going to be endangered if we fully insulate our homes and buildings, use smaller cars, drive and fly less, and use more mass transit.

A decision to conserve the 5 to 10 percent of our oil supply in question is a perfectly feasible, even attractive, alternative that would lessen our dependence on Arab oil in the decade of the 1980's and thereby greatly strengthen our national security. In fact a combination of energy conservation and opening up all of the Arctic North to development offers the best available prospect of lessening our dependence on Arab oil and thereby maintaining our national security of energy supply in the decades ahead.

The notion that we can't afford to wait for the completion of the Canadian energy corridor is thus a false notion that is detrimental to obtaining a secure source of energy for the United States in the 1980's.

Of course it is possible that the Secretary of Interior may have reasons for making his decision which have not been disclosed. I am always open to

persuasion by new facts or new reasons. My testimony is that the decision simply cannot be justified in the name of national security on the basis of the public record and the reasons advanced to date.

I would therefore strongly urge the Secretary to reverse his decision and announce that he will cooperate with the Canadian government in expediting an energy corridor across Canada to deliver the natural gas and oil from the Alaskan and Canadian North to the United States. Such a decision would make a maximum contribution to our secure supplies of energy with the least damage to the environment of the North American continent.

Chairman PROXMIRE. Mr. O'Leary.

**STATEMENT OF JOHN F. O'LEARY, ENERGY CONSULTANT,  
WASHINGTON, D.C.**

Mr. O'LEARY. Mr. Chairman, I would like to file my prepared statement for the record—

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

Mr. O'LEARY (continuing). And spend this few minutes in covering the more general background of the energy question. I think first of all, it may be of use to you to note that the present crisis has some shallow roots and some deep roots. I think the proximate causes were, first of all, some rather expansive estimates by the AEC and by the nuclear energy industry on the rates at which nuclear power could be introduced. This had an effect on the coal industry beginning in the mid-sixties of essentially drying up investment for coal mines unless those mines had a dedicated market. In short, the coal industry simply would not invest in coal mines on speculation. If they had a firm commitment from a power company they would invest. If they did not, they would not.

The general confusion then led to major under-investment in the coal industry which exacerbated the short fall of nuclear energy.

The third factor was emergence of environmental considerations after about 1970 on both siting and the composition of the fuels that could be used in these plants and completely complicating that, the fourth factor was the inability of natural gas, which could have cured all of these problems, to be able to continue as a major contributor to energy growth.

Behind these four factors, Mr. Chairman, there are several basic causes that have much deeper roots.

The first of those is the exponential rates of growth to which we have been subjected ever since the industrial revolution. Here we have in the case of natural gas, for example, a growth of about seven percent per annum which means a doubling every decade since natural gas became a primary fuel immediately after World War II. We are experiencing very much the same rate of growth for electric power. In the case of natural gas I think you can get an idea of what that does based upon the numbers that Chairman Nassikas gave you earlier.

The American Gas Association estimates we have about 1,200 trillion cubic feet of gas yet to be found in this country. Now, that seems like quite a bit in light of today's consumption of 24 trillion cubic feet. It is roughly 50 years' supply. When you apply the historic rate of growth and assume we maintain a ten-year reserve, we find that we commit the last molecule of that 1,200 trillion cubic feet in about 14 years, by 1986.

The Geological Survey has a much larger number. They say that ultimate reserves remaining to be found total 21 trillion cubic feet. That increase would buy us about another eight or nine years at historic rates of compound growth. Growth, then, is the first villain among the basic causes of the shortage.

The second is connected to our energy-related institutions. We have a classic case of institutional mismatch here. We would think at a time like this there would now be major incentives for the resource industries to invest in the development of new energy options and we find in fact, there are major disincentives. We would expect there would be major incentives on the major industries to innovate at this point in time and we find instead there are disincentives. Altogether the institutions that served us reasonably well during the post-war period began by 1965 or 1966 to be out of date and unless we can get to that problem and change the institutions, we will find ourselves in serious trouble for the remainder of the century.

Data is the third of these causes. In this particular case we relied upon industry—parties at interest—in large measure to supply our data. Those data have understandably represented the interest of those parties supplying them. They have not served the public interest. People cannot believe the data that have been so supplied. This has been, I believe, a major cause in the long debate that has surrounded recognition of the fact that we do have an energy problem. Data is another area that must be cleaned up.

Finally, research is the way out of this. Our research history since 1954 on the fossil fuel side has been abysmal. We have had essentially no concerted Federal effort aimed at the development of indigenous options. The only significant program of research bearing on the energy equation has been with respect to the nuclear program. It has been funded at \$200 to \$250 million a year steadily. In contrast the coal research program has been funded at about \$10 million a year and the oil research program was funded at something less than \$3 million a year all during this post-war period.

We must find ways to reform our research approach in order to develop new alternatives to get us out of this problem.

Now, this situation, Mr. Chairman, has left us with this set of options. We are deeply into our lead time for the development of technological alternatives and, therefore, we really have to live the next 10 years with largely what we have today and those are imports or the use of inherently dirty fuels to supply our industrial requirements. In other terms, I think that the stark alternatives available are a backing up on the progress that we are making under the environmental programs and a retreat to the use of raw coal, or the massive turning to importation of heavy fuel to meet our requirements. There, Senator Javits alluded to some of the difficulties that we are going to encounter.

First of all, the balance of payments will suffer enormously when our imported fuel bill runs to \$20 or \$25 billion a year as it almost certainly will by 1980, and secondly, the liquidity position of the suppliers of this energy will be such that they will have a major strategic advantage over us in our political dealings with them.

So I think that altogether, Mr. Chairman, this long history of failure to recognize the energy equation for what it is, which is essentially

very large rates of growth applied against finite resources and to take prudent steps to protect the country against the consequences of those two elements of the equation have brought us to the point where we are approaching a crisis.

I think the thing we have to do to get out of it is a massive technological effort probably running to a billion and a half dollars a year to immediately go to the development of technological options. We must do that because the cost of not doing it will be several times the research cost.

The leverage here is enormous. If we invest a billion dollars in this area, 10 years from now we will be able to bring that back with returns of three- or four-fold on the investment.

Secondly, we must develop much stronger and more cohesive techniques for the development of policy within the Government to avoid slipping into this sort of crisis again.

Finally, Mr. Chairman, I think we have to recognize that we are really not in a resource crisis. We are in a management crisis. We have the resources on the continent and indeed, within the United States itself to get over this, to do it in an environmentally acceptable manner and do it in ways which do not trammel the freedom of action of our people.

The reason we are going to find difficult is because our management in this area for close to a generation has been shortsighted.

Thank you.

(The prepared statement of Mr. O'Leary follows :)

#### PREPARED STATEMENT OF JOHN F. O'LEARY

Mr. Chairman, and Members of the Joint Committee, it is a pleasure to appear before this Committee to discuss the outlook for natural gas.

My assignments over the past five years have provided me the opportunity to view the natural gas situation from three perspectives. First, during 1967 and 1968 I served as Chief of the Bureau of Natural Gas of the Federal Power Commission and was in day-to-day contact with the shortage during its initial phase. I then spent a year and a half as Director of the Bureau of Mines with the responsibility, among others, to review in depth the technology applicable to solutions for the gas shortage. Finally, I have spent the past two years as an independent energy consultant with the opportunity to see at close hand the influence of the shortage both on sellers and on consumers of natural gas.

In light of time strictures of this hearing, I should like to summarize my views on the situation with a number of more or less isolated conclusions. These are as follows:

1. In retrospect, the Federal Power Commission had little, if any, alternative to adopting pricing techniques for natural gas similar to those that were adopted in the wake of the Phillips decision. For many years local distribution companies had been subject to economic regulation by local or state authorities. This had the effect of creating economic rents. After 1938 long line transmission companies were subject to rate based regulation by the FPC which had the further effect of creating economic rents in that segment of the industry. By the early 1950's it was evident that there was a strong tendency of the economic rents created by regulation of the distribution and transmission industries to migrate back to field prices in the form of unearned profits. As early as 1954, for example, contracts were entered into for gas in the Louisiana Gulf area calling for prices in the 26 to 27-cent range. Absent the Phillips decision and the subsequent action by the Federal Power Commission, it is, I believe, clear that the full benefits to consumers that had been created by local and interstate regulation would have been diverted to natural gas producers.

2. The Federal Power Commission was correct in imposing controls on field prices of gas, but it erred in failing to adopt policies that would have dampened the high level of demand for natural gas created by the artificial pricing that was

applied to it. In particular, the Commission should have developed rate treatment or outright allocation techniques that would have severely reduced industrial and heavy commercial demand for natural gas.

3. It is clear that there is no possibility of meeting the projected requirements for natural gas from conventional domestic sources at prices that would continue to be of interest to consumers. We have experienced growth in consumption of natural gas in the range of 6 to 7 percent per annum. The economy has been accustomed to growth at this level—nearly two-thirds of the total increase in energy consumption since the end of World War II has been in the increase of usage of natural gas—and there is simply no possibility of supporting continued rates of growth of this magnitude from domestic resources. We have two estimates of the ultimate potential gas resources available to the nation. The first, the estimate provided by the industry's Future Supply Committee, indicates that there is something less than 1200 trillion cubic feet of natural gas yet to be found in the United States. This seems a substantial volume when contrasted to current consumption levels. When exponential growth is injected into the picture, however, and we recognize that the 1972 level of consumption—24 trillion cubic feet—would rise to 48 trillion cubic feet were the gas available by 1982, and to nearly 100 trillion cubic feet by 1992, we can see that this very large resource figure is rapidly trimmed to size. In fact, assuming the retention of a ten-year reserve, all of the industry's ultimate resources would be dedicated by 1986. The Geological Survey has a somewhat higher estimate of the ultimate resource potential. The Survey concludes that there are 2100 trillion cubic feet yet to be found. Assuming this larger volume were to be made available, it would be sufficient to sustain growth at the rate of the last thirty years, again assuming the ten-year reserve requirement, only until 1994 or 1995. Thus, a near doubling of the ultimate reserve figure would provide less than ten years of additional supplies of natural gas.

I think we can conclude from these examples that we are at the point where our natural gas supplies simply cannot be relied upon as a contributor to future energy growth in this country under any reasonable set of assumptions.

4. The first response that we must make to the situation, therefore, is to recognize that we are entering an era in which natural gas will become in extremely short supply with extreme rapidity. The Federal Power Commission staff, taking into account all of the non-conventional sources thus far announced, has concluded that the short-fall by 1980 in the United States will approximate 9 to 10 trillion cubic feet, approximately 40 percent of current consumption. My own view is that the annual short-fall will exceed this level and could rise to as high as 20 trillion cubic feet by 1980. In either event, there will almost certainly be an almost frantic attempt on the part of some classes of consumers to bid these limited supplies of natural gas away from other classes of consumers. A major effort is already under way on the part of industrial and utility purchasers of energy to meet their environmental obligations through acquisition of natural gas at almost any cost. Inevitably this will tend to increase sharply the cost of natural gas to the household and light commercial market and ultimately dry up the supply to consumers in these classes. Household consumers are to a very large extent "locked in" to natural gas. The replacement of their furnaces and other gas-burning appliances would be a major item of expense that many of them could not afford and they will be forced to pay whatever price is demanded by the serving utility. Industrial consumers, including utilities, are not subject to the same price constraints. For the industrial segment fuel costs represent only a small portion of total cost and thus substantial premiums can be paid without significant influence on the final price of their products. For utilities, generally speaking, increases in energy costs can be "passed through" to customers without detriment to the earnings of the utility involved.

5. It seems that we must immediately test the rather grim prospect that I have outlined here, and if it appears to be the likely trend of events, we should begin now the orderly development of techniques for allocation of natural gas in order to prevent a completely chaotic marketing situation. It is clear that the allocation must be done at the Federal level and that it must extend to all supplies of natural gas, not just to those now subject to the jurisdiction of the Federal Power Commission. In this connection, the Committee should note that the Federal Power Commission attempted to extend jurisdiction to certain classes of industrial sales heretofore regarded as non-jurisdictional and was reversed in the Fifth Circuit Court of Appeals. This reversal is now on appeal in the Supreme Court but the net effect of the lower court's decision is to increase the

likelihood that industrial consumers will bid scarce supplies away from the jurisdictional customers. Legislation will be required to permit effective disposition of scarce natural gas supplies by the FPC. As yet the FPC has not recognized this necessity, and time is running out. Failure to develop an orderly allocation system within the next year will almost certainly lead to the development of a completely disrupted natural gas market by late 1974 or 1975 with major injury to residential consumers.

6. As I pointed out earlier, I do not believe that there is any real possibility of developing sufficient supplies of natural gas to support prospective growth levels. At the same time I think that we will never understand the relationship of the response of natural gas production to price changes until we have had some empiric experience. I therefore recommend that we free natural gas prices strictly on an experimental basis for a period of sufficient duration to definitely test the response. I would suggest three years. Through this technique we can put to rest once and for all the "incentives" argument without serious damage to our energy economy. I would not extend the decontrol to gas now under contract. This would simply be putting a gun to the head of the current purchasers of old gas who would be forced to increase the price for flowing gas sharply in order to be in a position to bargain for new supplies as they were developing. I would, however, in order to provide additional cash flows for the substantial exploratory effort that should follow on the freeing of new gas prices, increase the price of old gas by four or five cents per Mcf. This would provide substantial investment capital for the industry, but again would not seriously disturb the present fuels economy. At the termination of the three-year period, a comprehensive review should be made to determine the course of future field pricing. My own suspicion is that we will find that there is some response to the price increases that would occur in a free market situation. The response, however, will almost certainly be disappointing and we may well conclude at the end of the experiment that the public interest is best served by re-imposition of a field pricing regime comparable to the current one.

7. For application over the longer term, we should begin immediately on an urgent basis to develop alternatives to natural gas based upon indigenous resources. At the moment all of the gas supplements that are technically feasible are high in cost. LNG, Syngas, produced from methanol, and pipeline quality gas from coal are all in the range of four to five times present field prices for natural gas. Current research efforts aimed at the development of gas supplements are clearly inadequate (less than \$20 million per year of Federal expenditures and negligible private expenditures aimed at a target that the consensus of informed opinion concurs will require expenditures in the range of \$300 to \$500 million per year to assure success) and possibly aimed in the wrong direction. The first order of business and the highest priority should be directed toward the development of a clean liquid or gaseous fuel that can be used to replace natural gas under boilers and in other industrial applications. This would have more direct influence on the natural gas shortage than any other single course of action open to us. If a low sulfur or sulfur-free synthetic fuel could be developed, sufficient natural gas could be released thereby to eliminate the gas shortage for ten to twenty years—ample time to develop low cost techniques for synthesis of pipeline quality gas. My own bias runs to emphasis on a clean liquid fuel produced from coal, but all of the alternatives, including liquids from oil shale, gas from oil shale and from coal, and liquids from heavy oil deposits, including tar sands, should be explored. The point is we have a broad variety of technical options open to us, all of which require extensive lead times before they can bear on our current situation and at the moment no, or very little, work is being aimed at their development.

8. Unless work proceeds along this line, the United States will have only two means of dealing with the current crisis: We will either have to back off from our environmental effort and permit the use of intrinsically dirty fuels, particularly coal, to meet our industrial and generating requirements, or we will be forced to a massive increase in imports. There simply is not enough petroleum available to us within the United States, or indeed within the United States and Canada, to meet our growth requirements. The turning of the United States to major reliance on imports has some highly disturbing side effects. First, the balance of payments situation, already severe enough to force devaluation of the dollar last year, will be immensely compounded. The availability of reserve-producing capacity in the United States has for years operated as a constraint on energy prices throughout the remainder of the world. With the disappearance of that reserve capacity,

there is simply no limit to prices that exporting nations can demand and receive for their products from the chief consuming areas—North America, Europe and Japan. The State Department estimates that the price of oil will go into the \$5 range by the end of this decade, generating an annual payments drain in the range of \$20 billion per year. I think this estimate is conservative. Unless emphasis is placed urgently on the development of alternatives to imported crude based on indigenous resources, we could be paying \$7 to \$8 per barrel in 1970 dollars for our imports by the end of the decade. Second, the liquidity of the exporting nations, already substantial, will grow exponentially. It is probable that net liquidity of the Arab states alone will exceed \$30 billion by 1980. At the least, liquidity of this magnitude could have destabilizing impacts on world money markets and at worst, the producing states could simply shut down for a year or longer without curtailment of their internal social programs. The change in the strategic balance between the United States and the Middle East could during this time frame, therefore, shift so severely as to measurably reduce the freedom of action of the United States in both political and economic terms.

9. If we are unwilling to pay the economic or political costs associated with a massive increase in imports, we will have no alternative to a major increase in coal consumption at a time when techniques for burning coal are still seven to ten years away. Thus the progress made and foreseen for the clean air program will have to be abandoned.

10. In summary:

A. We should immediately begin development of an allocation system for natural gas covering the entire U.S. supply.

B. Mount a controlled experiment to test the responsiveness of natural gas supplies to increases in price.

C. Initiate a massive technological effort aimed at development of domestic alternatives to greatly increased reliance on oil imports with the first target being a clean under-boiler fuel that would free natural gas supplies now consumed by industrial utility customers.

Chairman PROXMIRE. Thank you, gentlemen. I would like to ask you, Mr. O'Leary, one of your major points is that we should as an experiment decontrol gas prices to find out what response we might get on the supply side.

Mr. O'LEARY. Yes; I think, Mr. Chairman—

Chairman PROXMIRE. Let me just finish on this. I wonder how responsible this proposal is.<sup>1</sup> We have had gas price increases year after year. Apparently that has been late response on the supply side and a continuing increase in demand.

All of our witnesses yesterday said this is certainly not the time to decontrol. Just since last November the wholesale price has risen at an annual rate of 8 percent. Would not gas prices have shot through the roof without controls?

Mr. O'LEARY. I think that gas prices in the area of the market which is growing very rapidly, beyond the reach of Federal controls, is shooting through the roof now, the interstate market, and I think we are weighted here with a myth. The general reliance on Federal policy at the moment is upon increased incentives for the development of additional oil and gas to solve the crisis internally.

My own conviction is, first, that the crisis will not be solved by any reasonable or foreseeable level of enhanced incentives for the production of conventional oil and gas, and secondly, that so long as that remains an undemonstrated fact, that we will not move into other and potentially more productive fields. Therefore, I think we ought to get this behind us by a test. If you did this on—

Chairman PROXMIRE. Have we not had a test? Have we not had increases in prices with no good results?

<sup>1</sup> See Mr. O'Leary's letter, dated June 14, 1972, p. 197.

Mr. O'LEARY. No. I think we have not had increases.

Chairman PROXMIRE. They ought to be bigger?

Mr. O'LEARY. I think we have not had substantial increases in real price for natural gas.

Chairman PROXMIRE. Well, how much would that cost the consumer?

Mr. O'LEARY. It would cost the consumer substantially. The alternatives—

Chairman PROXMIRE. He is locked in, is he not? He has got his gas range or has his gas-using facilities. He cannot convert very well. He is in a position where he has got to pay more.

Mr. O'LEARY. Well, he is going to have to pay a great deal more.

Chairman PROXMIRE. It will be highly inflationary.

Mr. O'LEARY. I think the course of action we are now embarking on, where we are really not providing an alternative to that is going to be much more costly to the individual consumer and the economy at large than the course I have outlined.

Chairman PROXMIRE. What do you mean by end use controls?

Mr. O'LEARY. About half of the gas that is consumed is consumed in the industrial heavy commercial markets, about half in the light commercial and household markets. The heavy industrial is growing about 10 percent per year and the household formation is growing at about 3 percent a year.

Probably some years ago the FPC should have begun to move in the direction of dampening down demand on the industrial side. That demand, of course, was attracted in large measure by the impact on the delivered price of gas that was created by field prices.

Chairman PROXMIRE. The Supreme Court's decision of yesterday should help.

Mr. O'LEARY. It helps a little bit to the extent that we are dealing with the direct sales of the pipelines. It does not help where we are dealing with indirect sales through an intermediary party.

Chairman PROXMIRE. Does this require any congressional action?

Mr. O'LEARY. To get this—to require substantial congressional action, substantial expansion of the FPC's jurisdiction, both in the interstate markets and portions of markets now regarded as nonjurisdictional.

Chairman PROXMIRE. Will you submit a memorandum to us indicating what action we should take?

Mr. O'LEARY. Yes.

(The following information was subsequently supplied for the record:)

SHADY OAKS MANOR,  
West River, Md., June 14, 1972.

HON. WILLIAM PROXMIRE,  
Chairman, Joint Economic Committee,  
U.S. Senate,  
Washington, D.C.

MY DEAR SENATOR PROXMIRE: In the course of my appearance before your Committee on Thursday, June 8, you requested that I prepare a memorandum explaining the relationship of last week's Supreme Court decision with regard to allocation of natural gas supplies to my proposal for new authority to be developed through statute to permit the Federal Power Commission to control the entire U.S. supply of natural gas during periods of shortage.

The Supreme Court's decision is confined to the question of jurisdiction over direct sales to "non-jurisdictional customers" of interstate pipeline companies.

That is to say, the Court has held that contracts entered into between regulated pipeline companies and their direct industrial customers may be amended or set aside entirely by the Federal Power Commission if shortages develop to the point where such action is required by the public interest.

This action by the Court provides significant assistance to the Federal Power Commission in dealing with current and prospective natural gas shortages. There remain three major areas, however, that are not touched by the Court's decision.

First, allocation of supplies between various classes of consumers served by direct customers of the regulated pipeline companies is beyond the Commission's reach. In the city of New York, for example, gas supplies are acquired by a joint utility and distributed between industrial, residential, and commercial accounts without reference to the FPC. It would, I believe, be incongruous to provide authority to the Federal Power Commission to allocate gas to an electric utility that was a direct customer of a pipeline but to deny authority to control gas to an identical plant, supplies for which were acquired through an intermediary distribution company.

A second area not dealt with by the Court's decision has to do with so-called Hinshaw companies. In California, for example, supplies are delivered by interstate pipeline companies to the California border, whereupon they are acquired by a totally intra-state corporation exempt from Federal Power Commission jurisdiction by the Hinshaw Amendment. In order to develop an equitable system for allocation of scarce supplies among various classes of consumers, the Federal Power Commission should have allocating authority over these currently exempt sales. At the moment, for example, there are substantial pressures on companies supplying California to cut back on their direct industrial sales in markets east of California in order to maintain service to the California market. The California market in turn is composed of both industrial and residential sales. There is currently no mechanism for assuring that the burden of curtailment is equitably shared between the customers of the supplying pipeline companies and the customers served by the California intermediary.

Finally, Federal Power Commission jurisdiction should extend to the allocation of supplies of natural gas that are entirely within the intra-state market. I suspect that we will soon be forced to withdraw natural gas from industrial plants and electric utilities around the country whenever an environmentally and economically satisfactory substitute is available. Were we to confine these withdrawals to plants served from interstate gas supplies and permit comparable facilities supplied by intra-state supplies to continue to use natural gas, the net effect of our denial of the interstate market may be simply to pave the way for increased industrial consumption in the intra-state market, thus frustrating the entire effort.

The enclosed draft amending Section 7 of the Natural Gas Act of 1938 would, I believe, augment the Supreme Courts' decision and provide authority to the Federal Power Commission to handle this aspect of gas shortage on a national rather than on a piecemeal basis.

Sincerely yours,

JOHN F. O'LEARY.

Enclosure.

[NEW SECTION 7(i)]

Whenever the Commission finds that the supply of natural gas is not sufficient to assure the maintenance of adequate service or to serve particular customers it may, without notice or hearing, allocate available supplies among classes of customers and particular customers and may impose end-use restrictions. For purposes of this subsection, and in view of the affect on interstate commerce, the authority of the Commission extends to the interstate and intra-state production, transmission and sale of natural gas and orders issued hereunder may be directed against any person engaged in such activities. The Commission may not continue an allocation order or end-use restriction beyond the period of emergency and it shall promptly advise all affected parties and the public of any action taken under this subsection. Upon application by any person aggrieved, filed within fifteen days of public notification of Commission action, a hearing shall be held examining into the reasonableness of action taken.

Chairman PROXMIER. I would like to ask you, Mr. Freeman, in your prepared statement you make a very powerful statement that is going to be quite interesting because we are going to get into the Alaskan

pipeline in great detail in the next 2 days of hearings, both tomorrow and a week from Monday. You say, "The decision to opt for transporting the North Slope oil across Alaska was justified in part, because arrangements with Canada might cause delays. Yet, we are somehow assuming that the natural gas pipeline across Canada will be swiftly approved without any prior assurances. This reasoning is difficult to follow. But even worse, it gives a priority to oil supply when the shortage is natural gas."

First, what should we have done in that respect?

Mr. FREEMAN. It seems to me that we should have some definitive arrangements with the Canadian Government. What we should have done, I think, is accepted the offer of the Canadian Government to work together with this Government and develop jointly the pipeline corridor across Canada for both the oil pipeline and the gas pipeline. That is what we should have done.

Chairman PROXMIRE. Yesterday we had Senator Gravel up here and I foresee this may be the shadow of things to come. We have Governor Egan coming to testify, Senator Stevens, and others who have great economic interest in this.

Senator Gravel said that all of this may be true but now if you want reaction, if you want to provide the kind of jobs they would like to develop in Alaska, develop the use of this oil next year, in the long run it is going to take too long to negotiate.

This is exactly what you are talking about here, an agreement with Canada and they may not even be negotiable. They may not want us to do it, may not want our investment. They have got too much investment up there.

What is the answer?

Mr. FREEMAN. The answer to that is the crisis is in natural gas supply and we conceive the only way we can deliver the natural gas economically is across Canada. We have to face our Canadian neighbors, who are not distant Arab nations, a nation with which we must develop better relations, I do not see how we can avoid it. To simply ignore the problems of natural gas where the shortage exists is to turn our back on the key problem area.

I would say approving the oil pipelines across Alaska just on the assumption that the Canadian Government is going to approve the pipeline for gas across Canada is not to my mind a prudent policy. And since I prepared my prepared statement, my fears are even greater because what has come to my attention is a speech which the Canadian Minister of Energy, Mines and Resources, the Honorable Donald S. Macdonald made on May 29, 1971, and to quote from his speech, which I shall, he says: "One aspect of the American decision, however, that did give us"——

Chairman PROXMIRE. Will you give us the entire reference?

Mr. FREEMAN. Yes, sir. It was a speech given to the Canadian Gas Association in Toronto, Ontario, May 29, 1972. I will quote just briefly. He is speaking about the decision of the U.S. Government on the oil pipeline: "One aspect of the American decision, however, that did give us pause was the Secretary of the Interior's insistence for reasons of security the oil pipeline must remain exclusively under U.S. control. That imposes a restriction which, of course, is incompatible with our 1970 northern pipeline guidance, a restriction which could be totally

unacceptable to the Government of Canada. That condition if applied to natural gas in the well could, of course, rule out the possibility of Prudhoe gas finding its way to market by the Mackenzie Valley."

So I think that we have to make peace with the Canadian Government.

Chairman PROXMIRE. Well, are you saying that it—

Mr. FREEMAN. If we want the natural gas.

Chairman PROXMIRE (continuing). May be difficult to negotiate this, that it may indeed take several years before we can secure such an agreement?

Mr. FREEMAN. I think it will take some time but my point is that the time will be shorter if we say, yes, we want to negotiate, rather than say, we are going it alone on the oil pipeline and without making any arrangements about the gas.

Chairman PROXMIRE. The other point that was made, after all, the oil companies have not been asked to build a gas line. No one is proposing that the Congress appropriate funds to build a natural gas pipeline. How do we do it if the oil companies are not interested in doing so?

Mr. FREEMAN. I think if it were my responsibility, in seeing the crisis that we have in natural gas, I would not approve a permit for an oil pipeline until there were marketing arrangements made for the natural gas.

Chairman PROXMIRE. Well, supposing in that event they simply stood tough?

Mr. FREEMAN. Well, that would be their decision. It seems to me that would not happen because the oil and gas go together. This is casinghead gas and it would be economical to simultaneously produce both.

Chairman PROXMIRE. There are sufficient economic incentives here, you think, if the Government took that position, that in that event they would build it to where we need the gas in the middlewest.

Mr. FREEMAN. There is no question. The companies involved, I think, have spent millions of dollars in planning natural gas pipeline already. This work is well underway. The stumbling block if there is one, is working out the relationship with the Canadian Government. I do not know that there would be a problem but it seems to me to be a mistake that when the Canadian Government in effect says to us we want to cooperate and want to develop a corridor across our country to permit American resources in Alaska to flow to the U.S. where they are needed, and where this alternative is superior economically and environmentally to the alternative of across Alaska, it seems to me in the public interest of the U.S. that we accept that offer and go that route.

Chairman PROXMIRE. Now, more than criticizing the trans-Alaskan alternative, you emphasize the advantages of developing the Canadian route. First, you say it is environmentally superior. You say in your prepared statement, "In addition, as the Impact Statement found, a land-based pipeline through Canada provides a safer route than tankers from Alaska to the west coast in the event of hostilities or natural disasters," but the Interior Department's Impact Statement concluded the two routes were equal in terms of environmental questions.

Why are you convinced the Canadian route is environmentally superior?

Mr. FREEMAN. It just seems to me the backup material in the Impact Statement gives you a basis for reaching that conclusion despite the statements that were made when the decision was made. The Impact Statement reveals that the earthquake problem is much more severe on the Alaska route than through Canada. It also reveals that there are serious ecological problems in terms of water pollution in moving the oil from Valdez to the west coast, problems which do not exist at all because—

Chairman PROXMIRE. Let me ask, then, are you saying that Secretary of the Interior Morton's decision does not seem to follow from the staff findings, that it is not justified, that it is political, it is motivated by something other than the facts?

Mr. FREEMAN. I do not know what it is motivated by and I am not saying what it is motivated by.

Chairman PROXMIRE. Are you saying, then, it is not justified by the facts?

Mr. FREEMAN. Yes, sir, I am.

Chairman PROXMIRE. You argue the Canadian route is economically more efficient. How is it more efficient?

Mr. FREEMAN. The figures in the Interior Department's Impact Statement reveal that the delivered cost per barrel of oil to Chicago is cheaper through the Canadian route than trans-Alaska, and—

Chairman PROXMIRE. Of course, that is only relevant if the need in Chicago is greater than it is elsewhere, which perhaps it is, and you do argue that. Would you illustrate for the committee the relative shortages we can expect in the west versus the midwest? As I understand it, the Alaskan route would supply oil to the Pacific coast.

Mr. FREEMAN. Yes, sir. I do not have the facts at my fingertips but the Impact Statement reveals that the future dependence on the less secure oil sources from the Eastern Hemisphere will be greater on the eastern seaboard and the midwestern areas than they would be on the west coast. For that reason it seems to me that if you think of it in terms of national security, which is a context in which the decision was made, it is more important that we bring that Alaskan oil into the mid-Continent where it could flow east or west or flow to the mid-Continent, that this gives us greater flexibility and greater assurance against interruptions than if the oil is forced to supply only the west coast, especially since the figures suggest that in the late 1970's, around 1980, the Alaskan pipeline may very well have a capacity greater than the ability of the west coast market to absorb it.

Chairman PROXMIRE. Then you argue the Canadian route will improve our national security. You know, I do not mean to be critical of you in this respect—I hope you can justify it—but this is the justification everybody uses for everything when they do not have good justifications. The oil import program, oil depletion allowance, everything that I have ever found to be serving a special interest and to be contradicting the public interest, people always toss national security in it. It is a nice vague concept. We are all national security conscious, love our country, love our Nation, support our country, oppose the Communists, so when somebody says national security, that does it.

Now, Senator Gravel said national security the other way. He said the Alaskan pipeline would be better security.

Mr. FREEMAN. My views of those words are much the same as yours. I describe them in my prepared statement as magic words which mean so much but often reveal so little. I based my prepared statement on those grounds only because those are the grounds that the Secretary of the Interior advances to justify his decision, and the point of my prepared statement is not that I pick national security as the reason that I advance, but accepting his statement that that is the central reason for his decision, I say that in my view, he has picked the wrong route in terms of national security, that if he is concerned about national security, he is concerned about this country having secure sources of oil in the years ahead, and we are much better off—

Chairman PROXMIRE. Why is it more secure to go through a foreign country, Canada, a country with which we have very fine relations and expect to have in the future, but nevertheless a foreign country and a country which may or may not—they disagreed with us for many years on the relationship of Mainland China, for example. Why is it more secure to go that route than to go from one of the States, Alaska, via an ocean route when we have on the basis, if you take my side versus Admiral Zumwalt's, overwhelming superiority over the Soviet Navy and a navy which can certainly defend the eastern Pacific if nothing else?

Mr. FREEMAN. My reasons are as follows, that if we go the Canadian route, we will provide a transportation route not just for the Alaska oil but this will provide the route, the pipeline, and the incentives to open up the oil resources in northern Canada and the gas resources which are estimated to be just as large as the oil and gas resources of Alaska. So that in the 1980's we will be able to obtain for U.S. markets perhaps as much as double the oil and gas that we could just get from Alaska, and that this oil and gas from Canada will be a good deal more secure than the alternative that would otherwise face us of importing that much oil from the Middle East.

Chairman PROXMIRE. Does that not depend on where in that huge country, Canada, the oil is found? The oil may not be near enough to us so it would be a significant economic contribution.

Mr. FREEMAN. The geologists, DeGolyer and McNaughten, who made a study of this, believe that the Prudhoe Bay oil fields is located on the western edge of a number of oilfields, the others of which are located in Canada. My point is that rather than moving a transportation route away from the oil, we ought to move through the oil country and, therefore, open up that much more of the resource for coming to the U.S. market. The point of my prepared statement is that the Canadian oil is much more secure than oil from Iraq or Libya or elsewhere where it would otherwise have to come from, and this is the thrust of my prepared statement on the basis of national security which I do not single out as the overriding reason but which the Secretary of the Interior has.

Chairman PROXMIRE. You simply argue that there is no great difference from the national security standpoint in the Alaskan and Canadian routes and if there is, the balance should be on the side of Canada, is that right?

Mr. FREEMAN. I suggest that the balance is on the side of moving through Canada. I think that our relations with Canada are also important to our national security.

Chairman PROXMIRE. Mr. O'Leary, I want to ask you in behalf of Senator Percy, who pursued very vigorously an area you are interested in, in developing new authority, he said that, and Senator Javits developed this to some extent with the Chairman of the FPC, that we were—relying on atomic energy is a very substantial increasing area of energy resources, 10 percent, I think, by 1985 and 25 percent by 1990, and then in a few years perhaps a great deal more than that.

But Senator Percy pointed out that the way that we have been proceeding has been so slow and lagging, the figure given by the Chairman of the FPC represents 0.6 percent of our energy needs now, in talking to some people over the last few years, that we have been proceeding so slowly. Can you give us any information on that? I do not want to compromise your position. I know you are brand new.

Mr. O'LEARY. I really am not in that position yet. I should make clear for the record that I accepted this invitation while I was an independent consultant and before I agreed to join the AEC. I am still an independent consultant and am offering my testimony in that capacity.

I think the situation is this, Mr. Chairman. If you can accept the rates that we have gone on for the last 5 years for both total energy and electrical energy, we will find that approximately 50 percent of our total energy, if we are lucky, will be in terms of electrical energy by the end of the century, by the year 2000.

Chairman PROXMIRE. What percent?

Mr. O'LEARY. 50 percent. Right now the final demand for total energy in this country, 25 percent is in the form of electrical energy. By the end of the century, taking into account the 10-year doubling period for electrical energy and the 15 to 18 year doubling period for total energy in the economy, the 25 percent will have risen to 50 percent. And conventional wisdom as of the moment, and you know the limitations on conventional wisdom, is that the nuclear side will be no more than 50 percent of electric power generation by the year 2000.

In short, by the year 2000 we will still depend upon fossil fuels for fully 75 percent of our total energy requirements.

Chairman PROXMIRE. My question is a little more limited than that. Those are very helpful and interesting estimates but I am asking whether or not the immediate progress and the progress that we have not enjoyed in the last 3 or 4 years is a matter of concern and perhaps requires some kind of Congressional action or some kind of greater concentration of resources or some new policies.

Mr. O'LEARY. Well, it might very well, Mr. Chairman. The rate of progress at the moment is of direct concern to the AEC. Just in April they reorganized their regulatory side. They brought in a number of new people—I am one of them—to involve themselves in licensing. We are looking both within the limitations of the existing statutes and existing procedural arrangements and probably going beyond that and in order to move this process forward.

We regard it as a matter of absolute essentiality that we find some way through the present procedural roadblocks and we are quite

willing, I personally and my colleagues, future, colleagues in the Commission, are quite willing to innovate to get there.

I think you should understand that it is a matter of highest priority on their part to move through this. They are not at all sanguine about it, and I think in this particular instance with the quality of personnel I find in that organization, there is the will, and we will find a way.

Chairman PROXMIRE. Thank you very, very much. I thank both of you gentlemen for a very helpful—

Mr. FREEMAN. Could I just add one comment on this last question, because I think the record may not entirely reveal the situation with respect to atomic energy.

I believe that if we check back on the estimates that were made for nuclear energy by the Atomic Energy Commission, the official estimates, we will find that nuclear power is coming on just as rapidly as the people estimated in the early sixties. One of the goals that President Kennedy set was to have a nuclear powerplant on line by the end of the decade and this goal was achieved.

When you speak of these percentages, we have very large energy systems. Where there is something new coming in, it takes a long time for that percentage to move up to a very significant number.

About one-half of the electric powerplants under construction today are nuclear powerplants. There are growing pains of licensing and breaking in of new technology. But I think the impression that might be left that somehow nuclear energy is not coming in as rapidly as people anticipated, I think if one checks the record rather carefully, we find with all of these problems, and I recognize the problems and the unsolved question marks. Nuclear energy is coming in at least as rapidly as the people who launched the intensive research effort in the early sixties had reason to believe.

Chairman PROXMIRE. Well, I thank you gentlemen very much for excellent testimony and I apologize for keeping you so long. You did a fine job.

The committee will resume its hearings tomorrow morning in this same room. We will hear from David Anderson, a Member of Parliament, in Canada, Charles Cicchetti, economist, Resources for the Future, Richard Nehring, former economist in the Department of the Interior, and Stewart Udall, formerly Secretary of the Interior and now chairman of the board of the Overview Corporation. This will be a panel which will testify tomorrow.

(Whereupon, at 12:40 p.m., the committee was recessed, to reconvene at 10 a.m., Friday, June 9, 1972.)

(The following information was subsequently supplied for the record by Mr. O'Leary:)

SHADY OAKS MANOR,  
West River, Md., June 14, 1972.

HON. WILLIAM PROXMIRE,  
Chairman, Joint Economic Committee,  
U.S. Senate, Washington, D.C.

MY DEAR SENATOR PROXMIRE: In the course of my appearance before your Committee last Thursday you expressed doubts as to the responsibility of my recommendation for an experiment in decontrol of gas prices.

During the past three years gas findings have averaged about 10 trillion cubic feet a year. Decontrol would probably result in an increase in new gas prices from the current 25¢ per Mcf to 45¢ to 50¢ per Mcf. Prices in this range, when delivery costs are included, would leave natural gas barely competitive with low sulfur

heavy fuels. Prices at this level might have the effect of bringing out annual findings in the range of 15 to 17 trillion cubic feet—the finding rate of the past decade. Were this to occur, the incremental 5 to 7 trillion cubic feet located over and above current finding levels would have been acquired at incremental costs per Mcf on the order of \$0.70 to \$1.00.

Each of the significant supplemental sources of natural gas currently being planned will cost in excess of \$1.00 per Mcf. Imported LNG, when all costs are taken into account, will be in the range of \$1.05 to \$1.15, gas produced from coal will, at best, be in the range of \$1.15 to \$1.25 per Mcf. Gas from Alaska through Canada to the upper mid-west will cost in excess of \$1.00 per Mcf, and gas produced from crude or from light petroleum fractions will cost in the range of \$1.00 to \$1.15 per Mcf. Thus, assuming the response is in the range that I have forecast, the experiment would yield additional supplies of gas at prices comparable to or below those ascribable to the other alternatives currently in sight. Further, it is unlikely that any of the other alternatives, regardless of cost, can have the immediate and substantial impact on natural gas supplies that could arise from augmenting conventional supplies through price increases.

There are distinct limits on the volume of new supplies that can be stimulated through incentive pricing. I believe that roughly a doubling of current prices would bring out a 50 to 70 percent increase in reserve additions for a few years. Response would probably fall off sharply beyond this level. For example, were we to increase the price to \$1.00 per Mcf, I doubt if findings would reach 20 trillion cubic feet per year. With the exception of areas of Alaska and the nation's continental shelves, the large, prolific gas occurrences available to this nation have by and large been found, and we rapidly approach the point of diminishing returns as exploratory efforts are directed to targets at increasing depth and of decreasing size.

Fundamentally, therefore, I discount the effectiveness of the incentive approach to obtaining increased gas supplies for the reasons that I put forward to the Committee. There simply is not enough gas remaining to us to permit conventional occurrences of that fuel to continue to make a strategic contribution to U.S. energy growth. Nonetheless, a tactical contribution can be made through this course. I therefore find it difficult to support regulatory policy that with one hand actively encourages exotic supplements at costs well in excess of \$1.00 per Mcf, and with the other precludes an empiric test of the response of naturally occurring supplies to price increases. It seems to me a foolish policy in the current situation to by-pass intermediate cost supplies in favor of demonstrably high cost alternatives because of a philosophical bias.

Further, until an empiric test is conducted, the political strength of the oil industry will be sufficient, I believe, to prevent the earnest pursuit of promising technological alternatives to reliance on conventional natural gas supplies. As I pointed out in my testimony, current levels of effort aimed at fuels syntheses are pathetically low in comparison to the scale of the problem. This stems from the widespread belief within the Government, which has been carefully fostered by the oil industry, that all that is required to return to energy plenty is an increase in incentives for the discovery of conventional oil and gas. This view is so deeply held that it can be regarded as the determining predicate of current U.S. energy policy. There is little likelihood that we will begin an adequately scaled attack on the technological problems of fuels syntheses so long as this "incentives" myth remains credible, that is, until an actual test is made.

I thus propose that we make a test within clearly defined terms, on the basis that it will not result in increases in unit cost of incremental supplies of gas beyond those that we are already willing to sanction. I recognize, of course, that adoption of the proposal would contribute windfalls to the producers who would, at least in theory, be willing to continue current finding levels at roughly current prices. I think, however, that this effect should not determine policy. In this case, the policy conclusion should be based on a comparison of marginal costs versus marginal benefits and the marginal costs of the proposal that I have outlined, if the estimates prove valid, are below those of any of the significant alternatives now being pursued.

Sincerely yours,

JOHN F. O'LEARY.

# NATURAL GAS REGULATION AND THE TRANS-ALASKA PIPELINE

FRIDAY, JUNE 9, 1972

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

The committee met, pursuant to recess, at 10 a.m., in room 1202, New Senate Office Building, Hon. William Proxmire (chairman of the committee) presiding.

Present: Senators Proxmire and Sparkman; and Representative Brown.

Also present: John R. Stark, executive director; Loughlin F. McHugh, senior economist; John R. Karlik and Courtenay M. Slater, economists; Jerry J. Jasinowski, research economist; Walter B. Laesig, minority counsel; and Leslie J. Bander, minority economist.

## OPENING STATEMENT OF CHAIRMAN PROXMIRE

Chairman PROXMIRE. The committee will come to order. In view of the fact that one of our witnesses has to leave early—he has to catch a plane, I understand, to get back to Canada—I am going to let him start first and I have some questions for him and then we will proceed after that, dismiss him, and we will proceed with Mr. Nehring and Mr. Cicchetti.

During the last two days the committee has received expert testimony on the dimensions of our energy crisis. We have been told that this nation's supply of energy has shifted from abundance to scarcity, while the demand for energy has actually increased. The immediate effect of this supply and demand imbalance has been a rapid increase in fuel prices.

Lee White, former Chairman of the Federal Power Commission, told the committee that what may seem like penny increases per thousand cubic feet of gas translate into billion dollar increases in fuel costs for consumers. He estimated, for example, that the 7 percent increase in the price of gas between 1969 and 1971 translated into a \$1 to \$1.5 billion increase in the overall cost consumers must pay for gas.

But our previous days of hearings have made clear that our national energy problems go beyond the current high cost of fuel and require at least the following policies:

First, we must follow policies that efficiently develop energy supplies for the future and we must learn to conserve those supplies by establishing priorities on how we will use these scarce resources.

Second, in developing and using future energy resources we must endeavor to protect the environment as mandated by Congress in the

National Environmental Policy Act of 1969. Good policies do not simply mean the most rapid development and use of energy resources.

Third, because energy resources are crucial to the functioning of our economy and society, the nation's security requires that we protect military and essential civilian needs for energy. The problem with national security needs is that most people who use them to justify their case never get beyond the rhetoric. The most authoritative definition of national security in the energy context was set forth by President Nixon's Cabinet Committee Report on the Oil Import Question as: ". . . protecting military and essential civilian demand against reasonably possible foreign supply interruptions that could not be overcome by feasible replacement measures in an emergency." Section 115, page 8.

This is a good definition and we will employ it in these hearings.

Fourth, we must work hard at developing new techniques to expand our energy base. This includes expansion of our uranium enrichment capacity, environmentally sound oil and gas leasing on the Outer Continental Shelf, accelerated research into nuclear fusion, and the development of Arctic region oil and gas reserves.

Thus, a wise energy policy is one that carefully balances environmental, economic, national security and other social demands while encouraging the development of new techniques to expand our usable base.

The importance of the Alaskan North Slope oil and gas fields in this national energy context is great. The known oil field in the Prudhoe Bay field alone contains over 25 percent of our oil reserves and is a significant addition to our gas reserves. In addition, the North Slope field is adjacent to estimated Arctic region reserves of 44 billion barrels of oil and large gas deposits.

There is no serious question about whether these huge oil and gas reserves should be developed, but there are a great many questions about how they should be developed and used.

With the assistance of the Joint Economic Committee staff, I have examined the material related to the Interior Department's approval of the Trans-Alaskan pipeline, including its final impact statement, the related economic and security analysis, the four volumes of comments submitted by conservation groups to the Department of the Interior, and Secretary Morton's May 11th public justification for proceeding with the Trans-Alaska pipeline right-of-way.

Unfortunately, I could not find in Secretary Morton's public statement justification for the Trans-Alaska pipeline approval. As I wrote Secretary Morton on May 19th, "There are serious omissions and inconsistencies among these documents, including inconsistencies between your public statement and the findings contained in the impact statement and the economic and national security analysis done by the Interior Department staff."

I also pointed out that the Secretary's public statement of May 11th was inadequate as an explanation of what substantive factors in fact caused him to believe that national security and economic considerations so overwhelmingly supported the Trans-Alaskan alternative.

Secretary Morton replied that he would come before the committee on June 22 and give a detailed explanation of his decision to approve

the Trans-Alaska pipeline. He also sent me a 45-page written document that purports to explain the decision. Both my letter and his complete response will be included in the record of the hearings.

Today we will have independent testimony analyzing the economic, environmental and national security merits of the decision to approve the Trans-Alaska pipeline. We will attempt to put this question into the broad context of national energy needs that may have been lacking in the Interior Department's analysis. We will inquire whether the Interior Department's evaluation process was adequate, objective and fair.

Our first witness this morning is Hon. David Anderson, Member of the Canadian Parliament of the House of Commons. He was elected to Parliament in 1968 and is Chairman of the House of Commons Special Committee on Environmental Pollution.

Mr. Anderson, I understand, as I said earlier, that you have a plane to catch, so we will be happy to put you on first.

We have a system of timing our witnesses and allowing them precisely ten minutes, at which point we will cut you off, insert in the record your complete prepared statement, and then proceed directly to questions.

#### STATEMENT OF HON. DAVID ANDERSON, MEMBER OF THE HOUSE OF COMMONS, CANADIAN PARLIAMENT

Mr. ANDERSON. Thank you, sir.

My name is David Anderson and I am a Member of the Federal House of Commons from British Columbia, a member of the Liberal Party as well as its leader in the Province of British Columbia and I am most appreciative for the invitation extended to me to come and testify before you.

I have a prepared statement which you and your committee members have received and I will perhaps, as our time is limited, proceed more informally and then go directly to questions.

First, sir, I would like to explain the concern in Canada about the Cherry Point refinery and the southern terminals of the Alaskan tanker route—

Chairman PROXMIRE. Will you pull the microphone a little closer to you; this is a big room.

Mr. ANDERSON. Is that better.

First, I would like to explain our concern over the Trans-Alaska pipeline. It is not related exactly to what happens in Alaska. We are only concerned about the impact on the Canadian side and this means in particular impact from oil spills resulting from the tanker Route being established at the Cherry Point refinery, at a cost of \$150 million, south of the island of Vancouver; the refinery is the best in the world. No damage or spill could be expected and I have for you, sir, three newspapers, this week's newspapers, Vancouver newspapers, where you have on the front page a picture of a child in Canada, Crescent Beach, hands covered with oil, with underneath the headline "Cherry Point Oil Slick Fouls Crescent Beach."

The following day, Wednesday, that was a Tuesday paper. I would like to show you again, sir, the two major photographs—birds covered in oil, children, high school children cleaning up the spill on the beach.

And then, finally, yesterday's paper, the latest one, a rather ironic picture of the Peace Arch, Canadian-U.S. border, and again a large number of people in Canada attempting to clean up oil spill from Cherry Point.

In other words, we do feel that the arguments put forward by the companies are fallacious; they have not got the technology even to take care of a minor spill. They proceeded to build a refinery without proper safeguards. They deliberately chose a site in which currents would take the oil northward out of American jurisdiction where presumably political criticism and comment would be less damaging to their interests.

So we do feel we have a genuine cause for complaint. We feel the events of this week have proved it.

I would like to answer that the subject of this oil spill was the topic for an emergency debate in the Canadian House of Commons yesterday and this debate extended throughout the day. In other words, we have a genuine problem; we have reason for genuine concern. We also feel the information provided by the companies has not been accurate, indeed may have been deliberately misleading.

I may point out the spill I have referred to was a minor one, and it has nothing to do with the spills the U.S. Coast Guard says can be expected when the Valdez to Cherry Point refinery route is established. The spill in question was, I believe, from Middle Eastern oil carried by a Liberian tanker to Cherry Point.

The point I would like to make to you, sir, at this time is that if this route is established and if these security arguments are accepted by the United States Congress and by the people of the United States, we must in turn accept some of the logic following from the security arguments of Secretary Morton. First of all, of course, it will mean scrapping defense agreements on the West Coast between the U.S. and Canada which involve, of course, areas of jurisdiction of the Pacific for submarine, antisubmarine patrol purposes. We have indeed a situation as a logical outcome of a decision based on a fallacious security argument:

All security defense-sharing agreements on the West Coast between Canada and the U.S. must immediately come into question, first, because we don't have the equipment—the military equipment—to substantially protect a brand new and very important route; second, because we feel this route is definitely against the interests of the Canadian people on the West Coast and we fail to see why Canadian servicemen should be exposed to hazard, possible loss of life, defending a route which is in no way in the Canadian interest and is based on a fallacious security argument designed more to protect the—or I should say designed more to justify some original bad investment decisions by oil companies rather than on the security of the United States or Canada.

If we accept the arguments of Secretary Morton, we must point out, sir, that the Alaskan Highway which for many years has linked Alaska by land with the lower 48 states, which runs through Canada, a highway that curiously enough, I was driving on only yesterday morning, 24 hours ago, is also insecure. We must accept the fact there is no way that we can continue to operate on the basis of our existing defense agreements once the principle is accepted that land link Canadian cross-bridge between Alaska and the lower 48 is insecure.

I point these things out only to indicate to you, sir, there are serious concerns. It will result inevitably in a change in the West Coast defense-sharing agreements. People undoubtedly—it will sadly shake the faith of the Canadian people in the efficiency and effectiveness of our other defense-sharing agreements with the U.S.

I do believe in this respect it is a turning point if these arguments are accepted. We cannot continue as we have done in the last 30 years to assume that we have common defense interests which can be protected by mutual cooperation and interdependence.

May I turn now to the gas pipeline which is an integral part of the energy transportation system from Alaska to the lower 48. Sir, as I have indicated in my prepared statement, there is an excellent chance of having a joint corridor approved or at least ready for consideration to work with the Canadian government and the oil and gas companies will probably be completed within a year; an application will probably be received at that time. It will have to be studied but there is, according to the Minister of Energy, Mines and Resources—maximum of two years would have to elapse before approval or otherwise could be given to that particular proposal.

If, however, an oil line is put through Alaska and a tanker route, damaging to Canadian interests is established on the West Coast, it seems unlikely to me that the Canadian government—and I am a supporter of the present Canadian government as a Member of the Liberal Party as well as its leader in the Province of British Columbia, it seems unlikely to me that the Canadian government would be willing to risk the political consequences of accepting a pipeline when it is predicated upon another pipeline, an oil pipeline, which is so damaging to the interests of West Coast Canadians.

Now, this is in no way suggesting that there is threat involved in this. The U.S. people and Congress and Government have every right to accept the idea of a west coast route, an Alaskan pipeline and a tanker route below that, but I think they should also be aware that the political consequences to the Canadian Government of thereafter approving such a decision by way of accepting the concept of a gas pipeline through Canada thereafter would be, I think, rather interesting.

I just simply would not put money on approval on political grounds if the Alaska route went in.

In other words, in my view, the Secretary of the Interior has incorrectly bifurcated the two problems: one is of gas movement; one is of oil movement. He has made an assumption on the movement of gas and I believe that gas is of just as equal importance, if not more important—Alaskan gas is just as important as oil to the U.S. economy. I believe he made this decision on the expectation there would be an automatic approval of the Canadian route thereafter.

I am suggesting, sir, that may be correct on technical grounds but on political grounds it is highly unlikely the Canadian Government would wish to risk a gas pipeline which is predicated on an oil pipeline so obviously detrimental to the interests of the west coast Canadians.

I have material here and also in my prepared statement concerning the various events that have taken place—the meetings, letters, between Canadian Government officials and the U.S. Government officials.

I find it difficult to accept the argument that adequate studies have been done of Canadian routes, that the factual material contained in that statement of the Secretary of the Interior which you mentioned a moment ago, sir, can be substantiated when so little effort has been made; in fact, I should say no effort has been made to obtain from the Canadian Government the results of the 30-odd environmental projects, study projects, which are at present underway in the Canadian Arctic.

It seems to me curious that the Secretary of the Interior could reject the possibility of a Canadian joint route which minimizes damage to both countries, basing it on information not provided by the Government doing most of the studies, and by the companies in Canada doing the rest of the studies.

I should point out that in my personal view I am—I have no great torch to bear for the Mackenzie oil route for oil or gas. My personal instincts are, and I would be happy if it were possible to delay this to when technology is improved as it is currently improving.

I do feel, however, that we, the Canadian people, and I as a representative of those people, elected representative, I feel that we are faced with two alternatives, neither one of which may be good from our point of view but one of which is definitely better than the other.

And I leave you, sir, with this comment, that I only wish that, at this point, to indicate that for your interests as well as our own it would be as well to choose the better of two alternatives neither one of which I am particularly inspired by or particularly enthusiastic about.

(The prepared statement of Mr. Anderson follows:)

#### PREPARED STATEMENT OF HON. DAVID ANDERSON

Mr. Chairman and Members of the Committee, I am most appreciative for the invitation extended to me to appear this morning to discuss a subject of intense interest and concern to responsible officials in both the United States and Canada. Few supposedly domestic issues have in recent years initiated greater debate and controversy among our respective citizenry than has the so-called Trans-Alaska Pipeline System.

Judging from the expressions of several of your national environmental groups it would appear that many citizens of the United States are greatly troubled by the threatened pollution of their last vast wilderness area, the further desecration of their west coast beaches, and the seeming refusal of the Interior Department to insist on a plan of development of North Slope reserves that would maximize economic and national security benefits.

Citizens of Canada are distressed over the fact that the issue of delivery of North Slope oil and gas to the lower-48 is viewed, in the States, as a domestic issue. If one thing is clear, it is the falsity of that assumption. For the initiation of any delivery system will have enormous environmental and economic implications to Canadians, and in particular to the residents of British Columbia.

Over the past year it became apparent that Secretary Morton was not inclined to accord appropriate regard to those implications. Consequently, the Canadian Wildlife Federation and I joined together in a rather unprecedented act—we sought leave to intervene in the litigation which three United States' environmental groups initiated against the TAPS proposal. Our effort, although welcomed by the plaintiff groups, was opposed by the Department of Justice, the State of Alaska and the oil companies and they prevailed in the district court. I am happy to report, however, that we carried our fight to the Court of Appeals which recently overturned the determination below and we now are active participants.

My concerns over the impact to British Columbia from the TAPS proposal were first corroborated in the summer of 1971. At that time, as Chairman of the Special Committee on Environmental Pollution of the House of Commons, I

chaired hearings concerned with the ecological impact of the proposed tanker traffic between Port Valdez and the Puget Sound. The thrust of those hearings was clear; initiation of that tanker traffic would place British Columbia's multi-million dollar recreation, fishing and logging industries in imminent peril.

It also became apparent to us that we were dealing with a resource problem that extended well beyond the Prudhoe Bay oil reserves. There was, in addition, the North Slope natural gas and the reserves of both oil and gas in the Canadian Arctic and Mackenzie Delta. Each presented parallel delivery problems and it seemed apparent that total environmental disadvantages could be minimized and economic advantages maximized only through a comprehensive analytical approach.

However, as we explored the problem in greater depth, it became apparent that the Interior Department was not moved by the logic that seemed to us so apparent. Indeed, it now appears that the Department, anxious to expedite exploration and delivery of the Alaska oil reserves, made an early commitment to the TAPS proposal presented by the oil companies and never gave competing alternatives sufficient consideration. This conclusion is clear from the recent deposition of former Deputy Under Secretary Jack Horton.

Ultimately it became apparent even to the Department that impacts to Canada could not be avoided. I have reference now not merely to the unavoidable damages to British Columbia, but to the necessity to transport Prudhoe Bay natural gas to the lower-48 by pipeline through Canada. The final environmental impact statement released by the Interior Department on March 20 concedes repeatedly that the natural gas will have to be transported overland through Canada. Logic would dictate, therefore, that the environmental consequences of that gas pipeline system be analyzed and, in view of its essentiality, that an analysis be undertaken of the economic and environmental implications of transporting both the oil and gas in an overland pipeline corridor.

Unfortunately the impact statement, notwithstanding its comprehensive facade, failed to undertake these basic analyses. Indeed, I understand that it was not until this past March, when Minister Macdonald undertook to come to Washington to meet with Secretary Morton, that the subject of the possibility of a Trans-Canadian oil pipeline was discussed. In the past, Secretary Morton has been content to request the oil companies, which already had demonstrated their commitment to TAPS by buying the required pipe and depositing it along the proposed Alaska route, to undertake the only substantive discussions with Canadians without the Interior Department so much as even undertaking a follow-up.

Indeed, the only direct request made to Canadian officials occurred on July 9, 1971 and related solely to a request for information concerning the effect of marine traffic in Puget Sound. In the interim we in Canada have not sat back. Mindful of the necessity to transport the natural gas overland, and of the probability that the Canadian reserves may soon require the construction of pipelines in the Mackenzie Valley, we have launched an unprecedented study effort designed to examine fully the environmental implications of overland pipeline construction through Canada.

Upwards of \$43 million have been spent on these efforts by the Government and private interests. During his recent Washington visit, Minister of Energy Mines and Resources, Donald S. Macdonald, apprised Secretary Morton of the status of the 30 studies now underway by our Government. This was not the first such communication. On March 28 of this year Minister Macdonald outlined the magnitude of the official Canadian effort in a letter to the Secretary and presumably the Department of Interior officials involved with the preparation of the impact statement were equally cognizant of the great deal of relevant activity going on north of the border.

Yet is it my understanding that at no time was either the Government of Canada or private research interests solicited by the Department for information save for the July 9, 1971 communique limited to marine traffic in the Puget Sound. To be sure many of our efforts have yet to be completed but much important preliminary data already has been accumulated. In his May 4 letter to Secretary Morton, Minister Macdonald indicated that the 30 Government studies were due for completion later this year. Canadians, however, had no way of anticipating that the Secretary, notwithstanding that knowledge, would choose to announce issuance of the Alaskan permits one week later. The Secretary alone was privy to his intentions and the point is he never requested the data being accumulated as a result of a \$43 million dollar commitment by Canadians.

As I stated earlier, the issue is not purely a domestic one. Canada will be impacted if only because we will be asked to accept your gas pipeline. It strikes me as a bit presumptuous to authorize the TAPS proposal in full recognition of the gas delivery situation without first initiating discussions with Canada and jointly exploring the environmental and economic implications.

Had such an inquiry been initiated before the Interior Department became, in its own mind, irretrievably committed to TAPS, it is likely that the logic of the Trans-Canada alternative would have become apparent. When we intervened in the litigation we took the position that the Interior Department was confronted not with an oil problem alone, but with a resource problem. That is, that it could not bifurcate the problem of delivering North Slope oil to the lower-48 without considering the natural gas as well. Yet when the impact statement compared alternative routes, it ignored the inextricable gas problem. Had the problem been viewed comprehensively, had a common corridor been analyzed, every indication points in favor of a Trans-Canadian route and against TAPS.

However, at no time did the Department undertake a comprehensive corridor analysis. It wasn't until hours before the Secretary's May 11 announcement in favor of TAPS that a staff economic analysis was prepared and an environmental analysis has yet to be initiated. That is not to say that it has not been undertaken. It has, by the plaintiff environmental groups and though their resources were limited their findings are most impressive.

I could perhaps understand the Department's failure had the Canadian Government expressed its opposition to the Trans-Canada alternative. But if anything it has leaned over backwards to express, as early as August, 1970 and as recently as May 4, 1972, its willingness to undertake serious, expeditious consideration of such a proposal. The United States government, although recognizing the inevitability of crossing Canada with the natural gas, has sat mute. The Secretary's justification is that the North Slope oil is needed in the lower-48 as soon as possible and must be delivered in a way most consistent with United States' national security.

I am dismayed to learn of concerns that the national security is thought to be put in jeopardy by a pipeline through Canada—particularly in view of our long history of mutual dependence on pipelines traversing our respective countries. As to the problem of delay, I can only report what Minister Macdonald made clear on April 19, 1972, on the floor of the House of Commons. In response to my question as to whether—

“... In light of American concern over their supply of oil during the two-year period required to evaluate alternative transportation routes to the Trans-Alaska pipeline system . . . [you have] made clear to [your] United States counterpart Canada's willingness to make oil available to the United States during this period so that a proper evaluation of a route can be undertaken free of short-term security considerations?”

Minister Macdonald replied that:

“Both in my discussions with Secretary Morton and other officials of the United States administration in Washington and recently with Secretary Rogers last week, I made it perfectly clear that Canada was prepared to supply additional quantities of oil to the United States not only for a two-year period but a longer period and that this would be facilitated by their lifting their quota system.”

It is, moreover, important to take a hard look at the projected delay that would be associated with consideration of a Trans-Canada application. The Canadian Government, officially in February of this year (by Aide-Memoire transmitting the February speech of Treasury Board President C. M. Drury), advised the Government of the United States that it would be ready to entertain a pipeline application by the end of this year. By that time our environmental studies should be completed and expeditious consideration of the application should be possible. On March 30, 1972, following his meeting with Secretary Morton, Minister Macdonald was asked for his estimate of the delay that would be involved should the Canadian route be pursued. He responded that the period of delay, originally presumed to be four years, had by all best estimates narrowed to two.

Mr. Chairman, our countries are confronted with very similar problems. Energy requirements are growing, as is, at the same time, environmental awareness. We can either proceed independently or we can join together in open, frank discussions. As I became involved in this controversy I developed a deep appreciation for your National Environmental Policy Act. Not only was I moved by its commitment to a much needed reordering of priorities, but to the dedication of Congress to open the administrative decision-making process to public participation.

From everything I know about TAPS, I must conclude that the Secretary's May 11 decision was precipitous. Should it be reexamined in light of the Canadian expressions of interest, concern and a willingness to share information and resolve interim and long-term difficulties, and I desperately hope that Secretary Morton will see fit to do so, I am confident that the decision that would emerge would strengthen greatly the bond between our countries by minimizing environmental impacts while maximizing the economic and national security advantages to each.

Thank you.

Chairman PROXMIRE. Well, thank you, Mr. Anderson, very much, and I appreciate so much your skillful abbreviation of your testimony. As I say, the entire prepared statement will be printed in full in the record.

I want to focus on three aspects of your fine testimony, the analytical reasons that cause you to support the Canadian proposal, the attitude of the Canadian Government toward the pipeline, and the Interior Department's approach toward the problem as you were able to see it.

One, you say that a joint corridor would minimize environmental damage and maximize economic and national security benefits for both of our countries. Why do you believe this is the case?

Mr. ANDERSON. Because, sir, the west coast route is, in my opinion, more vulnerable. Second, there is the problem, as I mentioned earlier, of the fact that delays may occur in building a gas pipeline which are presently unforeseen, delays resulting from the neglect of Canadian interests on the west coast oil tanker route. I believe it is more secure from the point of view of actual military or ability to control it, protect it. I also believe that because that gas pipeline would proceed down the middle of what you might call the oil patch rather than on the western edge of it, it would be able to pick up oil and gas because another line would be built for gas from both Canada and the American Arctic, the State of Alaska, thus providing an opportunity for perhaps twice as much oil and gas to come to the areas of the United States and southern Canada which, of course, are consuming areas.

In other words, if for some reason foreign supplies, Middle Eastern supplies, were cut off from the United States, it would still be possible, using this pipeline, by perhaps looping it and things of that nature to maximize the flow of gas and oil to the United States on a temporary basis from Canada as well as from Alaska, which is an opportunity denied to you if you build a west coast Alaska route with a tanker route below.

Further, I believe if you look at the weather conditions—and I have charts which I could show you of fog and other conditions of the Pacific in my area—if you look you will find it is one of the nastiest bits of water going. It is unpleasant from the point of view of weather; it is unpleasant from the point of view of fog and distinctly unpleasant from the point of view of antisubmarine patrolling.

Chairman PROXMIRE. You argue from the national security standpoint the vulnerability of the pipeline is due to the fact that any potential adversary seems to concentrate their naval power in the submarine area which is especially susceptible to vulnerability, and then you suggested something that had not occurred to me, frankly, before. You say that the Trans-Alaskan pipeline might bring into jeopardy other defense agreements between the United States and Canada?

Mr. ANDERSON. Yes, sir. If we accept the premise that a pipeline in Canada somehow jeopardizes the security of the U.S. and one bomb—I read the testimony of the Alaskan Senator who was before you a short time ago—that one bomb, perhaps, could jeopardize the security of the U.S., if we accept that, a very curious premise indeed; it points out to Canadians that Americans obviously don't trust Canadians to the point of accepting the Alaska pipeline.

I question whether or not you would wish to have such unreliable allies at your NORAD Headquarters at Colorado; I question whether you would wish to have joint sharing agreements where Canadians support Norfolk, Virginia, and elsewhere in position of certain trust with the NATO or NORAD agreements.

So I do feel that it is in some way, as I said, if this argument is accepted, an argument which is obviously counter to the Canadian interests, you are in a situation where Canadians would have very hurt feelings and would themselves begin to question the validity of some of the assumptions on which we have based our defense sharing and defense arrangements with the United States.

Chairman PROXMIRE. You say the Canadian government has bent over backwards to indicate its willingness to undertake serious, expeditious consideration of a trans-Canadian pipeline. You make two important points that have not been presented to us before: First, that the Canadian government has underway a \$43 million study effort—

Mr. ANDERSON. Correct.

Chairman PROXMIRE (continuing). To examine fully the environmental implications of overland pipeline construction through Canada. We have been led to believe that the Canadian government had made no effort on this score but you say they have already engaged in this very substantial investigation.

Second, the Canadian government estimates a 2-year delay associated with initiation of a Canadian pipeline. In his public justification for approving the Alaskan pipeline, Secretary Morton claims a 3- to 5-year delay. No one seems to know where those numbers came from, but it is useful to have on the record that they did not come, apparently, on the basis of your testimony, from the Canadian government.

I think it is quite valuable to have this evidence on the record. Are there any other explicit actions the Canadian government has taken to encourage U.S.-Canadian cooperation on development of this Canadian pipeline?

Mr. ANDERSON. Well, the statement made by the Minister of Energy, Mines and Resources, which he has made to me in the House of Commons as well as elsewhere—he has indicated to the U.S. Government that he believes the application should be possible at the end of this year or early next year. Consideration will then have to take place but presumably by mid or the end of next year he will be in a position to render a decision.

I should add that he has offered, sir, Canadian oil to make up any shortfall in that period. Existing capacity would allow us to give the U.S. or I should say sell to the U.S. 300,000 barrels a day of oil, which would help to make up deficits. In addition, I should point out that if looping is necessary to increase this, we can do that fairly quickly.

In March of this year, for example, the Inter-Provincial Pipeline requested approval of the looping arrangement—four foot pipe, by the

way; the first time four foot pipe has been used—and it was approved in June.

Indeed, in this morning's Wall Street Journal you will find a little item—I am sorry I don't have the page reference—referring to the approval, so it is quite easy to loop the existing arrangements; we can tomorrow deliver to you an extra 300,000 barrels of oil. Next year we can do 400,000 barrels when the looping is completed; and if you wish, we can certainly increase the looping. So it is not a question of a shortage of oil in any way. It is not a question of having to have the Alaskan pipeline to get oil immediately to the lower 48. It just certainly could not be, in my mind, with the possibility of looping, with the availability of Canadian oil for the U.S. market, there would not be an argument which could be sustained along these lines.

Chairman PROXMIRE. Very, very helpful. We have not had that argument before.

You say in your prepared statement that "it now appears that the Department, anxious to expedite exploration and delivery of Alaskan oil reserves, made an early commitment to the TAPS proposal presented by the oil companies and never gave competing alternatives sufficient consideration." You go on to say this is clear from the recent deposition of former Deputy Under Secretary Jack Horton. Can you tell us what is contained in that deposition?

Mr. ANDERSON. Sir, I don't have a copy of it with me. I could obtain it very quickly.

Chairman PROXMIRE. We would appreciate it if you could obtain it for the record.

Mr. ANDERSON. I will get it for the record for you.<sup>1</sup> I just don't have it at the present time. I believe the statement I heard quoted by the U.S. very clearly indicated the fact that Canadian government studies and studies carried out by companies in Canada, of which I have a list right here—30 studies here. A quick reading of the headings: energy, budget, components, land based, oil spill study, disturbance studies, et cetera—were not requested by the U.S. Government or by Mr. Horton or Secretary Morton.

We felt indeed, if I can generalize, there was a distinct refusal, a policy decision, not to accept information from the very best source that you can possibly obtain information on the Canadian route, namely, the Canadian government.

Chairman PROXMIRE. You say that Secretary Morton consistently asked the oil companies to discuss these matters with your government—the oil companies that is—rather than pursuing such matters on a governmental level. Can you tell us how often this happened and to what extent it dominated our relations with Canada on this matter?

Mr. ANDERSON. It happened, sir, because—I will have to—as I said for the statement, by Mr. Morton and Mr. Horton—I will have to get the information here; I don't have it, not right here now, but, of course, the suggestion that the oil companies should thereafter go after the Canadian route is, I think, rather a stupid one or I should say a nonstarter simply because these oil companies are committed with extensive investment to Alaska. They made that decision many years ago prior to 1970, so to ask those very same companies thereafter to

<sup>1</sup>The information to be supplied for the record was not available at time of printing the hearings.

make an application elsewhere, which would lose them—in their commercial interests, their economic interests—money, is not realistic.

I think if Mr. Morton wished to have information obtained he would have to have the U.S. Government get it or else make specific requests to those companies to do certain things.

The Alyeska Corporation at one time stated there was no way that it could proceed with a Canadian route because its corporate structure was—only allowed it to build a pipeline in Alaska. Well, if your corporate structure is only set up to build a pipeline in Alaska, it is pretty silly to request that particular company to go out and look for another route in Canada. After all, they have their commercial considerations to bear in mind, too, and I think this has been the problem.

To constantly say, "Well, no application has gone before the Canadians; we don't know what will happen" begs the question. No application goes before the Canadians—this is such a massive undertaking building such a pipeline, there are only a few companies that could possibly finance it and they are committed to another route, so what Mr. Morton and Mr. Horton have really said is that the companies will call the shot in this particular operation and the U.S. Government will stand back.

If the companies wished to go into Canada, that would be something else. It is a very curious argument and I simply cannot accept it. If information on the Canadian route was required, it should be considered; I believe it should be the responsibility of the Interior Department to make vigorous efforts to obtain it.

Chairman PROXMIRE. I have one more question before I yield to Senator Sparkman.

You indicated Secretary Morton never even requested the Canadian studies done on the feasibility of a Canadian pipeline.

How could he have evaluated this alternative if that was the case?

Mr. ANDERSON. This is the same situation. There are companies operating on both sides of the border; there are trade journals and I assume he used those. Giving him the full benefit of the doubt, I believe there is a fair amount of the information, 50 or 60 percent of the total, freely available.

Chairman PROXMIRE. If only 50 or 60 percent of the total is available, in other words, he neglected a substantial portion of the information that could have been secured if he had gone to the Canadian government for their analysis?

Mr. ANDERSON. This is my view, sir, and it is the view of the Minister of Energy, Mines and Resources, Mr. MacDonald.

Chairman PROXMIRE. Senator Sparkman.

Senator SPARKMAN. Mr. Chairman, I think you have taken up the questions. I have not finished reading the prepared statement and I will defer to you.

Chairman PROXMIRE. I understand Mr. Anderson does have a plane to catch. We do want to accommodate him. We have two other witnesses who have very significant and important testimony and I think we will proceed with them.

We want to thank you very, very much, Mr. Anderson; you certainly accommodated us very graciously in coming before us. It is a very difficult thing to do. I can see you are a Liberal leader of your province at a young age; apparently you are a young man.

MR. ANDERSON. Thank you very much, sir. May I leave for the committee the articles from the Province newspaper of this week?

CHAIRMAN PROXMIER. I wish you would do that, yes; because this urgency and the fact that you have already documented the fact that they have oil spills now is most impressive and you come with pictures and you come with newspaper reports. They will be placed in the record at this point.

(The articles follow:)

[From the Province (Vancouver, B.C.), June 6, 1972]

#### CHERRY POINT OIL SLICK FOULS CRESCENT BEACH

About 200 volunteers worked with municipal employees Monday night to clean up an oil slick that hit Crescent Beach earlier in the day after drifting from a U.S. refinery.

Meanwhile, Surrey Mayor Bill Vander Zalm said Atlantic Richfield Oil had been "totally unprepared" for the oil spill from its refinery at Cherry Point, Wash.

Between 4,000 and 12,000 gallons of crude oil were dumped into the water at Cherry Point on Sunday after a pipe burst on the Liberian tanker World Bond.

The accident occurred at 6 a.m. Sunday, and less than 31 hours later the oil had reached Crescent Beach. Thin streaks of crude oil were first reported on sandbars at the high tide level at 12:30 p.m.

Marine experts called the Crescent Beach slick minor—but municipal officials and angry residents said a slick of any size is too big.

Earlier Monday, oil hit U.S. recreational beaches at Tongue Point, Birch Point, Birch Bay and Point Whitehorn.

The U.S. Coast Guard reported Monday night that the heaviest spills were in the Birch Bay area.

They said an overflight by helicopters showed that most of the oil that escaped from the Cherry Point dock area had already hit beaches, and no major new patches were expected.

"There are very few offshore patches, and those that do exist are boomed off," a spokesman said.

Volunteers and Surrey municipal workers began cleaning up the Crescent Beach spill late Monday afternoon.

Oil, oil residues and oil-laden seaweed was shoveled up and put in about 4,000 sacks, which were carried away by front-end loaders.

More than 4,000 bales of hay were brought in and placed along the water line to soak up more oil.

At a meeting of Surrey council Monday night, Vander Zalm said Atlantic Richfield "had no knowledge, no experience, no plan" for dealing with the spill.

"They didn't even know that solvent chemicals can't be used," he said.

He said Arco sent two men to Surrey Monday afternoon "but neither has much experience in cleaning up oil.

They didn't even know the laws here—about what the department of fisheries would or would not permit; that certainly shows they weren't prepared."

He said Arco suggested that chemical solvents be used to dissolve the oil, but department of fisheries men on the beach promptly vetoed the idea because the solvent would damage ocean ecology almost as much as the oil.

Ald. Ron Ross concurred, saying in council:

The fellow they sent up here was willing to grasp at any straw, any solution. He didn't know what to do, he wasn't an expert. It was very unfair of Atlantic Richfield to send that man up here."

Vander Zalm said Arco agreed over the phone to pay all costs Surrey incurs in the cleanup and he expects written confirmation by today.

However, Vander Zalm said he could not completely condemn Arco.

They were dumbfounded. They didn't know what to do. Can you imagine having this thrust upon you and being asked in effect—as I asked them—to sign a blank cheque? This is tough for these hardheaded businessmen."

Vander Zalm said council learned about the spill at 3:30 p.m. Monday when the municipal manager, apparently alerted by a Crescent Beach resident, rushed into a special council meeting with the news.

He said an Arco man later told him the company had a plane watching the oil slick all day.

Vander Zalm said he could not understand why Surrey had not been warned by the company earlier in the day.

"I can only attribute this to the fact they had no inkling that this would happen and were totally at a loss as to what to do," he said.

Council authorized the mayor to hire anyone he feels is necessary for the cleanup.

"One thing that might sink in for Arco is getting a big fat bill for the cleanup," said Ross.

Council will also request immediate action from the federal and provincial governments and Arco in setting up an emergency organization to cope with oil spills.

As the cleanup began, Vander Zalm warned sightseers to stay away.

"I hope people don't go down there as tourists" he said.

The slick struck sandbars with the high tide at 10.2 feet as measured at Point Atkinson. Had the tide been higher, said a beach resident, the oil might have struck rocks and would have been more difficult to remove.

Beachside resident John Sinclair said he could smell the crude oil from his home.

"I've got a sample of the stuff and we're going to send it to the Cherry Point people," he said.

Don Ferguson, year-round resident of the area said the damage might be repaired, but that worse spills might occur.

"It proved it could happen, and it could happen to much of our water if enough oil were spilled. It's also proof that a spill like this can travel quickly," he said.

W. R. Green, Surrey administrator of parks and recreation, said that some areas of Crescent Beach were not affected, and that early Monday afternoon there were "a fair number of people on the beach enjoying the sunny weather despite the damage.

When the spill was first reported, Arco officials said that most of the slick was contained with plastic booms inside the wharf area, and that a skimmer—marine vacuum device—was being used to take the oil off the water surface.

Plant manager Jack Racine estimated that of 100 barrels spilled, 20 or 30 barrels escaped. A barrel contains 42 gallons.

U.S. Coast Guard officials later estimated the spill to be between 100 and 300 barrels with an estimated 50 barrels having escaped the boom.

"If they call this a minor spill—and they say only 20 barrels escaped the boom—what would it be like with a so-called major spill," asked Stan Heron, who lives near the beach.

Meanwhile, the South Survey Plan Study Group, a group of residents concerned with the development of South Surrey, sent a telegram to Environment Minister Jack Davis Monday night demanding immediate federal supervision of the cleanup operation.

The group also asked federal and provincial authorities to arrange a meeting with Arco to draw up contingency plans for action and responsibility on any future spills.

The telegram also stated that the group is opposed to the planned tanker route from Alaska to Cherry Point.

At a New Westminster council meeting Monday night, Ald. A. J. Seigo said he would lead a blockade of pleasure boats through Georgia Strait if oil tankers are allowed to carry oil from Alaska to Cherry Point.

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[From the Province (Vancouver, B.C.), June 7, 1972]

#### CREWS TO TRY NEW METHODS IN CRESCENT BEACH CLEANUP

(By James Spears)

Crescent Beach cleanup crews will try technology today to remove crude oil from a mile of beach rocks. If that fails, they'll use muscle and hard work.

Oil spilled Sunday at the Atlantic Richfield refinery at Cherry Point, Wash., hit Crescent Beach on Monday.

Work through the night by an estimated 200 Surrey municipal employees and volunteers cleaned much of the sandy areas of the beach by Tuesday.

Angry citizens of the area have scheduled at least two meetings to protest the spill.

Surrey Mayor Bill Vander Zalm said Tuesday that fisheries department officials would not allow detergents to be used on the oil still left on the rocks, although it would have been the fastest and cheapest method.

Harry Burrough, fisheries department district conservation officer, said that chemical could not be used because of the large amount of wildlife in Boundary Bay.

Instead, three methods will be tried:

Naphtha gas and talcum, to dissolve and soak up the oil, will be the most sophisticated.

Workers will also cover the rocks with sand, then peat moss, and hope that tidal action grinds the oil and sand into the peat moss.

A final method would involve covering the rocks with peat moss and using a high-pressure water stream to dislodge the oil.

Vander Zalm said that if all else fails, crews will have to remove the rocks, which range from pebbles to boulders, or "use wire brushes on them."

Crews spread straw along the beach Monday night to absorb the oil, but could reach only areas accessible by road and were forced to leave the rocks unprotected.

#### WELFARE HELPERS

Vander Zalm said about 50 workers drawn from welfare rolls are being paid the standard municipal rate of \$3.76 an hour.

Fifty employees of the Arco refinery arrived at Crescent Beach to help in the cleanup Tuesday morning.

"Arco offered to bring in more employees, but we asked them not to," said Vander Zalm.

"We don't have to import labor from the U.S. for that purpose. They agreed to leave it to the municipality today."

The company has agreed to pay labor costs in the cleanup, and Surrey municipal employees are working long hours during the emergency.

Volunteers also were being asked to record the number of hours they worked in order for bills to be sent to the refinery.

Members of the Surrey chapter of the environmental group SPEC kept records on the beach Tuesday.

#### PROTEST MEETING

SPEC has called a protest meeting for 7 p.m. Friday at the Peace Arch.

Earlier, an unidentified worker dumped oil-laden straw at the Peace Arch.

Surrey SPEC president Bill Nieuwenhuizen said "it was a spontaneous act by one of our members in the heat of the moment."

A second protest is scheduled to coincide with a visit by Premier Bennett to White Rock on Thursday morning.

Bill Smithaniuk, chairman of the South Surrey Plan Study Group, called the protest for 9:30 a.m. at White Rock Centennial Park. He asked interested parties to prepare their own placards and make their feelings known to the provincial government.

Bennett and the provincial cabinet are due at the White Rock pavilion at 10 a.m. Thursday.

"We don't plan to harass the premier," Smithaniuk said. "This is strictly an ecological protest, but we do think it's about time the provincial government declared itself on the Cherry Point refinery."

Giant oil tankers will transport crude oil from Alaska to Cherry Point if a proposed pipeline is built across Alaska.

In a telephone interview from Stockholm, site of the United Nations conference on the environment, Environment Minister Jack Davis said he was considering legal action against Atlantic Richfield.

"I have asked our people to look into the U.S. law. They will explore all avenues with the justice department and the external affairs office."

He said the Boundary Waters Treaty of 1909 gives Canadians the same rights in U.S. courts as American citizens.

#### COSTS SOARING

The cost of the spill, which Arco officials said was stopped within three seconds, is mounting.

Vander Zalm would not estimate the municipal cost, but said that labor alone could be \$400 or more an hour. Operations are expected to continue for days.

In Washington State, an ecology official said it was likely that either the Liberian-registered tanker, World Bond, which was unloading oil at the time of the spill, or Atlantic Richfield, would be fined.

In Vancouver, harbor master Capt. Roy Holland said the spill was preventable. "I don't mind who knows it; there is no excuse for a spill like that when a tanker is discharging oil. It could not have been properly boomed."

He said minor spills occur in Vancouver harbor, but strict booming has prevented the oil from spreading.

Holland flew over Boundary Bay earlier in a single-engined plane at an altitude of 500 to 1,000 feet and reported he could not see any remaining oil.

Fisheries officials have been worried about the wildlife in Boundary Bay, particularly crabs, clams and herring that spawned during February and March.

Volunteers have established a bird rescue centre at a beachside home. Among the first customers were two marine birds, murrelets.

Attending to the birds was Paul Woodhouse, who wrapped them in blankets to prevent heat loss as a result of damaged feathers. Woodhouse said he had experience in bird rescue during California oil spills.

Arco workers, municipal and federal officials all praised the large turnout of volunteers Monday night to stop the spread of oil on to other parts of the beach.

One fisheries department official on the scene said the same event five years ago would not have produced such immediate and enthusiastic action.

Students excused from Surrey schools were out in force Tuesday, spreading new hay after an estimated 5,000 bales were spread and then collected Monday night and Tuesday morning.

Many adults, some in their 50s, worked on the difficult job of cleaning sticky rocks. Burlap bags were filled with rocks, and some volunteers included broken bits of glass in the haul.

White Rock Mayor Art Wall expressed concern Tuesday for his own beaches, which as yet have not been seriously affected.

Layers of debris, believed to have been carried into tidewaters by Interior flooding, lined the White Rock beaches, and Wall said this might protect beaches by acting in much the same manner as straw.

Wall accepted Vander Zalm's offer of several hundred bales of hay to be stockpiled as a precaution.

Wall said some debris was coated with small amounts of oil, but none had reached the beach sand.

Mr. ANDERSON. I should make one final point on that and that is, it is a great—it really hurts a politician to have an oil company such as ARCO state "Well, you might as well put up with the Alaska pipeline anyway because we are going to bring in Liberian oil or oil from the Middle East in Liberian tankers and you are going to get it coming or going;" and I think it is unfair—not precisely in those words—and I object to it bitterly.

Chairman PROXMIER. Thank you.

Our next witness is Mr. Charles Cicchetti, economist in the Natural Environment and Environmental Quality programs at Resources for the Future. Mr. Cicchetti has served in this capacity since 1969. This spring he was visiting lecturer for a graduate environmental economics seminar at the School of Natural Resources, University of Michigan.

Mr. Cicchetti, you have a very interesting statement. I had a chance to study it. If you would like to abbreviate it for us, we will put the entire statement in the record.

Following you, we will immediately hear from Mr. Nehring and then we will question both of you together.

Mr. CICCHETTI. Fine.

#### STATEMENT OF CHARLES J. CICCHETTI, ECONOMIST, RESOURCES FOR THE FUTURE

Mr. CICCHETTI. In 1971 I reviewed the preliminary environmental impact statement on the proposed Trans-Alaska pipeline; I found

that statement's economic analysis totally unobjective and wholly inadequate. Together with John Krutilla, I filed a detailed comment with the Department of the Interior.

Our comment was acknowledged in the final environmental impact statement as the basis for the revised economic analysis which appears in that statement. I have also examined the revised analysis in considerable detail. Again, I have found the analysis biased, although in a more subtle way. With John Krutilla, I have, therefore, once more submitted written comments, explaining my criticism, to the Department of the Interior, which I have made available to the chairman.

My purpose in testifying today, however, is not to summarize my criticisms of the Department of the Interior's economic analysis of the proposed trans-Alaska pipeline. After the release of the preliminary impact statement in 1971, I undertook independently to evaluate the economic benefits of the proposed trans-Alaska pipeline and its alternatives. My analysis resulted in a manuscript which was made available for comment and review to various individuals in the Department of the Interior, the State of Alaska, Canada, oil experts, as well as economists, in February 1972.

I am presently editing my manuscript in light of these reviews and I would like to present my principal findings and conclusions to this committee. They are:

(1) Assuming (a) that foreign crude oil would be used on the west coast of the United States as an alternative to North Slope oil and (b) that all North Slope oil would be consumed on the west coast, then the present economic value of the proposed trans-Alaska pipeline to the nation, at a 10 percent discount rate, would be between \$3 and \$6 billion. Accordingly, a decision totally to forego development of this resource would mean the nation judged the environmental damage to the State of Alaska, the world's oceans and west coast ports to be greater than or equal to this amount. I will examine these conclusions and further comment below.

(2) The proposed trans-Alaska pipeline transportation system, which necessarily includes use of oil tankers to transport oil from southern Alaska to market, is apparently inferior, from the environmental point of view, to a completely overland pipeline from the North Slope to the Midwest and east coast of the United States.

I am not an ecologist, however, numerous experts in this field have asserted the superiority of the so-called trans-Canada route, principally because it would avoid the marine pollution threat from increased tanker operation as well as the seismic and avalanche threats of southern Alaska.

Indeed, even the Department of the Interior concedes that in view of the near certain prospect of a gas pipeline through Canada to deliver North Slope gas, a joint oil and gas system through Canada would have environmental advantages over a separate oil line through Alaska and a gas line through Canada. Because of the environmental superiority of the all land pipeline, the objective of my research was to determine the amount of the economic advantages of TAPS over the Canadian alternative in order to be able to compare them with TAPS' comparative environmental disadvantages.

(3) I found that a trans-Canada pipeline would probably cost more than the trans-Alaska pipeline; however, when the costs of the port and terminal facilities and tankers required to transport oil carried in TAPS to market are also considered, it is not clear that a Canadian oil line would cost more. Indeed, some estimates made by oil companies would make the two routes appear to be on equal footing and most estimates place the total difference, if constructed at the same point in time, at much less than \$1 billion.

(4) More importantly, I found that the Canadian alternative was actually economically superior in terms of net economic efficiency or benefits to the nation.

I found further that it was superior economically for the State of Alaska and, except under certain interesting schemes for ultimate delivery of the oil, for the oil companies themselves.

I will briefly discuss the benefits to the Nation and the State of Alaska, as well as the situation for oil company profits, in turn:

(a) The Nation: I concluded that the extra costs required to supply the U.S. Midwest rather than the west coast with foreign crude as a replacement for North Slope oil are such that net economic benefits to the Nation are greater under a trans-Canadian pipeline than a trans-Alaskan pipeline. Further, if foreign crude is restricted as an alternative source of supply and some higher cost domestic crudes are used to supply consumers in lieu of North Slope crudes, the economic efficiency benefits to the Nation increase significantly for the Canadian alternatives relative to TAPS. These extra benefits are, in fact, so great—\$3 to \$5 billion in present value discounted at 10 percent (\$16 billion is discounted)—that a Canadian line is economically superior, even if it is delayed two or three years and/or if the Canadian Government imposes as much as a 20 percent tax on the costs of transporting oil across her territory.

(b) The State of Alaska: The price of oil in Chicago—\$3.65 to \$3.81 per barrel—is at least 40 cents and perhaps 60 cents per barrel greater than the price of oil similar in quality to North Slope crude in Los Angeles—\$3.17 per barrel. Note that the price in New York is about 25 cents per barrel greater than Chicago but the extra costs of a Chicago-to-New York pipeline are expected also to equal 25 cents per barrel; therefore, it is appropriate to use the same price for either Midwest or East Coast calculations.

Since such price differences far exceed any additional cost estimates of such a route, the State of Alaska would find that if both routes were to be built at the same time the present value of its tax revenues would be about \$1 billion greater under a Canadian pipeline. Undiscounted, this would equal a loss of about \$5 billion. Given this difference, it would even be in the States' interest to accept possible delays of 2 to 3 years in order to maximize its expected revenue stream, if a Canadian pipeline were to be built.

(c) Oil companies: Higher prices without a similar increase in costs usually mean greater profits. I concluded that if the oil companies intend to produce the oil for sale exclusively on the West Coast if TAPS were built, then they are making a less profitable decision which will cost them about \$3 to \$5 billion in present value of profits—at a 10 percent interest rate—by foregoing the Canadian alternative.

This equals about \$16 billion undiscounted. Oil companies, however,

do not make a practice of passing up such staggering profits. The second part of my analysis addressed this question in considerable detail.

(5) I also concluded that it is likely that there will be an excess supply of oil on the west coast if TAPS is built, which may average as much as a million barrels of oil per day as late as 1985 to 1990 if import restrictions similar to the rest of the Nation are imposed on the west coast. Excess supply may result in increased costs, both environmental and economic, to transport oil into other districts in the lower 48 in new pipelines. It may also reduce competition on the west coast, since domestic companies would have a difficult time trying to compete with lower North Slope crude in west coast markets.

Further, with expected increasing Oil Petroleum Exporting Country—OPEC—taxes, it is more costly to the Nation to produce U.S. oil for export before it is actually needed domestically.

Accordingly, excess supply may be considered a factor which reduces the economic benefits to the Nation and taxes for the State of Alaska, thus making the TAPS alternatives even more inferior than a Canadian alternative. Indeed, oversupply on the west coast would mean that possible delays for an economically superior Canadian route of 5 years or greater could occur and the Nation would still be better off by building a Canadian pipeline.

Lower prices and/or higher costs may also be considered as economically damaging by oil interests. However, two plans for dealing with this excess supply have been discussed which make profits higher than a trans-Canadian alternative and at the same time drive net economic efficiency benefits for the Nation and State taxes down further still. These are:

(a) An Import for Export Plan. Under this plan excess oil would be shipped in foreign-built tankers from Valdez, Alaska, to Japan, thus paying lower royalties to Alaska and avoiding the restriction of the Jones Act and any possible benefit to U.S. shipbuilding. In return, the exporting company would be allowed to increase its imports of foreign crude on the east coast. It is averred by its proponents that this plan will satisfy the national security and balance-of-payment requirements of the present mandatory oil import quota program.

(b) A second plan calls for the use of foreign built and operated tankers to transport North Slope crude oil to Central America where a new pipeline would be built to move oil to another fleet of foreign tankers to carry oil to the Virgin Islands for refining.

By selling oil to themselves or engaging in swaps at the world price, the net back and taxes to the State of Alaska will be reduced. After refining, this domestic crude could then be shipped to the east coast of the United States outside the mandatory oil import quota program reaping larger profits than a direct overland pipeline through Canada but leave the rest of the Nation and the State of Alaska to pay the bills, to say nothing of the land and marine environment that is likely to be damaged.

(6) In addition to the above plans, which if implemented would make TAPS more profitable than a Canadian alternative but much less beneficial for the Nation and the State of Alaska, there are two other important oil company considerations:

First, the average rate of return for the domestic oil and gas industry in the United States before corporate income taxes was about

40 percent in 1970. Additionally, in 1968 the 10 largest domestic oil companies paid average corporate income taxes which were less than 10 percent. Accordingly, while a delay of a year may cost society or the State of Alaska about 10 cents per dollar foregone per year, the oil companies on the North Slope find their opportunity costs to be several times greater than this amount.

Possible delays of 2 or 3 years for the companies involved may therefore double the economic costs to these companies, thus their decision in favor of the fastest possible development is understandable, if not socially justifiable.

In addition, British Petroleum, Limited, has merged with Standard Oil Co. of Ohio. In order to complete this merger as agreed, BP Oil Company of Ohio. In order to complete this merger as agreed, BP must produce 600,000 barrels of oil per day by 1976. Possible delays along with possible loss of pipeline throughput control are doubtless reasons why BP has selected and pursued the TAPS alternative in order to develop the speediest alternative, regardless of United States and Canadian national interests.

(7) Finally, without quantifying the environmental savings expected for a Canadian route, and possible economic savings for a joint gas pipeline, I conclude that national and state interests require the development of the economically superior and more urgently needed trans-Canadian pipeline even with delays up to 5 years when we consider as offsets (a) West Coast oversupply and the various plans for dealing with it, and (b) higher economic benefits per barrel in the Midwest and East Coast compared to the West Coast.

Contrary to this conclusion is the position of the oil companies who, it seems, intend to utilize existing irrational industry regulations at the expense of oil companies, taxpayers, the State of Alaska, the U.S. maritime industry and probably others. Therefore, they have concealed the real reasons for selecting an inferior economic and environmental alternative in order to maximize their short-run profits.

Accordingly, the issue being considered today is more than a question of economic or environmental superiority. In my opinion, the issue is which interest, oil profits or national well-being, will dominate major decisions of this nature.

Chairman PROXMIRE. Thank you very much, Mr. Cicchetti.

Our next witness is Mr. Richard Nehring.

Mr. Nehring was an Interior Department economist before he resigned last week in protest over the department's decision to approve the trans-Alaska pipeline. A former Rhodes scholar, Mr. Nehring is presently a Ph. D. candidate in economics and political science at Stanford University.

I trust it is no understatement, Mr. Nehring, to say that your recent experience at the Interior Department has significantly expanded your understanding of the interactions of politics and economics.

Mr. NEHRING. Quite correct, sir.

Chairman PROXMIRE. Go right ahead.

**STATEMENT OF RICHARD D. NEHRING, FORMER ECONOMIC  
ANALYST, U.S. DEPARTMENT OF THE INTERIOR**

Mr. NEHRING. Mr. Chairman and distinguished members of the Joint Economic Committee, thank you for the invitation to discuss

the national interest in the choice of an oil pipeline route from the North Slope of Alaska to U.S. markets. I am particularly grateful for your willingness to hold public hearings on this subject. It is a refreshing experience to find public officials who believe in a full public airing of matters of this importance.

My testimony today is primarily derived from a paper which I wrote in the Department of the Interior entitled "Future Developments of Arctic Oil and Gas: An Analysis of the Economic Implications of the Possibilities and Alternatives" and a complementary paper which I wrote specifically for these hearings, "The Public Interest in the Choice of a Pipeline Route From the North Slope of Alaska."

I request that they be included in the record as essential parts of my testimony.

Chairman PROXMIRE. Without objection, it will be done. They will be placed at the end of your oral statement.

Mr. NEHRING. The consideration which the senior officials of the Department of the Interior gave to the question of the choice of route was simply inadequate. Their major concern was basically whether a safe Alaskan pipeline could be built. Thus they approached the problem with tunnel—perhaps I should say pipeline—vision; they did not vigorously pursue alternatives; and they did not explore the full implications of their decision.

In my testimony I will discuss those points which they did not adequately consider, all of which provide a strong case for building the initial oil pipeline through Canada.

(1) The West Coast does not need North Slope oil. The Midwest and the East Coast do need Slope oil, and they need it badly.

Secretary Morton has asserted that there will be a crying need for North Slope oil on the West Coast after 1975. That need is largely imaginary. In the first place, it is based upon ridiculous projections of West Coast demand. The estimate which Secretary Morton quotes implies an unprecedented growth rate of over 7 percent annually in petroleum product demand on the West Coast from 1971 to 1975. By contrast, the actual average rate of growth in demand on the West Coast from 1960 to 1971 was 4.1 percent. Continuation of this rate to 1975 would result in a demand estimate of 10 percent or 250,000 barrels per day less than the one Secretary Morton used.

Secondly, Secretary Morton disregarded the alternative sources of supply available to the West Coast. After 1975, up to 15 percent of West Coast demand, or 25 to 30 percent of the projected deficit, could be supplied by production from the giant Santa Ynez field in the western part of the Santa Barbara Channel. After 1980, the West Coast could also be supplied by production from new Outer Continental Shelf leases, the sale of which the Department of the Interior is currently considering.

Both Southern California offshore areas and the Gulf of Alaska offer considerable promise here. Imports from the Western Hemisphere—Canada, Ecuador and Peru—could supply more than 1 million barrels per day to the West Coast after 1980. Some imports from Indonesia and the Middle East would still be needed, but these would be only several hundred thousand barrels per day, a relatively small proportion of West Coast needs.

On the other hand, Secretary Morton conveniently sidestepped the question of how petroleum product demand in the East Coast and

Midwest will be met from 1975 to 1990. In 1971, demand in these two areas averaged 10 million barrels per day, two-thirds of total U.S. demand and five times as much as West Coast demand.

Even if the growth rate in demand declines, demand in these areas will be more than 15 million barrels per day shortly after 1980. The deficit in these two regions—the amount they will need to import without North Slope oil—will be at least 9 to 10 million barrels per day in 1980, roughly six to seven times greater than the projected deficit on the West Coast at that time.

Even if two oil pipelines were built from the North Slope/Mackenzie Delta to these regions, carrying up to 4 million barrels per day, it will be extremely difficult to keep their dependence on imported oil, primarily from the Middle East, at reasonable levels after 1980. Without North Slope oil, we will need five to 10 million barrels per day of Middle East oil in these regions during the 1980's.

My second point follows directly from these considerations.

(2) It is not so important to ship North Slope oil any place in the United States as quickly as possible. What is important is to ship North Slope oil to the right place in the United States as quickly as possible.

National security requires that we avoid allowing any region of the country to become dangerously dependent on any single insecure foreign source for its petroleum supplies. Secretary Morton's decision is directly counter to this. If a trans-Alaskan pipeline is built, after 1980 the western half of the United States will be basically self-sufficient in its crude oil supply. The eastern half of the country will be heavily dependent on imports, primarily from the Middle East. Secretary Morton's decision thus makes the eastern half of the country hostage to the uncertain politics of the Middle East.

If the initial oil pipeline from the North Slope is built through Canada to the Midwest, these risks can be substantially reduced. The eastern half of the country would have much larger domestic supplies available to it. The West Coast would still be basically unaffected. An expansion of the standby production capability at the Elk Hills Naval Petroleum Reserve to 350,000 barrels per day would provide adequate emergency supplies for its needs in any crisis.

(3) The imbalance resulting from construction of the Alaska pipeline is also economically inefficient. If we want to maintain a healthy diversity in our foreign sources of supply, those supplies to the West Coast backed out by North Slope oil—imports from Canada, Indonesia, Peru, and Ecuador and possibly even some domestic supplies—would have to be shipped to the eastern half of the country. During the 1980's this would impose additional transportation costs on the economy of \$75 to \$150 million per year.

(4) The use of a single corridor for all pipelines from the North Slope/Mackenzie Delta to U.S. markets has great economic advantages. The initial oil pipeline will be only the first pipeline; a gas pipeline will have to be completed within a year or two after its completion. The combined resources of the North Slope and the Mackenzie Delta will probably be large enough to justify constructing a second oil pipeline by or shortly after 1980. I have estimated that we can save more than \$1 billion by constructing all of these pipelines in a single corridor through Canada.

(5) The use of a single corridor through Canada would substantially reduce the adverse environmental impacts which would result from large-scale development of the Arctic. The route through Canada minimizes the hazards of earthquakes and tanker disasters. Constructing all pipelines in a single corridor through Canada will minimize the unavoidable terrain disruption from pipeline construction; it will minimize adverse effects on fish and wildlife; and it will minimize the disruptive impacts on the wilderness resources and the native culture of the region.

These considerations, which take account of the broad implications of the different pipeline routes, which give due recognition to the long-run needs of the Nation, clearly point to what the right choice should be in bringing North Slope resources to market. That choice is a pipeline route through Canada.

Thank you.

(The articles referred to in Mr. Nehring's oral statement for the record follow:)

FUTURE DEVELOPMENTS OF ARCTIC OIL AND GAS: AN ANALYSIS OF THE ECONOMIC IMPLICATIONS OF THE POSSIBILITIES AND ALTERNATIVES

(By Richard D. Nehring)

INTRODUCTION

The estimated potential recoverable fossil fuel resources (oil and gas) on the North Slope in the Alaskan Arctic and in the adjacent Canadian Arctic regions, such as the Mackenzie Delta area, are considerably greater than the estimated total throughput of the proposed Trans-Alaska Pipeline (TAPS) or equivalent transportation alternatives to it. The development of this resource will require a pipeline transporting natural gas. It is also likely to require a second crude oil pipeline as well.

The projected daily capacity of TAPS or equivalent alternatives to it would be a substantial proportion of the daily supply of any region of the United States into which it would enter. Thus, in varying degrees, the introduction of a supply of this size into any part of the country will alter existing marketing patterns.

Because of these two factors, the construction of TAPS or any of the alternatives to it would have major implications for a national energy policy for the next 15 years. The purpose of this paper is to highlight some of the major economic implications of TAPS or its leading alternative, a Mackenzie Valley Pipeline (MVPL). It considers how each, as the initial part of a major development, fits into an overall pattern of development of these resources. It also considers the costs of delay of pursuing alternatives to TAPS and the costs of market displacement from pursuing either major transportation alternative. These are then compared with the economics of constructing all pipelines within a single corridor.

The analysis considers these two alternatives in terms of their contributions to national economic efficiency. The implications for corporate economics or the finances of the State of Alaska are not considered. The analysis is also limited to the economic aspects of future developments. It does not consider the environmental impacts. These are either fully discussed in the Trans-Alaska Pipeline Environmental Statement or can be inferred from it.

In an analysis of this type, many alternatives or combinations of alternatives could be considered. The approach of this analysis will be to state several possible alternatives for a given case, and to exclude for specific reasons from extensive consideration several of those mentioned. The bulk of the analysis thus concentrates on those few alternatives which are judged to be most advantageous on the basis of preliminary analysis.

This analysis is essentially a continuation of the earlier analysis reported in *An Analysis of the Economic and Security Aspects of the Trans-Alaska Pipeline*. It presupposes, to a considerable degree, a familiarity with that document. It also uses much of the same methodology and data as that analysis. In some cases, this analysis updates that one by considering data which have become available since the former document was written.

The assessment of future developments in the Arctic and their implications for national energy policies is subject to considerable uncertainty. The total

amounts of oil and gas which can be recovered from the Alaskan North Slope and the adjacent regions of the Canadian Arctic are unknown. The timing of future discoveries, of future resource development and of development of the transportation system are also unknown. The future growth rates in U.S. crude oil demand are unknown. To cope with this uncertainty, a range of estimates is used for each critical variable. The sensitivity of suggested conclusions is also tested against changes within this range.

To facilitate comparisons, all calculations of cost are brought to their present value (in 1972). A single discount rate, 10%, is used for these calculations. Preliminary analysis for this paper indicated that any conclusions are insensitive to rates within the range of 7% to 13%.

#### DEVELOPMENTS OF ARCTIC OIL

##### *The resource potential*

The Prudhoe Bay field is currently estimated to contain 24 billion barrels of oil-in-place. At an estimated recovery rate of 40%, the current proved recoverable reserves of the field of 9.6 billion barrels of crude oil.<sup>1</sup> These reserves alone make the Prudhoe Bay field the largest ever discovered on the North American continent.<sup>2</sup> Nevertheless, the 9.6 billion barrel estimate must be considered a conservative indication of the crude oil potential of the field, the Arctic Slope province, and the adjacent regions of the Canadian Arctic. (See Figure 1 for a map of this region.)

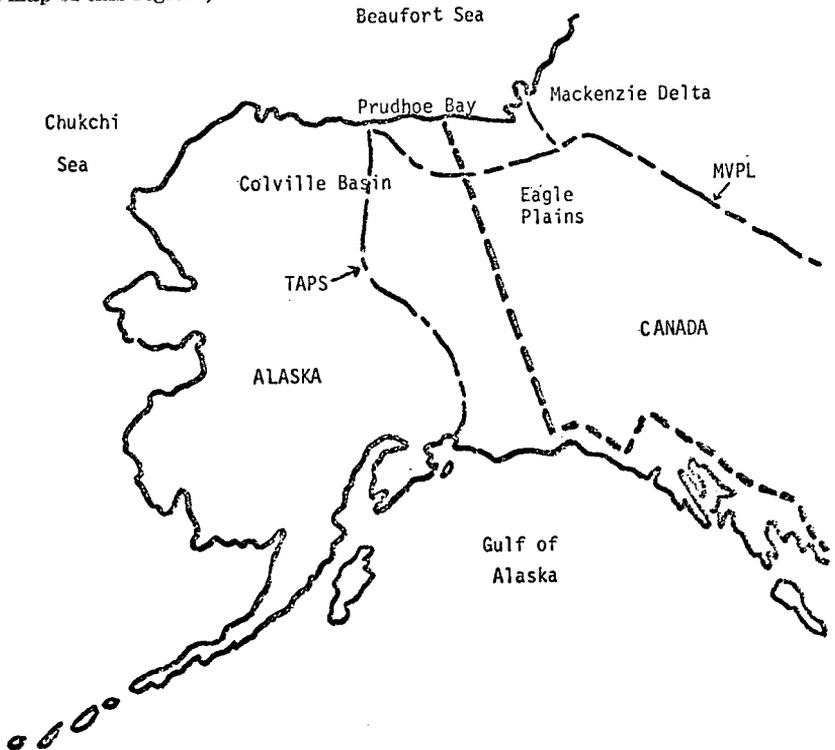


FIGURE 1.—Alaska and Adjacent Canadian Regions with Proposed Pipeline Routes.

<sup>1</sup> American Gas Association, American Petroleum Institute, and Canadian Petroleum Institute, *Reserves of Crude Oil, Natural Gas Liquids, and Natural Gas in the United States and Canada and United States Productive Capacity as of December 31, 1970* (May 1971), p. 27.

<sup>2</sup> Michel T. Halbouty, A. A. Meyerhoff, R. E. King, R. D. Dott, Sr., H. D. Klemme, and Theodore Shabad, "World's Giant Oil and Gas Fields, Geologic Factors Affecting Their Formation and Basin Classification," in Michel T. Halbouty, ed., *Geology of Giant Petroleum Fields*, Memoir 14, American Association of Petroleum Geologists (November 1970).

Initial estimates of the reserves of newly discovered fields seldom indicate their full potential. As further drilling occurs, the proved area of pools is extended. Further developmental drilling and production provide additional information upon which more accurate estimates of reserves can be based. The application of secondary recovery techniques in the field also increases the amount of proved reserves.<sup>3</sup>

The current reserve estimate for the Prudhoe Bay field is for unextended pools and assumes primary recovery only. Since the Prudhoe Bay discovery is quite recent and since relatively few wells were drilled at the time this estimate was made, it is highly probable that reserve estimates will increase as the field is developed. ARCO officials have recently indicated that they hope to recover ultimately 65% to 70% of the oil-in-place.<sup>4</sup> This increase in the recoverable percentage would increase present reserve estimates to 15.6-16.8 billion barrels of recoverable reserves from present estimates of oil-in-place. With the addition of possible extensions, it is likely that at least 20 billion barrels of crude oil will eventually be recovered from the Prudhoe Bay field. This would make it the fifth largest oil field ever discovered.<sup>5</sup>

The estimated reserves of the Prudhoe Bay field do not exhaust the petroleum potential of the Arctic Slope province in Alaska. The Prudhoe Bay field is located in the Colville Basin. Geologically, this basin is classified as an intermediate crucial type (i.e., its underlying crust is intermediate to that beneath continents and that beneath oceans), the basin itself being extracontinental (located on the margin of a continent) and sloping downward into a small ocean basin. Extracontinental, downward warping basins are among the richest sources of oil and gas in the world. Examples of such basins include the Arabian platform and Iranian basin (Persian Gulf), the East Texas basin, and the Tampico embayment (Mexico). Over half of the 119 known oil fields with at least one billion barrels of recoverable reserves are found in the ten known basins of this type.<sup>6</sup>

Basins of this type vary widely in their potential, since their reservoir rocks vary in thickness, lateral extent, presence of traps, porosity, and permeability. Approximately 80 percent of the giant fields (one billion barrels or more in recoverable reserves) and over 90 percent of the super-giant fields (five billion barrels or more) found in this type of basin are in the Arabian Platform and Iranian basin. The other basins of this type (excluding the Colville Basin) have an average of slightly more than four large oil and gas fields each (over 500 million barrels or 2 Tcf), as well as numerous smaller fields.<sup>7</sup> The Prudhoe Bay field is thus unlikely to be a unique deposit, even though it may be unique in size. When exploratory activity renews, it is highly probable that additional fields of varying size will be discovered.

The ultimate potential on the onshore area in the Arctic Slope province (excluding the Arctic Wildlife Refuge, but including Naval Petroleum Reserve Number 4) is uncertain. The platform along the Arctic coast gives considerable geologic indications of being very favorable for both oil and gas.<sup>8</sup> Comparison with the history of similar basins indicates a high probability of further discoveries of varying size. One estimate made prior to the release of detailed information on the Prudhoe Bay field suggested an ultimate recovery of up to 30 billion barrels for the province (including speculative reserves).<sup>9</sup> Other professional estimates made before and since that time (which incorporate higher recovery rates as well as greater optimism about additional discoveries) are somewhat higher, ranging up to 40 to 50 billion barrels.<sup>10</sup> Considerably higher estimates than these have been made,<sup>11</sup> but the geologic evidence for them is lacking.

<sup>3</sup> *Reserves of Crude Oil*, pp. 13-21.

<sup>4</sup> *Oil and Gas Journal* (April 17, 1972), p. 40.

<sup>5</sup> Halbouty, et al.

<sup>6</sup> Halbouty, et al.

<sup>7</sup> Halbouty, et al.

<sup>8</sup> George Gryc, "Summary of Potential Petroleum Resources of Region 1 (Alaska and Hawaii)—Alaska," and W. P. Brosge and I. L. Tailleux, "The Northern Alaska Petroleum Province," in Ira H. Cram, ed., *Future Petroleum Provinces of the United States—Their Geology and Potential*, Volume 1, Memoir 15, American Association of Petroleum Geologists (1971).

<sup>9</sup> Ira H. Cram, "Future Petroleum Provinces of the United States—Their Geology and Potential: Summary" in Cram, ed., *Future Petroleum Provinces*, p. 24.

<sup>10</sup> Sam H. Schurr and Paul T. Homan, *Middle Eastern Oil and the Western World: Prospects and Problems* (New York: American Elsevier, 1971), pp. S6-S7. Personal communications with Richard Meyer, Office of Oil and Gas, and George Gryc, U.S. Geological Survey, U.S. Department of the Interior.

<sup>11</sup> Governor Egan of Alaska was quoted in *The Oil Daily* (July 7, 1971), p. 3, with an estimate of 150 to 300 billion barrels.

The Beaufort basin east of the Richardson Mountains and encompassing the Mackenzie Delta also has considerable geologic potential for petroleum. Two discoveries of oil have been made already in this area by Imperial Oil, Ltd. They are considered to be significant, but official reserve estimates for them have not yet been published. Imperial has only indicated that it is optimistic about finding at least 2 billion barrels of recoverable crude on its Beaufort Basin leases.<sup>12</sup>

The Chukchi and Beaufort Seas off the northern Alaskan and northern Canadian coasts are also believed to be potential oil and gas area.<sup>13</sup> These must be considered more speculative possibilities than the onshore areas. Imperial, Oil, Ltd. currently plans to build artificial islands by dredging in shallow parts of the Beaufort Sea off the Mackenzie Delta later this year. Exploratory drilling will begin from these in late 1973.<sup>14</sup> Other shallow sections may be open to similar techniques. Drilling in deeper areas (50 feet or more) may however prove to be prohibitively expensive, even if geologic prospects are good. Hence, recoverable oil from deeper offshore areas may be limited.

#### *Transportation alternatives and their costs*

The petroleum potential of the Colville and Beaufort Basins and adjacent regions suggests that a second oil pipeline could be a real possibility. The proposed trans-Alaskan pipeline is scheduled to have an ultimate capacity of 2 million barrels per day. With a 25-year operating life and the earlier proposed seven year build-up schedule, this capacity, maintained to the end of operating life, would entail a total throughput around 16.5 billion barrels. With a 30-year operating life, total throughput would be approximately 20 billion barrels. An acceleration in the build-up schedule, reaching full capacity three years after the initiation of operations such as Alyeska recently proposed, would increase each of these totals by one billion barrels.<sup>15</sup>

If proved reserves on the North Slope were to reach a level of 15 billion barrels from extensions only (equivalent to an increase in the estimated oil-in-place to 40 billion barrels) by the period 1975-1980, with the prospect of additional discoveries still to come, a second crude oil pipeline from Prudhoe Bay would then be economically justifiable.<sup>16</sup> With reserves of this size, plus the additional reserves from secondary recovery, the ratio of reserves to production at the full capacity of a single pipeline would be over 30 to 1. By comparison, the ratio of reserves to production in the lower 48 states in 1971 was around 9 to 1.<sup>17</sup> Since the oil companies will be receiving a high rate of return from the production and marketing of North Slope oil<sup>18</sup> and given the projected need for expanded domestic sources of supply, an increase in transportation capacity from the North Slope beyond a single pipeline would be highly desirable, once larger reserves of the magnitude indicated were discovered.

It is likely that the information needed to know whether or not a second pipeline will be economically justifiable will not be available until after the beginning of construction on an initial pipeline. Once construction on a pipeline is permitted, exploratory and developmental drilling should begin again with increased intensity. Within several years after this, enough should be known to provide better indications of total recoverable reserves, particularly for the area between Naval Petroleum Reserve Number 4 (NPR-4) and the Arctic Wildlife Refuge. Knowledge of the full potential of other parts of the North Slope, such as NPR-4, are not likely to be obtained for several years after that, as leasing and drilling would require new legislation permitting commercial development of NPR-4.

If the reserves are adequate to support a second pipeline, four system alternatives (based on previous analyses of most economically efficient routes<sup>19</sup>) are available. (1) If the initial pipeline were TAPS, a second pipeline could be built paralleling it, ending at Valdez where the oil would be transported by tanker

<sup>12</sup> *Oil and Gas Journal* (February 7, 1972), p. 41; *The Oil Daily* (March 8, 1972), p. 6; *Oil Week* (March 13, 1972), p. 9; *Oil and Gas Journal* (April 13, 1972), p. 17.

<sup>13</sup> Gryc, "Summary of Potential Petroleum Resources . . ."

<sup>14</sup> *Oil and Gas Journal* (January 24, 1972), p. 28; *The Oil Daily* (March 8, 1972), p. 6.

<sup>15</sup> For the earlier schedule, see Alyeska Pipeline Service Company, *Summary: Project Description of the Trans-Alaska Pipeline System* (August 1971), p. 55. In a personal communication to Dr. Fred Sanger, U.S.D.I. on April 13, 1972, E. L. Patton, President of Alyeska gave a new build-up schedule beginning with .6 million b/d, increasing to 1.2 million b/d at the end of the first year, and reaching full capacity of 2.0 million b/d at the end of the third year of operation.

<sup>16</sup> See a similar estimate by Milton Lipton, *Oil and Gas Journal* (November 17, 1969), p. 44.

<sup>17</sup> *Oil and Gas Journal* (April 3, 1972), pp. 18-19.

<sup>18</sup> See Office of Economic Analysis, Assistant Secretary—Program Policy, U.S.D.I., *An Analysis of the Economic and Security Aspects of the Trans-Alaska Pipeline* (December 1971), Appendix H.

<sup>19</sup> See *An Analysis* . . . , particularly Appendices C and H.

to the West Coast or other destinations. (2) If the initial pipeline were TAPS, the second pipeline could be built down the Mackenzie Valley (a MVPL) to Chicago. (3) If the initial pipeline were a MVPL, the second pipeline could be TAPS. (4) If the initial pipeline were a MVPL, the second pipeline could be built paralleling it to Chicago or continuing beyond Chicago eastward.

Within these system alternatives, there may also be alternatives in the size of the second pipeline from the North Slope. If extensive additional reserves (at least 20 billion barrels, excluding oil from secondary recovery) are proven before a decision on a second pipeline is made, the second pipeline would quite likely have a 48" diameter (the same as the diameter of the initial pipeline). Smaller additional reserves would likely dictate the use of smaller diameter pipe, such as 42" or 36". (Pipeline design capacity varies directly with the square of the pipeline radius.) This may be particularly desirable if the second pipeline is a MVPL. Smaller diameter branches could be built from both the North Slope and the Mackenzie Delta region, feeding into a 48" pipeline going south from the vicinity of Arctic Red River, N.W.T.

If North Slope oil is to supply U.S. markets only, the first system alternative (a dual TAPS) can be dismissed on the basis of supply and demand balances. The projected crude oil demand for Petroleum Administration for Defense (PAD) District V (the West Coast) in 1985 ranges from 3.7 to 4.2 million barrels per day.<sup>20</sup> Two 48" pipelines operating at full design capacity could supply 4 million barrels of North Slope oil per day to District V after 1985. To this would be added other District V production (California onshore and offshore, Cook Inlet, and the Gulf of Alaska) between 1.0 and 1.5 million barrels per day. District V could also obtain imports from both Canada and Ecuador/Peru.

Thus, for the period from 1985 to 1990, the total potential supply from the Western Hemisphere alone to District V would be considerably greater than any likely demand. At the same time, the other major using districts (I—the East Coast and II—the Midwest) would be heavily dependent on imports from the Eastern Hemisphere. North Slope oil which could not be consumed in District V and which would be shipped to these two districts would either have to move by pipeline from the West Coast to the Midwest or by tanker to eastern U.S. markets with transshipment through Panama. Both of these alternatives are considerably more expensive than transporting the oil by a pipeline through Canada.<sup>21</sup> Expansion of the terminal facilities at Valdez may also be subject to physical constraints and subsequently much higher costs. Hence, a second oil pipeline paralleling TAPS does not appear to be desirable.

For most purposes of analyses, the second and third alternatives are essentially similar. In the long run, they have similar consequences for PAD district supplies. They also have basically comparable total system costs. Since the present permit application is for TAPS, in the following analysis the mixed alternative (TAPS and MVPL) with TAPS as the initial system will be used.

This mixed system and the dual MVPL system would have roughly similar total investment costs, but different consequences for the mix in sources of supply for the various PAD districts. The estimated costs of these two multiple systems are given in Table 1. The table assumes that a second pipeline will be a 48" pipeline like the first. The estimates for each of the initial systems can be considered the "best" comparable estimates currently available. These would entail average transportation costs of approximately \$1.10 per barrel for the TAPS/tanker combination to the West Coast and \$1.30 per barrel for a MVPL to Chicago.<sup>22</sup> This compares with the estimates of \$1.00 and \$1.20 respectively used in *An Analysis of the Economic and Security Aspects of the Trans-Alaska Pipeline*. Further increases beyond these are likely. Alyeska has recently increased its own estimate to \$3 billion.<sup>23</sup> This would most likely imply a similar absolute increase in the cost of a MVPL. Increases are also likely in the estimated costs of the tanker fleet and associated facilities. In most cases, further increases would be applicable to both alternatives. Hence, the relative difference between them is not expected to change to any appreciable degree.

<sup>20</sup> See *An Analysis . . .*, Appendix I-3, and the National Petroleum Council, *U.S. Energy Outlook: An Initial Appraisal, 1971-1985*, Volume Two (November 1971), p. 16.

<sup>21</sup> See *An Analysis . . .*, particularly Appendices C and K-2.

<sup>22</sup> See U.S. Department of the Interior, *Final Environmental Impact Statement—Proposed Trans-Alaska Pipeline*, Volume 4 (March 1972).

<sup>23</sup> *Oil and Gas Journal* (April 3, 1972), p. 38.

TABLE 1.—ESTIMATED SYSTEM COSTS, MULTIPLE TRANSPORTATION ALTERNATIVES FOR CRUDE OIL

[In billions]

	Alternative I	Alternative II
Initial system.....	MVPL: \$5.3 <sup>1</sup> (Construction beginning in 1974)	TAPS: \$2.8 <sup>2</sup> (Construction beginning in 1973) tankers and associated facilities \$1.7 <sup>3</sup>
2d system.....	MVPL: \$6.24-X <sup>5</sup> (construction beginning in 1978)	MVPL: \$6.2 <sup>4</sup> (construction beginning in 1978).
Total.....	\$11.5-X	\$10.7.

<sup>1</sup> From Alyeska Pipeline Service Co., cost estimate: Trans-Canada Oil Pipeline, submission to U.S. Department of the Interior (Fall, 1971—but no specific date) less \$100,000,000 (their estimate has too many pump stations for stated route).

<sup>2</sup> Calculated from estimates given in <sup>1</sup> by Alyeska for various parts of TAPS. (This can thus be considered a comparable estimate of the MVPL estimate.)

<sup>3</sup> Personal communication from Alyeska Counsel, May 10, 1972. Includes \$200,000,000 for additional large tanker facilities on West Coast.

<sup>4</sup> \$5.3 billion at 4 percent per year escalation.

<sup>5</sup> X = cost savings realized from constructing a parallel pipeline.

The estimates for the second system must be considered more tentative. It is unlikely that construction of a second pipeline from Prudhoe Bay would begin any earlier than 1978. Later dates are quite possible. As the preceding discussion has indicated, additional reserves must be proved up if a second pipeline is to be built. Although it is highly probable that the necessary reserves will eventually be attained, it is uncertain when this will occur. The estimates of cost escalation are also subject to uncertainty. Overall costs of pipeline construction in the U.S. increased at an annual average of 3% from 1967 to 1970. Costs of construction alone (excluding pipe, valves, pumping stations, etc.) increased at an annual rate of 5.4% during the same period.<sup>24</sup> Since these are a significantly higher proportion of pipeline costs for a TAPS or MVPL than for typical 48" pipelines, a 4% annual increase was used. A projected escalation of 3% annually would entail capital costs of \$5.95 billion, and an escalation of 5% annually would entail costs of \$6.45 billion for a second MVPL with construction beginning in 1978.

The estimate for the second system also assumes a 48" pipeline from Prudhoe Bay to Chicago. The recent discoveries made by Imperial Oil, Ltd. in the Mackenzie River Delta suggest the desirability of a branched pipeline. This would entail pipelines of diameters smaller than 48" from both Prudhoe Bay and the Mackenzie Delta feeding into a 48" pipeline southward from the vicinity of Arctic Red River. The size of each branch would depend upon the proportion of the proved, probable, and possible crude oil reserves in each area.

Pipelines 36" in diameter from each area would provide equal capacity from each sufficient to fill a single 48" pipeline. A 42"/30" combination would provide roughly a two-to-one difference permitting some marginal adjustments. A greater degree of flexibility and thus some excess capacity on either pipeline would be permitted by a 42"/36" combination. On the basis of current data, the two most likely combinations, if a second pipeline were built, are either a 36" pipeline from each area or a 42" pipeline from Prudhoe Bay and a 36" pipeline from the Mackenzie Delta.

The incremental costs and savings from these combinations can be estimated by rough extrapolations from cost estimates for the various portions of TAPS and a MPLV. A pipeline from the Mackenzie Delta to Arctic Red River would traverse terrain similar to the first one hundred miles out of Prudhoe Bay. The area is one of continuous permafrost with a high ice content. Hence, the pipelines would probably have to be elevated for most of the district depending on the location of the major producing fields in the area, the pipeline could be anywhere from 150 to 200 miles long. On the basis of these assumptions, the costs for this branch with construction beginning in 1978 would be approximately \$350 to \$475 million. Because of the use of smaller diameter pipe and smaller capacity pump stations on the segment from Prudhoe Bay to Arctic Red River, these costs would be partially offset by an estimated \$50 million less investment costs on a 42" line and \$100 million less on a 36" line. The net additional costs of a branched system (assuming 4% cost escalation annually) would thus be anywhere from \$250 million to \$425 million. The total cost of a branched system with construction beginning in 1978 is thus \$6.45-\$6.63 billion.

<sup>24</sup> *Oil and Gas Journal* (August 2, 1971), p. 90.

The major difference in the two alternatives (or variants of them) outlined in Table 1 is the savings which could be realized on the construction of the second system in Alternative I (a dual MVPL). Table 2 presents one estimate of the possible savings which could be achieved from the construction of a parallel oil pipeline. The table indicates both total costs without any savings and those aspects of the total construction effort on which savings could be realized. Savings are estimated on the assumption of a pipeline beginning construction in 1978. The estimates assume that both pipelines would be owned and operated by the same company. The table assumes that there would be no savings on the purchase of pipe and valves and on the construction of pump stations, river crossings, and the terminal. The estimated saving of \$1.082 to \$1.173 million, subtracted from the \$6.2 billion estimated for the second system, yields a cost of \$5.0-\$5.1 billion for the second system of Alternative I with a 48" pipeline. For a branched system, total costs would be reduced from \$6.45-\$6.6 billion to \$5.3-\$5.5 billion with these savings.

TABLE 2.—ESTIMATED COST SAVINGS FROM THE CONSTRUCTION OF A PARALLEL MVPL PIPELINE

(In millions)

	Estimated savings	Estimated costs <sup>1</sup> without savings
Pipe and valves.....		\$762
Pipeline construction:		
0-1,100 miles.....	\$299-\$338	1,398
1,100 miles, Chicago.....	57	872
Pipeline—General:		
0-1,100 miles.....	65- 74	309
1,100 miles, Chicago.....	8	125
Pump stations.....		659
Communication facilities, design and research, aircraft support, materials handling, and right-of-way.....	116- 122	205
Haul road construction.....	275- 290	309
River crossings.....		36
Terminal.....		41
Subtotal.....	820- 889	4,716
4½ percent overhead.....	37- 40	212
Subtotal.....	857- 929	4,928
5 percent contingency.....	43- 46	246
Subtotal.....	900- 975	5,174
Working capital <sup>2</sup> .....	20- 22	177
Interest charges <sup>2</sup> .....	81- 88	468
Cost of delay <sup>2,3</sup> .....	81- 88	468
Total.....	1,082-1,173	6,227

<sup>1</sup> The total cost estimates and the cost categories used in arriving at these estimates were taken from the Alyeska submission noted in table 1, note 1. Total costs are based on construction of a second oil pipeline beginning in 1978 with a 4 percent annual cost escalation from 1974 to 1978.

<sup>2</sup> The savings on these items are assumed to be the same proportion of the total for these items as the subtotal of savings is a proportion of the subtotal of all costs.

<sup>3</sup> Alyeska's estimates were for pipeline construction beginning in 1972. This cost of delay is their estimate of the increase in construction costs from 1972 to 1974.

The estimated savings were based on the following assumptions. They assume that a second pipeline would be built 75 feet away from the initial one (centerline to centerline) on the opposite side of the workpad. The estimated savings for pipeline construction from 9 to 1100 miles assume that most of the considerable costs of route preparation would not be necessary for a second pipeline. The minimum construction zone would have to be expanded from 100 feet to 140 feet; the normal maximum construction zone of 300 feet would not require additional expansion, but some additional cuts and fills.<sup>25</sup> The estimate assumes that all of the necessary clearing and grading would be done at the time of construction of the initial pipeline and that the additional costs of this, with interest, would be deducted from the full costs of new construction to yield the estimated savings. The estimates also assume that the workpad and access roads would remain in place after the construction of the initial pipeline and would

<sup>25</sup> These estimates are based on the design specifications stated in Alyeska Pipeline Service Company, Project Description, Sections 1.4.1.13 and 1.5.12.

be maintained in a usable condition for surveillance of the initial pipeline.<sup>26</sup> The estimated savings do, however, permit some rehabilitation of the workpad and access roads for renewed heavy use, plus a widening of the workpad up to 60 feet. Total savings on the basis of these assumptions were equal to 21% to 24% of estimated total costs of construction on this segment.

The estimates for the section from 1100 miles to Chicago assumes a 10% savings on pipeline construction from 1100 miles of Edmonton and 5% savings from Edmonton to Chicago (mostly for clearing and grading).

The estimated savings for pipeline-general (essentially construction support) were assumed to be the percentage of the total identical to the percentage of savings estimated for pipeline construction. The estimated savings for communication facilities, etc., assume a high proportion (60-80%) of savings on the costs of communications facilities, design and research, and right-of-way, some savings on aircraft support, and none on materials handling. The estimate for haul road construction assumes that the haul road built for the initial pipeline could be utilized for the second one, with some rehabilitation for renewed heavy use. Savings on overhead, contingencies, and financial elements are assumed to be the same proportion of the whole as savings on physical construction expenditures.

For construction beginning later than 1978, the nominal values of these anticipated savings would not change, even though real values would decline. A longer interim between construction of the two pipelines would mean somewhat greater deterioration of the workpad, haul road, and access roads, necessitating higher costs of rehabilitation. There would also be higher costs for equipment assembly. But this annual reduction in savings would be relatively small, probably less than 5% per year. Since this is roughly equal to the rate of estimated cost escalation, no change in normal value is projected.

These savings would be a significant benefit to the U.S. economy. Investment opportunities which could not be pursued because of the large capital demands of pipeline construction would be possible if these savings were realized. The percentage of these savings which should be allocated to the U.S. economy does pose some question. As the analysis has indicated earlier, a second pipeline would most likely have two branches, one going to the North Slope, the other to the Mackenzie Delta. The branch to the Mackenzie Delta would carry Canadian oil produced by Canadian corporations. The investment savings, which would be reflected in subsequently lower transportation costs, would in part accrue to the Canadian economy as well as to the U.S. economy to the extent that Canadian oil was transported through one or both of the pipelines.

The following analysis indicates that most of this saving however should be allocated to the U.S. economy. Of the estimated savings, 55% apply to the segment of the pipeline between Prudhoe Bay and Arctic Red River. Thus, only 45% of the savings would be appreciable to lower transportation costs of Canadian production. As a most likely case, this analysis has indicated a second pipeline system with a 42" branch from Prudhoe Bay and a 36" branch from the Mackenzie Delta. This would indicate that approximately 80% of the production carried in both pipelines would be North Slope production (U.S.) and 20% Canadian production. Allocating the savings over the transportation costs of both pipelines (since savings on the second could not be realized without construction of the first) would mean that only 9% of the resultant transportation cost savings would apply to Canadian oil. Of this amount, part would go to the companies producing the oil and part would go to the Canadian government (in taxes, royalties, etc.). Part of that accruing to the producing companies would be realized by the U.S. economy to the extent that they are the subsidiaries of U.S. corporations. This would indicate that 90%-95% of these savings can be allocated to the U.S. economy.

Table 3 shows the present value of these savings to the U.S. economy discounted at 10% from 1972. The discounting assumes that the savings will be distributed over a three-year construction period, with 40% of the savings being realized in the first year of construction and 30% in each of the subsequent years. The effect of different start-up times (1981, 1983, 1985) is also shown. These correspond to the initiation of construction in 1978, 1980, and 1982.

<sup>26</sup> See *Project Description*, Sections 8.2.2.3 and 8.2.3.3.

TABLE 3.—PRESENT VALUE TO THE U.S. ECONOMY OF SAVINGS FROM CONSTRUCTION OF A PARALLEL OIL PIPELINE

[In millions; discount rate=10 percent]

	Undiscounted savings	90 percent to U.S. economy	95 percent to U.S. economy
Operation begins in:			
1981.....	\$1,082	\$507	\$535
	1,173	548	579
1983.....	1,082	419	442
	1,173	454	479
1985.....	1,082	347	366
	1,173	375	396

*National supply and demand considerations*

The use of a single corridor down the Mackenzie Valley for two crude oil pipelines would have different consequences for the mix of crude oil supplies to the different regions of the U.S. than a TAPS/MVPL alternative. Table 4 shows what these differences might be in 1985 for the Petroleum Administration for Defense (PAD) districts receiving North Slope/Beaufort Basin oil. In the table, districts I and II are assumed to receive all crude oil flowing through Mackenzie Valley pipelines; District V is assumed to receive all crude flowing through a TAPS. The data used are from recent and widely used government and industry studies. The table assumes that a second pipeline would reach full capacity by 1985, i.e., construction of a second pipeline, assuming a rapid build-up, would begin no later than 1980.

With a dual MVPL (Alternative I), Districts I and II (the East Coast and Midwest) would still have a mildly greater relative dependence on Eastern Hemisphere imports than District V, even though District V would be receiving no

TABLE 4.—PROJECTED PAD DISTRICT SUPPLY AND DEMAND, 1985<sup>1</sup>

[Million barrels per day]

	Districts I and II		District V	
	Low	High	Low	High
Demand.....	17.1	18.9	3.7	4.2
Supply:	High	Low	High	Low
Within districts <sup>2</sup> .....	1.1	0.9	1.5	1.0
From other districts (net) <sup>3</sup> .....	2.6	.7		
Canada <sup>4</sup> .....	1.05	.75	.5	.35
Latin America <sup>5</sup> .....	2.0	1.5	1.0	.5
Total, Western Hemisphere.....	6.75	3.85	3.0	1.85
Deficit.....	10.35	15.05	.7	2.35
I:				
North Slope/Beaufort Basin <sup>6</sup> .....	4.0	3.6		2.35
Eastern Hemisphere imports.....	6.35	11.45	.7	
Percent.....	37	61	19	56
II:				
North Slope/Beaufort Basin <sup>6</sup> .....	2.0	1.8	2.0	1.8
Eastern Hemisphere imports.....	7.35	13.25		0.55
Percent.....	43	70	0	13
Changes: Canadian and Latin America <sup>7</sup> .....	1.0		-1.3	

<sup>1</sup> Data derived from USDI, "An Analysis of the Economic and Security Aspects of the Trans-Alaska Pipeline," app. B, L-3, and L-4; and the National Petroleum Council, "U.S. Energy Outlook: An Initial Appraisal, 1971-85," vol. 2. The range of estimates used are, in most cases, the estimates of the NPC and the Bureau of Mines.

<sup>2</sup> District V figures exclude North Slope production.

<sup>3</sup> Excess of supply over demand in district III (less 0.1 mbd to district IV on low supply).

<sup>4</sup> Includes production from tar sands and Canadian Arctic (except for Beaufort Basin).

<sup>5</sup> Districts I and II import primarily from Venezuela; district V imports from Ecuador and Peru.

<sup>6</sup> High supply figures assume full design capacity of 2 mbd per pipeline; low supply figures assume 90 percent of design capacity. All figures assume that the second pipeline reaches full capacity by 1985.

<sup>7</sup> With low demand and high supply estimates in district V, 1.3 mbd of Canadian and Latin American imports are backed out with TAPS. The table assumes that 1 mbd of this goes to districts I and II instead.

crude oil from the North Slope or the Beaufort Basin. The absolute dependence of Districts I and II on Eastern Hemisphere imports would be considerably greater. With a TAPS/MVPL combination (Alternative II) Districts I and II would have a substantially greater dependence on Eastern Hemisphere imports than District V. Under the low demand and high Western Hemisphere supply projections, District V would have to back out most of its potential supplies from Canada and Latin America if it were to absorb all of the North Slope oil being transported through TAPS.

These conclusions are those suggested by the demand and supply projections used in Table 4. However, projections 13 years into the future are subject to considerable uncertainty. Different projections based on different assumptions may affect these conclusions to a considerable degree. Three contingencies are particularly relevant to these conclusions: (1) differences in U.S. demand projections, (2) differences in U.S. supply projections, and (3) differences in Latin America supply projections. The various possibilities in these and their implications for the conclusions are considered below.

Table 4 assumes an annual average growth in demand for oil from 1970 to 1985 of 3.7% to 4.4% in Districts I and II and of 4.3% to 5.0% in District V. This compares with annual average rates of growth from 1960 to 1971 of 3.8% in Districts I and II and 4.1% in District V and annual average rates of growth from 1965 to 1971 of 4.5% in Districts I and II and 4.7% in District V. Observed rates of growth for Districts I and II for different periods of the past decade thus roughly encompasses the range of projected rates of growth in demand to 1985. Observed rates of growth for District V, however, roughly encompass only the lower half of the range of projected rates of growth in demand. An increase in the average annual rate of growth beyond observed rates for District V would still fall within the range of the estimates used in Table 4. An increase for Districts I to II would go beyond the range of projections and imply an even greater dependence on Eastern Hemisphere imports.

Growth in demand to 1985 could also be less than the projections indicate. A declining rate of growth in population could be having a noticeable effect by that time. Net migration to District V could decline. Energy conserving technologies could be developed and introduced. Other constraints on the growth in demand are also possible. A reduction to an annual rate of growth of 4.0% in District V would result in a demand of 3.5 million barrels per day by 1985. Reductions of this size or even growth rates of only 3.0% annually would not significantly affect the heavy dependence of Districts I and II on Eastern Hemisphere oil. For District V, however, a reduction in the rate of growth of demand to 3.5% per year would moderately reduce its dependence on Eastern Hemisphere imports without TAPS (from 19%-56% to 9%-44%). With TAPS, such a reduction would imply supplies solely from U.S. sources to District V if all the North Slope oil through TAPS was to be absorbed there. Under some assumptions about District V supplies (high internal production, limited backing out of imports), moderate to substantial amounts of North Slope oil transported through TAPS would have to be delivered to places other than the West Coast even as late as 1985.

Changes in the assumptions about potential domestic supplies of crude oil would also alter this picture. The projections used in Table 4 assume a total domestic production (less North Slope) of 8.1 to 9.7 million barrels per day in 1985. The estimates, however, particularly the 8.1 million barrel per day estimate of the NPC, basically assumed a continuation of present prices and policies. Price increases, with the impetus they would give to exploration and increased secondary recovery, could result in increased production in the 1980's. Extensive development of the potential oil resources on the Outer Continental Shelf could have the same effect. Under the assumption that the necessary incentives and policies would be forthcoming, total U.S. production (less North Slope) in the middle 1980's could be around 12 million barrels per day. This would break down to a potential of 5 million barrels per day available to Districts I and II and 2 million barrels per day available to District V.

For Districts I and II, this would reduce dependence on Eastern Hemisphere imports from 37%-61% of supply to 30%-43% of supply with a dual MVPL. With a TAPS/MVPL combination, this dependence would be reduced from 43%-70% to 35%-52% of supply. Thus, while some changes would be made, the dependence of these two Districts on Eastern Hemisphere imports would only be moderately reduced. For District V, an increase of this magnitude would have greater relative effects. Without TAPS, the dependence on Eastern Hemisphere imports would be reduced from 10%-56% to 5%-32%. With TAPS and domestic supply (less North Slope) of 2.0 million barrels per day in 1985, District V

would require no Eastern Hemisphere imports under any set of plausible assumptions; under all assumptions it would be backing out all or the majority of Western Hemisphere imports; and under some plausible assumptions it would not even be able to absorb all U.S. production (including that from the North Slope), even if it were receiving no imports.

The third major contingency underlying the projections presented in Table 4 were the estimates of Latin American imports. For Districts I and II, the estimated imports of 1.5 to 2.0 million barrels per day were assumed to come from Venezuela and adjacent fields. The potential Latin American imports for District V were assumed to come from Ecuador and Peru. These latter estimates are highly uncertain. Exploratory drilling in the Marañon-Pastaza basin (southeastern Colombia, eastern Ecuador, northeastern Peru, and western Brazil) has only occurred on a substantial scale during the last two years. The drilling which has occurred has had a remarkable record of success. Nothing equivalent to a Prudhoe Bay field has been discovered, but numerous fields ranging from 100 million to 2 billion barrels of proved, probable, and possible reserves have been discovered in Ecuador, where most of the drilling has been done so far. Given this pattern of success, the oil resources of the basin may possibly even exceed those of the North Slope. Current estimates for 13 of the fields recently discovered in Ecuador give them 5.6 billion barrels of proved, probable and possible reserves. This estimate excluded eight other fields in which discoveries have been made. Since exploration is only beginning in Peru, no estimates are available for its potential.<sup>27</sup>

Texaco Petroleum is currently close to completing a pipeline with a 250,000 barrel per day capacity (with some potential for expansion) from its fields in Ecuador to Port Esmeraldas. Other pipeline possibilities are currently being investigated. Studies are also being made into the feasibility of shipping the oil by barge down the Amazon. This activity points to the possibility of this area becoming a major exporting region by 1980. Some of this production would most likely be used in Latin America itself, supplying Chilean, Ecuadorian, and Peruvian requirements. The markets for the remainder would be the U.S. West Coast, the U.S. Gulf Coast, and Japan. Of these three, the West Coast would produce the highest returns (assuming equal West Coast and Gulf Coast prices) as it would have the lowest transportation costs. Thus, the West Coast, to the extent that it could absorb imports from this area, would be the primary market.

The total amount of oil available for export from Ecuador and Peru by 1985 is uncertain, depending on the outcome of current and future negotiations between the companies and the respective governments, on the timing and success of future exploration, and on the timing of production and transportation development. Table 4 used an estimate of 0.5 to 1.0 million barrels per day to the West Coast. With a favorable political climate, it is not unreasonable to expect a total available for export of 2.0 million barrels per day by 1985. If 75% of this were to be exported to the West Coast, District V would be dependent on Eastern Hemisphere imports for 5%-32% of its total supply without any oil from the North Slope. With North Slope oil, Latin American imports of this size could not be absorbed on the West Coast, even if all Eastern Hemisphere imports were backed out.

The investigation of these three contingencies shows that the projected situation in Districts I and II is essentially insensitive to changes in assumptions. Under any plausible set of assumptions, these two districts will be heavily dependent on Eastern Hemisphere imports, even with 4.0 million barrels per day of Arctic oil, if projected demands are to be met. The projected situation in District V is, however, quite sensitive to changes in assumptions. The smaller absolute shortfall on the West Coast is heavily affected by smaller growth rates in demand and plausible increases in supply. The effect is particularly pronounced if these two factors are combined. Under several plausible sets of assumptions, District V would not be able to absorb 2.0 million barrels of oil per day from the North Slope even if all imports from the Western Hemisphere to the West Coast were backed out.

#### FUTURE DEVELOPMENTS OF ARCTIC GAS

The Prudhoe Bay field has large reserves of natural gas dissolved in or associated with its crude oil reserves. Recoverable gas reserves in the field were estimated to be 26 trillion cubic feet as of the end of 1970.<sup>28</sup> Currently, no pub-

<sup>27</sup> *Oil and Gas Journal* (January 24, 1972), p. 18; *Oil and Gas Journal* (April 17, 1972), pp. 35-38.

<sup>28</sup> *Reserves of Crude Oil*, . . . , p. 170.

lished estimates are available for the distribution of these reserves between the dissolved gas and the associated (or gas cap) gas. An average of 750 cubic feet of dissolved gas per barrel<sup>29</sup> for the current oil reserves of 9.6 billion barrels would indicate reserves of approximately 7 trillion cubic feet of dissolved gas and 19 trillion cubic feet of associated gas. These reserves, which, like the crude oil reserves of the Prudhoe Bay field, are subject to extension and revision, constituted 8.9% of recoverable U.S. natural gas reserves at the end of 1970.<sup>30</sup> They also make the Prudhoe Bay field the 13th largest gas field ever discovered in the world.<sup>31</sup>

The natural gas prospects of the North Slope are not limited to the Prudhoe Bay field. Several gas fields were discovered in the 1940's and 1950's on NPR-4, the largest of which was the Gubik field with 300 billion cubic feet of reserves. Geologic investigations of other parts of the North Slope have indicated a favorable potential for future gas discoveries within them as well.<sup>32</sup>

Large reserves of natural gas in separate field have recently been found in the Mackenzie Delta region. Iperiorrm Mackenzie Delta region. Imperial Oil has drilled two successful gas wells on Richards Island at the mouth of the Mackenzie River. Although no official reserve estimates have been released for this new field, its reserves are believed to constitute a substantial proportion of the estimated 15 trillion cubic feet of gas reserves found in the Canadian Arctic so far.<sup>33</sup>

This would be a significant addition to current Canadian gas reserves<sup>34</sup> and would rank the Richards Island field among the 30 largest gas fields discovered in the world.<sup>35</sup> The potential of this region is also believed to be much greater. Current exploration activity is very intense. One additional gas discovery was made in February, 1972, 45 miles north of Inuvik and additional ones in the near future would not be surprising.<sup>36</sup>

Given the large size of these reserves and the projected shortages in other sources of domestic supply, transporting this gas to U.S. and Canadian markets would seem desirable to meet the potential demand. Two transportation possibilities have been suggested: (1) transporting the gas by pipeline to Valdez, liquefying it, and shipping it in liquid natural gas (LNG) tankers to the West Coast; or (2) transporting the gas by pipeline through the Mackenzie Valley to various U.S. and Canadian markets.

The first alternative has apparently been rejected as uneconomic in comparison with the other. A gas pipeline parallel to a TAPS oil pipeline with a throughput of 3.0 to 3.5 billion cubic feet per day would cost around \$1.6-1.8 billion.<sup>37</sup> Liquefaction facilities in Valdez and gasification facilities on the West Coast would cost around \$2.7-3.0 billion. The LNG tankers required would cost around \$0.9-1.0 billion.<sup>38</sup> Thus, total investment costs would be around \$5.2-5.8 billion for the entire system. With this moderately higher initial investment cost and the significantly higher operating costs associated with LNG operation, the delivered cost of North Slope gas by this means to the West Coast would be at least \$0.25 per thousand cubic feet more than the delivered cost of North Slope gas by a Mackenzie Valley pipeline to the West Coast.

Three different consortia have made proposals for pipelines down the Mackenzie Valley to various U.S. and Canadian markets. The Gas Arctic Systems Study Group, consisting of the Alberta Gas Trunk Line Company, Ltd., the Canadian National Railway Company, Columbia Gas Systems, the Northern Natural Gas Company, the Pacific Lighting Gas Development Company, and the Texas Eastern Transmission Company, has proposed a pipeline down the Mackenzie Valley through Alberta to serve a number of U.S. and Canadian markets. The Mountain Pacific group, consisting of Canadian Bechtel Ltd., El Paso Natural Gas Company, Pacific Lighting Company, Southern California Edison Company, and West-coast Transmission Company Ltd., has proposed a pipeline down the Mackenzie

<sup>29</sup> Suggested by the data given in Bureau of Natural Gas, Federal Power Commission, National Gas Supply and Demand: 1971-1990, pp. 98-99.

<sup>30</sup> *Reserves of Crude Oil*, . . . , p. 124.

<sup>31</sup> *National Gas Supply and Demand: 1971-1990*, p. 74.

<sup>32</sup> See "The Northern Alaska Petroleum Province."

<sup>33</sup> *Oilweek* (February 14, 1972), p. 5. *Oil and Gas Journal* (January 24, 1972), p. 28.

<sup>34</sup> *Reserves of Crude Oil*, . . . , p. 224.

<sup>35</sup> *National Gas Supply and Demand: 1971-1990*, p. 74.

<sup>36</sup> *The Oil Daily* (March 14, 1972), pp. 1-2.

<sup>37</sup> Estimated from a \$2.8 billion cost for TAPS less the costs of terminal and the haul road, plus 4% per year for two years escalation, less 10-25% savings due to lower construction costs for gas pipeline and for parallel construction.

<sup>38</sup> Extrapolated from estimated costs for a smaller Cook Inlet LNG facility as reported in *The Oil and Gas Journal* (January 3, 1972), p. 17.

Valley to Fort Liard. From Fort Liard one branch would go to serve Canadian and U.S. Midwest markets. The Northwest Project Study Group, consisting of the Atlantic Richfield Company, Humble Oil and Refining Company, Michigan Wisconsin Pipe Line Company, the Natural Gas Pipeline Company of America, the Standard Oil Company (Ohio), and Trans-Canada Pipe Lines Limited, has proposed a pipeline down the Mackenzie Valley directly to Emerson, Manitoba, to serve eastern Canadian and U.S. Midwest markets.

These proposals date back to 1970. Since then, a number of changes have occurred, entailing both some changes in concept and considerable increases in estimated costs. No recent estimates are available for the Mountain Pacific project. One of its original members, the Pacific Lighting Company, joined the Gas Arctic consortium in late 1971, indicating that the Mountain Pacific project may now be inactive. Table 5 summarizes the major characteristics of recent Gas Arctic and Northwest Project proposals.<sup>39</sup>

TABLE 5.—COMPARISON OF MAJOR CHARACTERISTICS, PROPOSED GAS ARCTIC SYSTEMS AND NORTHWEST PROJECT GAS PIPELINES

	Gas Arctic	Northwest project
Length.....	2,830 miles, Prudhoe Bay to Emerson, Manitoba, via existing Alberta Gas Trunk Line routes with spurs to Kingsgate, British Columbia, and other places.	2,500 miles, Prudhoe Bay directly to Emerson, Manitoba.
Diameter.....	48 inches.	48 inches.
Capacity throughput.....	2,700,000,000 <sup>1</sup> cubic feet per day.	3,400,000,000 cubic feet per day.
Cooling.....	Gas kept below 32° for first 900 miles from Prudhoe Bay.	Gas kept below 32° from Prudhoe Bay to Emerson.
Compressor and cooling horsepower.	1,333,000,000.....	Up to 2,000,000. <sup>2</sup>
Current estimated cost.....	\$4,400,000 for construction beginning in 1974. <sup>3</sup>	\$3,600,000,000 for construction beginning January 1976, with the possibility of escalation up to \$5,000,000,000.

<sup>1</sup> Based on 3,000,000,000 cfd entering of which 10 percent will be used to power compressors enroute.

<sup>2</sup> Oil and Gas Journal (Oct. 25 1971), p. 92.

<sup>3</sup> Oil and Gas Journal (Feb. 7, 1972), p. 3.

The differences between these two proposals as outlined in Table 5 should not be heavily emphasized at this time. Currently Gas Arctic Systems and the Northwest Project Study Group are negotiating to combine their efforts. The common proposal which will emerge after such an agreement is signed will probably differ in some respects from both proposals stated here.

Many major uncertainties still remain as well. At this time, industry experts differ in their opinions about how soon the gas caps in the Prudhoe Bay field can be tapped. Assuming 750 cubic feet of dissolved gas per barrel of oil produced, only 1.5 billion cubic feet per day of dissolved gas would be produced when oil production reaches a level of 2.0 million barrels per day. The additional gas to meet the full planned capacity of each of these pipelines would have to come from the gas caps. The issue may not be fully resolved until several years after oil production begins, at which time empirical data on the effects of production of associated gas on the production of oil will be available.

Although neither of the proposals cited in Table 5 mentioned it, it is likely that a gas pipeline to the Midwest and lower Canada would transport gas from both the North Slope and the Mackenzie Delta region. The implications of this for the size, throughput, and cost of a gas pipeline have yet to be fully explored by the consortia involved.

Because of these and other uncertainties, the cost estimates for either proposal or for possible future proposals must be considered highly tentative. No detailed stipulations have yet been issued for gas pipelines in the Arctic by either the U.S. or Canadian governments. Hence, changes in design with subsequent changes in costs could be expected. Starting dates are also uncertain. With these considerations in mind, a best estimate of investment costs at this time would be \$4.5-5.0 billion for a pipeline to Emerson with construction beginning one to two years after the initiation of construction on an oil pipeline.

<sup>39</sup> Unless otherwise noted, all of the data in Table 5 are from *Gas Arctic System Study Group* (March 3, 1972), or the statement by Wilber H. Mack, Chairman, Northwest Project Study Group to NARUC Ad Hoc Committee on U.S.-Canada Energy Supply (February 29, 1972).

Investments costs in this range would indicate a delivered price at Emerson of no less than \$0.80 per thousand cubic feet (averaged over a thirty-year pipeline life and including a wellhead price of \$0.15-0.20 per thousand cubic feet) and possibly upwards to \$1.00 per thousand cubic feet. Delivery to major Midwest markets would, of course, increase this by \$0.10-0.25 per thousand cubic feet. Operation in the early years of the pipeline at less than full capacity would entail a somewhat higher delivered price during that period. The costs of North Slope gas delivered to U.S. markets would thus be considerably greater than the current delivered costs of gas produced in the lower 48. But they would be no greater than and probably somewhat less than the delivered cost of gas from LNG imports or synthetic gas, the two other sources of supply which could close the gap between lower 48 demand and supply.

The suggestion has been made, for environmental reasons, that the gas and oil pipelines from the North Slope be built utilizing the same corridor through the Mackenzie Valley. Such an approach could have economic advantages as well, with the potential savings of construction in a single corridor resulting in lower delivered costs for North Slope gas. However, a distinction should be made between two possibilities here. The first possibility would be to build both pipelines within the same *corridor*, following basically similar routes, but utilizing different rights-of-way anywhere from several hundred yards to several miles apart. The second would be to build both pipelines in the same *right-of-way* (i.e., 25 to 30 yards apart) within a given corridor.

The choice between these two possibilities is strongly affected by several important qualitative considerations. A single oil pipeline and a single gas pipeline may not be the only pipelines built from the North Slope and the Mackenzie Delta to U.S. and Canadian markets. As this paper has indicated earlier, the potential oil reserves of the area may be sufficient for two oil pipelines. Further discoveries could eventually justify a second gas pipeline. Currently, the indicated reserves for the Prudhoe Bay field and the Mackenzie Delta region total around 40 trillion cubic feet, the approximate total throughput of a pipeline operating for thirty years with a capacity of 3.5 billion cubic feet per day. Further additions of any appreciable size to this would either support a second pipeline or the construction of a larger pipeline initially from Arctic Red River south (such as a 56-inch line). If a second line for either product were to be built and if any two lines were to be built in the same right-of-way, it would be desirable for the following reasons to build two carrying the same product together rather than two carrying different products.

Pipelines carrying the same product would presumably be built and operated by the same consortium. Hence, the distribution of the savings obtained from utilizing the same right-of-way not pose any problems. With pipelines carrying different products and presumably owned and operated by different consortia, the distribution of savings would have to be negotiated, possibly delaying the construction and operation of the second of the two pipelines to be built.

If both the initial oil and gas pipelines from the North Slope were built using the Mackenzie Valley route, their construction periods would overlap to some degree. The construction of each would take 30 to 36 months to complete, with the construction of the gas pipeline beginning 12 to 24 months after initiation of construction on the oil pipeline. Because of this overlap, the two consortia involved would have to coordinate their efforts carefully to avoid congestion, bottlenecks, and delays. Some congestion would be avoided by the fact that more of the mobilization and construction of the gas pipeline in Arctic regions would occur in the wintertime. However, to some extent necessary construction on the same construction spreads at the same time on the same right-of-way may not be possible. With the use of different rights-of-way, potential problems are limited primarily to possible congestion on the transportation network supporting the construction projects.

The operation of pipelines carrying the same product would require similar surveillance procedures and similar pump or compressor station spacing. Thus, some economies may be possible in operating costs. With different products, some operating differences would be expected. Pipelines carrying different products also face different accident hazards. The owners of the pipeline carrying one product may not wish to expose their line to the hazards posed by a line transporting the other product.

These qualitative considerations suggest that the utilization of a separate right-of-way for the gas pipeline would be preferable if both pipelines were to be built in the same corridor. The available evidence suggests that a second oil or gas pipe is likely to be built and that greater economies would result from using the same right-of-way for both pipelines transporting the same product.

Estimates of the savings which would result from either alternative are necessarily more tentative than the estimated cost savings from the construction of a second pipeline. No detailed cost estimates for the latest gas pipeline proposals are available. Older detailed estimates which are available are not wholly comparable to currently available estimates of oil pipeline costs. Possible costs of congestion are also unknown. The estimates ventured here are based primarily on various qualitative considerations applied to the data which is available.

Since some differences in marketing patterns between Arctic oil and gas are likely, it is probable that oil and gas pipelines would not utilize the same corridor much further south than central Alberta or central Saskatchewan. Subsequently, any economies from construction in a common corridor which could be achieved would apply to no more than the first 2000 miles from Prudhoe Bay. As Table 2 indicated, this limitation does not have a significant effect on cost savings.

The only significant economies which a gas pipeline built in a separate right-of-way are likely to realize would come from the utilization of some of the same transportation facilities (air strips, haul roads, and access roads) serving construction on the oil pipeline, from some possible savings in equipment and crew mobilization, and from some possible savings in support costs (such as use of the same construction camps). The gross savings here could in part be offset by additional costs of congestion. Taking all these factors into consideration, it does not seem likely that possible savings could be more than 5% of the total costs of the first 2000 miles of a gas pipeline. This would fix undiscounted savings from a gas pipeline constructed in a different right-of-way within the same corridor as an oil pipeline at \$100 to \$150 million. The present value of these investment savings (discounted at 10%) would be around \$70-\$105 million for a pipeline beginning construction in 1975, \$60-\$95 million for a pipeline beginning construction in 1976, and \$55-\$85 million for a pipeline beginning construction in 1977.

The estimated investment savings for a gas pipeline constructed in the same right-of-way as the oil pipeline are greater than the savings for a gas pipeline constructed along a different right-of-way. But, they would be less than the savings realized from constructing a second oil pipeline in the same right-of-way as the first. Representatives of Gas Arctic Systems have stated that they do not plan to construct an all-weather haul road from the Mackenzie River to Prudhoe Bay, utilizing a winter haul road instead.<sup>40</sup> They also plan to do most of their construction in regions of detrimental permafrost during periods when the surface is frozen, thus avoiding the expense of a workpad wherever possible. If a haul road and workpad were available to them, they would however realize some savings in utilizing it. The small projected savings for construction of a second oil pipeline in the sections across southern Canada and the northern U.S. would probably not be realized either. Adjusting the estimates in Table 2 for these considerations yields an estimated \$400-\$500 million in savings from constructing a gas pipeline down the Mackenzie Valley in the right-of-way of the initial oil pipeline. The present value of investment savings of this size (discounted at 10%) would be around \$275-\$345 million for a pipeline beginning construction in 1975, \$250-\$310 million for a pipeline beginning construction in 1976, and \$225-\$285 million for a pipeline beginning construction in 1977.

#### THE RESOURCE COST OF DELAY

In *An Economic and Security Analysis of the Trans-Alaska Pipeline*, the comparative economic efficiency of each pipeline route (TAPS and MVPL) was analyzed on the basis of the difference between the resource cost of delivering North Slope oil to its principal market by each route and the resource cost of delivering Eastern Hemisphere imports to that same market. That analysis concluded, on the basis of the best data currently available, that the resource cost differentials of each route, when compared with imported oil, were essentially equal. Therefore, the two routes, from the standpoint of the economic welfare of the nation, were of equal economic efficiency. That analysis also concluded that a MVPL, because construction on it would be completed later, would place a resource cost of delay on the nation. The undiscounted cost of delay, based on a resource cost differential of \$1.50/bbl between North Slope oil and imported oil was estimated to be \$1.095 billion for each year of delay. At the earliest, the amount delayed (730 million barrels for each year of delay) would be received at the end of the life of the pipeline. If a second pipeline were built, the amount delayed would possibly not be received until the end of the life of the field or even until the end of

<sup>40</sup> In various personal conversations with the author, the latest being on May 1, 1972.

North Slope production. Its discounted value (at anywhere from 35 to 50 years hence) was thus considered so small as to be insignificant.<sup>41</sup>

The purpose of this analysis of the resource cost of delay is to complement that earlier analysis, examining what the present value of the net resource cost of delay might be under a variety of assumptions. These different values will then be compared with the present value of the resource cost savings which could be realized from the construction of a gas pipeline, either in the same right-of-way or in the same corridor, and from the construction of a second oil pipeline parallel to an initial oil pipeline from Prudhoe Bay to Chicago.

#### Delay in delivery

If an oil pipeline were to be built from the North Slope to the Midwest (MVPL) instead of TAPS, the availability of North Slope oil to U.S. markets would be delayed. The length of this delay is uncertain. On the assumption that construction of TAPS could begin in early 1973, it seems most likely that if a decision to construct a MVPL were to be made, construction on it could most likely begin between early in 1974 and early in 1975, a delay of one to two years. A similar delay would apply to the initiation of operations as well.

Table 6 shows the consequence of delays of one to two years for the expected delivery of North Slope to 1985. Two different build-up schedules are used: the first is a schedule inferred from that used by Alyeska in its *Project Description*<sup>42</sup>; the second is Alyeska's most recent schedule.<sup>43</sup> As the table indicates, the total amount delayed is not altered by the change in build-up schedules; only the time-stream is altered.

TABLE 6.—ESTIMATED DELAY—NORTH SLOPE OIL DELIVERY, 1976-85  
[Million barrels per day]

Year	Average daily throughput (TAPS)	MVPL with 1-year delay (difference)	MVPL with 2-year delay (difference)
<b>(1) 7-year buildup:</b>			
1976	.6	(.6)	(.6)
1977	.8	(.2)	(.8)
1978	1.2	(.4)	(.6)
1979	1.2	(.2)	.8
1980	1.4	(.2)	1.2
1981	1.6	(.2)	1.2
1982	1.8	(.2)	1.4
1983	2.0	(.2)	1.6
1984	2.0	(—)	1.8
1985	2.0	(—)	2.0
Total		(2.0)	(4.0)
<b>(2) 3-year buildup:</b>			
1976	.6	(.6)	(.6)
1977	1.2	(.6)	(1.2)
1978	1.6	(.4)	.6
1979	2.0	(.4)	1.2
1980	2.0	(—)	1.6
1981	2.0	(—)	2.0
Total		(2.0)	(4.0)

Table 6 however contains the implicit assumption that all North Slope oil produced could be consumed in District V. However, if TAPS attains its capacity in three years after the initiation of operations, this could not occur under almost any set of circumstances. Moreover, a rapid built-up of this nature would seriously disrupt existing marketing patterns in District V. In three years time, all imports to District V would be backed out and would have to seek other markets, generally at greater transportation costs. Even with this occurring, some North Slope oil would have to be shipped to markets other than the West Coast for a period of several years.

Table 7 shows the amount of North Slope oil which would be available for shipment to markets other than District V from 1976 to 1985 if the three year build-up schedule is used. Negative numbers in the table indicate a need for additional imports beyond the minimum amounts specified, positive numbers the amount of North Slope oil available for use elsewhere. A wide range of assumptions about

<sup>41</sup> See *An Analysis . . .*, Statement of Findings.

<sup>42</sup> *Summary: Project Description . . .*, p. 55.

<sup>43</sup> Personal communication from E. L. Patton, President of Alyeska, to Dr. Fred Sanger, USDI, on April 13, 1972.

TABLE 7.—NORTH SLOPE OIL IN EXCESS OF DISTRICT V REQUIREMENTS

[In millions of barrels per day]

District V production without North Slope	Rate of growth in district V demand (percent)	Imports from Canada, Indonesia, Ecuador, and Peru	1976									
			1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
1.01	3.0	0	-0.75	-0.23	0.10	0.43	0.35	0.27	0.19	0.10	0.02	-0.07
		.3	-.45	.07	.40	.73	.65	.57	.49	.40	.32	.23
	4	.6	-.15	.37	.70	1.03	.95	.87	.79	.70	.62	.53
		0	-.87	-.37	-.07	.22	.11	-----	-.13	-.25	-.38	-.52
	5	.3	-.57	-.07	.23	.52	.41	.30	.17	.05	-.08	-.22
		.6	-.27	.23	.53	.82	.71	.60	.47	.35	.22	.08
1.25	3	0	-.99	-.52	-.26	-----	-.15	-.31	-.47	-.65	-.83	-1.02
		.3	-.69	-.22	.04	.30	.15	-.01	-.17	-.35	-.53	-.72
	4	.6	-.39	.08	.34	.60	.45	.29	.13	-.05	-.23	-.42
		0	-.50	.02	.35	.68	.60	.52	.44	.35	.27	.18
	5	.3	-.20	.32	.65	.98	.90	.82	.74	.65	.57	.48
		.6	.10	.62	.95	1.28	1.20	1.12	1.04	.95	.87	.78
1.5	3	0	-.62	-.12	.18	.47	.36	.25	.12	-----	-.13	-.27
		.3	-.32	.18	.48	.77	.66	.55	.42	.30	.17	.03
	4	.6	-.02	.48	.78	1.07	.96	.85	.72	.60	.47	.33
		0	-.74	-.25	-.01	.25	.10	-.06	-.22	-.40	-.58	-.77
	5	.3	-.44	.03	.29	.55	.40	.24	.08	-.10	-.28	-.47
		.6	-.14	.33	.59	.85	.70	.54	.38	.20	.02	.17
1.5	3	0	-.25	.27	.60	.93	.85	.77	.69	.60	.52	.43
		.3	.05	.57	.90	1.23	1.15	1.07	.99	.90	.82	.73
	4	.6	.35	.87	1.20	1.53	1.45	1.37	1.29	1.20	1.12	1.03
		0	-.37	.13	.43	.72	.61	.50	.37	.25	.12	.02
	5	.3	-.07	.43	.73	1.02	.91	.80	.67	.55	.42	.28
		.6	.23	.73	1.03	1.32	1.21	1.10	.97	.85	.72	.58
1.5	5	0	-.49	-.02	.24	.50	.35	.19	.03	-.15	-.33	-.52
		.3	-.19	.28	.54	.80	.65	.49	.33	.15	-.03	-.22
		.6	.11	.58	.84	1.10	.95	.79	.63	.45	.27	.08

Assumptions: Operation of TAPS begins in 1976; buildup to full capacity occurs in 3 years, reaching 2,000,000 barrels per day in 1979.

Negative numbers indicate a need for additional imports; positive numbers indicate the amount of North Slope oil available for use elsewhere.

District V oil production (less North Slope), the growth in District V demand, and in remaining imports to District V are shown in Table 7. The range of estimates for District V production (less North Slope) bracket existing projections. The low estimate (1.0) is the approximate average for the period estimated by the Bureau of Mines; the high estimate (1.5) is the projection of the National Petroleum Council; the middle both splits the difference and corresponds to the average of several other estimates.<sup>44</sup> The estimates for the rate of growth in demand are taken from the projections used in *An Analysis of the Economic and Security Aspects of the Trans-Alaska Pipeline*.<sup>45</sup> Four percent can be considered the median estimate, with 3% and 5% bracketing the likely range of plausible projections. By comparison, actual growth in District V demand from 1960 to 1971 was 4.1%. The growth in demand is measured from a 1971 demand of 2031 thousand barrels per day.

Three estimates for imports in District V are used. The first, a no import case, assumes that all imports into District V would be backed out as necessary by North Slope oil. The second assumes that 300 thousand barrels per day of Canadian oil would still come into District V. With the recent expansion of the Trans-Mountain pipeline from Alberta through British Columbia, the capacity exists to transport at least this amount of Canadian oil to District V. If oil in this amount is not imported into District V, either much of the Trans-Mountain pipeline capacity is unused, a not inconsequential economic inefficiency, or Canadian oil is exported to other Pacific countries, most likely Japan. The third estimate assumes both 300 thousand barrels per day imported from Canada and 300 thousand barrels per day imported from Ecuador, Peru, and Indonesia. The latter figure is slightly less than the likely imports into District V from these countries in 1973. From the standpoint of some individual companies, importing oil from these latter three countries is preferable to buying it from the North Slope producing companies, so long as the delivered cost to them of oil imported from their production leases in these countries is less than the delivered price they would have to pay for North Slope crude. Of the nine major companies in District V (defined as those with over 75,000 barrels per day refining capacity), only two—ARCO and Humble—have significant production capabilities on the North Slope. Seven (ARCO, Gulf, Phillips, Shell, Standard Oil of California, Texaco, and Union), however, are either engaged in exploration efforts or have substantial producing leases in Ecuador, Peru, and Indonesia. If oil from these countries were not imported into District V, it would either be imported into other PAD Districts, with a consequent higher resource cost to the nation from higher transportation costs, or it would be exported to other countries and thus lost to U.S. markets. The two estimates for maintaining imports to the West Coast when North Slope oil is available to it as well assume that the existing oil import system would be altered to permit long-term commercial treaties for oil delivery or to establish area quotas (to maintain, for example, a flow of Indonesian oil to the U.S., a source of supply which otherwise might be lost to U.S. consumers if TAPS were constructed).

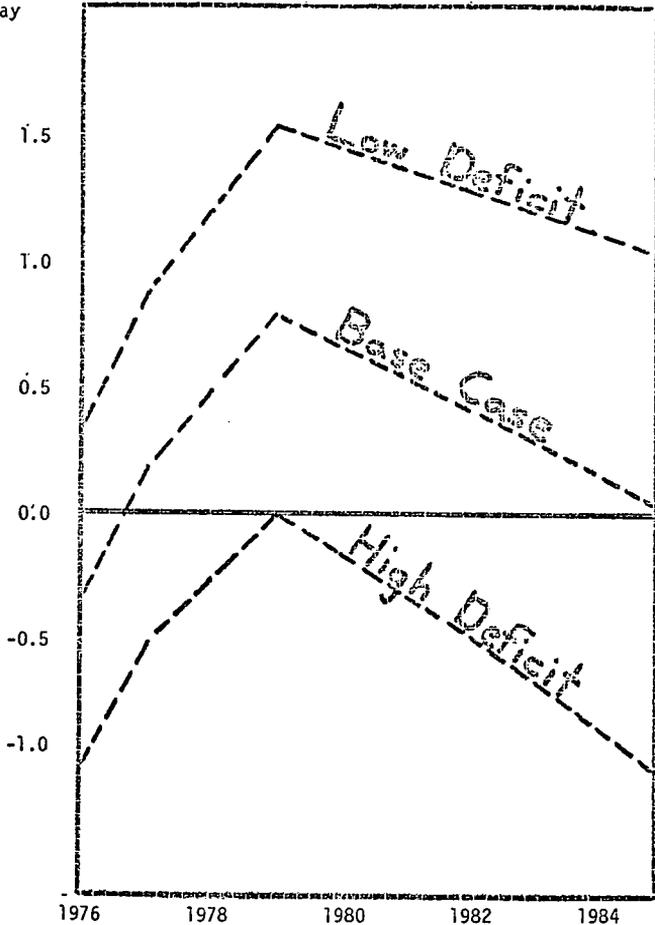
The data in Table 7 are summarized in Figure 2. Figure 2 presents three cases: (1) a base case, assuming District V production of 1.25 million barrels per day, at 4% rate of growth in District V demand, and 300 thousand barrels per day of imports from Canada to District V; (2) a low deficit extreme case, assuming District V production of 1.5 million barrels per day, a 5% rate of growth in District V demand, and no imports. The two extremes bracket all other cases. In all cases, the amount of excess North Slope oil reaches a peak in 1979, the year when TAPS first reaches full capacity. After that time, a growing demand gradually reduces it, or increases the deficit.

Only in the high deficit extreme case is all North Slope oil marketed on the West Coast. In all other cases, some North Slope oil would be, for some years, in excess of District V requirements. In the basic case, nearly 40% of the total throughput of TAPS is in excess of District V requirements in the peak year (1979). In the low deficit extreme case, over 75% of the total throughput of TAPS is in excess of District V requirements. For the period 1976-1985, 1300 million barrels of North Slope oil would be shipped elsewhere in the base case. In the low deficit extreme case, 4165 million barrels of North Slope oil would be shipped elsewhere during this period (this would be 65% of the total throughput of TAPS for the period).

<sup>44</sup> See *An Analysis . . .*, Appendices L-3 and L-4, and U.S. Energy Outlook . . . , Volume 2, p. 41.

<sup>45</sup> See *An Analysis . . .*, Appendix L-1 and Volume III, Chapter 4.

Million  
Barrels/Day



Assumptions:

Low Deficit: District V Production - 1.5 mmb/d, demand - 3% annual growth, minimum imports - .6 mmb/d

Base Case: Production - 1.25 mmb/d, demand - 4% annual growth, minimum imports - .3 mmb/d.

High Deficit: Production - 1.0 mmb/d, demand - 5% annual growth, no minimum imports.

FIGURE 2.—Summary: North Slope Oil in Excess of District V Requirements, 1976-1985.

The imported oil backed out of District V by North Slope production would go to other markets. North Slope oil not utilized in District V would go elsewhere as well. This change in marketing patterns, assuming that all of this oil would go to other U.S. markets, would place additional resource costs on the nation (which will be considered in the subsequent section).

Some of this oil may not be marketed elsewhere in the United States.

Middle East exports to the West Coast could be shipped to the East Coast without additional resource costs. Oil from Peru and Ecuador could be shipped to the Gulf Coast at some additional resource cost. Displaced oil from Indonesia, because of a significantly higher transportation cost, it is not likely to be shipped to the East or Gulf Coasts. Most likely it would be shifted to the Japanese market.

Oil from the North Slope not marketed in District V could be shipped to either the U.S. Gulf or East Coasts. Shipment to the Gulf and East Coasts would entail higher resource costs for North Slope oil delivered in the U.S. It may also face physical or economic constraints from available tanker capacity, particularly if such a route is going to be used for several years only.

Excess North Slope oil could also be exported to Japan. British Petroleum, which controls, through associated companies, roughly 50% of current estimated North Slope reserves, does not have any refining or marketing facilities in District V. Sohio, in whom BP has vested ownership of its Prudhoe Bay reserves in exchange for an interest in Sohio and a share of the profits from Prudhoe Bay production, likewise does not have any such facilities. Until January 1, 1978, or any earlier date in which production from these Prudhoe Bay properties equals or exceeds 600,000 barrels per day Sohio cannot market Prudhoe Bay oil outside the United States or Canada without the consent of British Petroleum.<sup>46</sup> As Table 6 has indicated, with Alyeska's recently announced build-up schedule, this level of production would be reached sometime in 1977, assuming that 50% of production would come from BP/Sohio properties on the North Slope. Table 7 also indicates that there would be almost no excess North Slope oil prior to 1977, and significant amounts of excess oil would not be available under most assumptions until 1978.

British Petroleum also signed an agreement in 1970 with United Petroleum Development, a company created by four separate Japanese companies (Qatar Oil Company, Ltd.). (Japan), Abu Dhabi Oil Company, Ltd. (Japan), North Slope Oil Company, Ltd., and Alaska Petroleum Development Company, Ltd. The British Petroleum has asserted that the agreement relates primarily to exploration offshore of Abu Dhabi and Watar and the sale of Middle East oil to Japan. They also assert that it was not contemplated that Alaskan oil would be involved.<sup>47</sup> The participation of North Slope Oil Company and Alaska Petroleum Development Company in the agreement does, however, indicate a Japanese interest in North Slope oil. Moreover, there are currently no legal constraints on the export of North Slope oil to other countries such as Japan. If the world price for crude oil continues to increase, by the late 1970's North Slope oil could be relatively attractive to Japan.

Any imports to Japan of North Slope oil would reduce the projected amount of oil delivery delayed in comparing TAPS with a MVPL (see Table 6). This would reduce the cost of delay. On the other hand, if a MVPL is built, probably all North Slope oil would be marketed in the United States. Except for an outside possibility of some exports to eastern Canada, it would be uneconomic to ship it out of U.S. markets.

#### *The cost of delay*

Delay in the delivery of North Slope oil to the United States would impose costs on the economy for each barrel of oil delayed. *An Analysis of the Economic and Security Aspects of the Trans-Alaska Pipeline* used as its measure of these costs the difference per barrel between the resource cost of North Slope oil and the resource cost of Middle East oil, judged to be the only significant crude oil substitute to North Slope oil. This analysis assumed that these resource costs and hence the resource cost of delay per barrel would be fixed during the period in which the pipeline would build up to full capacity. It estimated a resource cost per barrel of imported oil delivered to Los Angeles of \$2.80 (\$3.02 to Chicago) and a resource cost per barrel of North Slope oil delivered to Los Angeles of \$1.35 (\$1.55 to Chicago via a MVPL). With these resource costs, there would be a resource cost saving of \$1.45-\$1.47 per barrel from using North Slope oil.<sup>48</sup> (Since these cost estimates are at best accurate only within a range  $\pm$ \$0.05, for all practical purposes the resource cost saving utilizing either pipeline route is identical.)

These assumptions clearly yield rough approximations only. Nevertheless, the use of both more current data and more realistic assumptions, does not significantly alter this differential.

The estimated resource cost of North Slope oil in the earlier analysis consisted of production costs of \$0.30 per barrel, gathering charges of \$0.05 per barrel, and transportation charges of \$1.00 per barrel to Los Angeles and \$1.20 per barrel

<sup>46</sup> Letter from Robin W. Adam, President, BP North America, Inc. to J. O. Horton (former), Deputy Under Secretary, USDI, March 30, 1972. See also *An Analysis . . .*, Appendix F, p. F-20.

<sup>47</sup> Letter from Adam to Horton.

<sup>48</sup> See *An Analysis . . .*, particularly Appendix H.

to Chicago. The production cost and gathering charges were average costs during the early years of production of the field. No changes in these have been indicated. The transportation charges were average costs over the life of each system. Using the comparable investment figures of Table 1, these would be \$1.10 per barrel to Los Angeles and \$1.30 to Chicago, yielding a resource cost of \$1.45 for North Slope oil delivered to Los Angeles and \$1.65 delivered to Chicago.

Some additional increases beyond the estimates of Table 1 are likely to occur. The most recent estimates of investment costs for TAPS indicate a \$0.5 increase in transportation costs. Further increases would not be surprising. Production costs may turn out to be higher. The pipeline may not be able to attain its full design capacity. (A reduction to 90% or 1.8 million barrels per day would increase the resource cost by \$0.05-0.10 per barrel.) Hence, the estimates of \$1.45/\$1.65 are minimum estimates of the resource cost of North Slope oil. Increases to \$1.60/\$1.80 are quite possible. In the following analysis an estimate of \$1.50/barrel for North Slope oil delivered to Los Angeles will be used.

The resource cost of imported oil delivered to Los Angeles was estimated by the Council of Economic Advisers to be \$2.80 per barrel in 1975.<sup>49</sup> This consisted of the following components:

Payments to producing country government.....	\$1.50
Transportation charges.....	0.88
Oil company earnings.....	0.30
Average production cost.....	0.12
Total .....	2.80

The two largest components of the resource cost of imported oil are subject to considerable change after 1975. Payments to the producing country governments are likely to continue to increase. Transportation charges could change in either direction.

The payments to producing country governments may consist of several elements. Currently for Saudi Arabia, Iran, and Kuwait, (the leading exporters from the Middle East), these payments consist of a 12½% royalty on the posted price and a 55% tax on the tax reference price (the posted price less the royalty and the average production cost). After 1975 these payments are likely to consist of some proportion of oil company earnings to the extent that the producing countries are successful in realizing their current demand for participation in the production operations of the international oil companies. This, however, is not likely to change the resource cost initially since the increase in payments to the producing country governments would be balanced by a decrease in oil company earnings.

If the posted price continues to increase at present rates, the resource cost of imported oil would be increasing during the time when a pipeline transporting North Slope oil to U.S. markets is building up to full capacity. Table 8 shows a projected increase in the projected price, continuing the formula of the Tehran Agreement from 1975 to 1980 (2½% per year plus a flat addition of \$0.05 per barrel per year).

TABLE 8.—ACTUAL AND PROJECTED INCREASES, POSTED PRICE AND RESOURCE COSTS TO LOS ANGELES, PAYMENTS TO PRODUCING COUNTRY, 1970-80

[Dollars per barrel for Arabian Heavy 27° ex Ras Tanura]

	1970	1975	1980
Posted price.....	\$1.470	\$2.559	\$3.158
Payments to producing country.....	.767	1.485	1.849
Resource cost to Los Angeles.....	2.07	2.79	3.15

The posted price shown is for Arabian Heavy 27° ex Ras Tanura, a crude oil basically comparable to North Slope crude. The 1975 and subsequent posted prices incorporate the 8.4% increase agreed to at Geneva on January 20, 1972. The table assumes no further changes in exchange rates. Total government payments per barrel are also shown at each posted price (using a tax rate of 50% for 1970, and 55% for all years thereafter).<sup>50</sup> The resource cost to Los Angeles assumes that all other components remain consistent.

<sup>49</sup> See *An Analysis* . . . , Appendix K-3.

<sup>50</sup> Based on the difference used in *An Analysis* . . . , Appendix C, p. C-17.

If such a pattern of increases were to occur, payments to the producing country would increase from \$1.555 in 1976, the earliest year of pipeline operation now possible, to \$1.849 in 1980, the last year of a projected delay with a three-year build-up period. Whether such an increase will occur is unknown. Additional earnings from participation could possibly have a moderating effect on price increases. But this would, in part, depend on what the producing countries would have to pay the international companies to assume part ownership.

Price increases greater than this are also possible. An increasing world demand for crude oil coupled with limitations on production by all or some of the Middle East countries would put strong upward pressures on international prices. Price increases greater than this are also possible. If all other components of the resource cost of imported oil remained constant, this increase in royalties and taxes would make the resource cost of imported Middle East oil delivered to Los Angeles in 1980 \$3.15, still slightly less than the delivered price of comparable domestic crudes in Los Angeles currently. If domestic prices go up, as many observers are now predicting, the price of imported oil could increase even more than the projected increases in Table 8.

If deepwater port facilities are constructed so that supertankers from the Middle East to the West Coast could be used, the transportation cost component could be reduced \$0.20 by 1980. However, increasing investment and operating costs could possibly offset or more than offset the reduction realized by utilizing larger tankers. Delays in approval and other long leadtimes could also delay realization of such a swing until late in the decade. Consequently, the transportation cost component will be assumed to remain constant.

On the basis of these assumptions (Middle East prices continuing to rise at 1973-1975 projected rates, constant transportation costs, and a resource cost for North Slope oil of \$1.50 per barrel delivered to the West Coast), the resource cost per barrel to the nation of not having North Slope oil would be the following amounts:

	1976	1977	1978	1979	1980
Resource cost: Middle East oil.....	\$2.85	\$2.92	\$3.80	\$3.07	\$3.15
Resource cost: North Slope oil.....	1.50	1.50	1.50	1.50	1.50
Cost of delay per barrel.....	1.35	1.42	1.50	1.57	1.65

With a three-year build-up period and one or two years' delay associated with a MVPL, the delay in the delivery of North Slope oil to U.S. markets would occur from 1976 to 1980 (as indicated in Table 6.) During this period the resource cost of delay would increase, according to these assumptions, from \$1.35 to \$1.65 per barrel.

The present cost of such a delay to the economy can be determined by multiplying each annual amount delayed (from Table 6) by this per barrel cost, discounting to 1972, and summing the resulting figures from over the length of the build-up period. Using a 10% discount rate, the present costs of the anticipated delay from building a MVPL to the economy would be \$636.1 million for a one year delay and \$1244.6 million for a two-year delay.

These figures only indicate the gross costs of delay. With a delay in pipeline construction, there would also be a delay in the investment stream for pipeline construction. This would yield some opportunity cost savings to the economy. The capital not used for construction investment could be put to use elsewhere in the economy. Assuming the following investment stream: 10% of total investment in the year before construction begins, 40% of total investment in the first year of construction, and 25% in both the second and third year of construction, the present value (using a 10% discount rate) of the opportunity cost savings are \$239 million for a MVPL with a one-year delay and \$464 million for a MVPL with a two-year delay. These opportunity cost savings are calculated from a base case of a MVPL beginning construction in 1973, compared with a MVPL beginning construction in 1974 and 1975. Construction costs are assumed to increase by 4% annually.

These opportunity cost savings are not the only offset to the resource cost of the delay in North Slope oil. As was indicated earlier in the analysis, if North Slope oil went to the West Coast, there would be a considerable displacement of

existing market patterns. This would place additional resource costs on the economy. With a MVPL, these costs would be avoided.

If oil from Ecuador and Peru were to continue to go to U.S. markets, displacement from West Coast markets would impose additional transportation charges. Rather than shipment in medium to medium-large tankers to the West Coast in an uninterrupted voyage, this oil would have to be shipped to Central America, unloaded, transported by pipeline to the Gulf of Mexico, loaded, and shipped to the Gulf Coast. The use of smaller tankers, the greater proportion of tanker time spent in ports, and the pipeline charge would increase transportation costs of this oil to U.S. markets by at least \$0.15 per barrel.

Under some assumptions, if North Slope oil goes to the West Coast, Canadian oil would be backed out of District V. If this oil were to go to U.S. markets in Districts I and II, it would have a higher transportation cost. (\$0.15-0.20 per barrel). There may also be some opportunity costs to U.S. investors if the existing Trans-Mountain capacity is not used. On balance, the resource costs of displaced Canadian oil would thus be at least \$0.20 more per barrel.

Oil from the Middle East backed out of the West Coast could be shifted to East Coast markets at no additional cost to the nation. Oil from Indonesia backed out of the West Coast by North Slope oil would probably go to Japan, rather than incurring the additional cost of shipment to the East Coast. If this oil is not replaced by oil from other sources, its loss would impose costs on the economy. This analysis, however, assumes that it will be replaced.

As Table 7 has indicated, some North Slope oil may be in excess of District V requirements. If this goes to U.S. markets, there would be additional transportation costs. Assuming that it would go to the East Coast via tankers and a pipeline through Central America, the additional resource costs would be at least \$0.50 a barrel.<sup>61</sup> This assumes the use of non-U.S. flag tankers because of the transshipment through Central America. If U.S. flag tankers were used, the costs would be higher. If some North Slope oil were to go to Japan, this would impose opportunity costs on the U.S. economy. The opportunity costs per barrel would be equal to the difference between the resource costs of Middle East and North Slope oil, the amount of which was indicated earlier (\$1.35 to \$1.65 per barrel from 1976 to 1980).

However, if North Slope oil were to go to District II via a MVPL, there would also be some additional resource costs to the economy. The growth in District II demand and the likely decline in shipments from District III to District II as a result of growing demand with constant or declining supply in District III would not be sufficient to absorb all of the North Slope oil shipped to District II immediately. Some North Slope oil would thus have to be shipped to District I for several years. The additional costs of this shipment would be around \$0.20 per barrel.

All these effects considered together give the net resource costs of delay and market displacement if North Slope oil comes to the U.S. via a MVPL. What these costs are, depend upon the assumptions used to project various possibilities. Tables 9a and 9b show the present value of these net resource costs under five different projected cases for delays of one and two years respectively. The cases used are representative ones, chosen to indicate a broad range of possibilities. Both tables indicate costs only to 1985. Except for the low-deficit cases 4 and 5, no costs of significance are incurred after that time. The tables only consider a single pipeline from the North Slope. In both tables, positive numbers indicate costs from using a MVPL; negative numbers indicate benefits from using a MVPL. The discount rate used was 10%.

Case 1 corresponds to the high deficit case shown in Figure 2. It assumes a 5% annual rate of growth in demand in all PAD Districts and all imports are backed out of District V as necessary. From 1978 to 1980, Canadian imports are backed out of District V to varying degrees. From 1977 to 1983, imports from Ecuador/Peru are backed out of District V in varying degrees and shipped to the Gulf Coast, with total imports from Ecuador/Peru being fixed at 400,000 barrels per day. For a MVPL, this case assumes that oil shipments from District III to District II would decline by 100,000 barrels per day per year and that North Slope oil would go to District I for the first four years of pipeline operation (with a two-year delay) and the first five years of pipeline operation (with a one year delay). Case 1 represents the maximum cost of delay and displacement from deciding for a MVPL.

<sup>61</sup> Based on the difference used in *An Analysis . . .*, Appendix C, p. C-17.

TABLE 9A.—PRESENT VALUE OF NET RESOURCE COSTS OF DELAY AND DISPLACEMENT WITH MVPL—1 YEAR DELAY  
 [Discount rate=10 percent; positive signs indicate costs of MVPL, negative signs indicate benefits of MVPL]

	[Dollars in millions]				
	Case 1	Case 2	Case 3	Case 4	Case 5
Cost of delay, North Slope Oil to United States.....	+\$636.1	+\$636.1	+\$636.1	+\$636.1	+\$636.1
Opportunity cost: saving on investment.....	+239.0	-239.0	-239.0	-239.0	-239.0
Displacements:					
North slope oil:					
West coast to east coast.....		-300.9	-215.1	-925.9	-697.4
West coast to Japan.....			-281.4		-738.5
PAD II to PAD I.....	+64.5	+120.7	+120.7	+205.9	+205.9
Peru/Ecuador oil: West coast to Gulf coast.....	-54.8	-89.1	-89.1	-24.3	-25.3
Canadian oil: PAD V to PAD II.....	-17.1				
Total.....	+389.7	+127.8	-67.8	-346.2	-858.2
Major assumptions:					
Growth in district demand (percent).....	5	4	4	3	3
Minimum imports to PAD V (million barrels per day).....	None	300	300	600	600
North Slope Oil to Japan (million barrels per day).....	None	None	1 200	None	1 400

<sup>1</sup> 1978-82.

<sup>2</sup> 1977-83, declining to none in 1986.

TABLE 9B.—PRESENT VALUE OF NET RESOURCE COSTS OF DELAY AND DISPLACEMENT WITH MVPL—2 YEAR DELAY  
 [Discount rate=10 percent; positive signs indicate costs of MVPL, negative signs indicate benefits of MVPL]

	[Dollars in millions]				
	Case 1	Case 2	Case 3	Case 4	Case 5
Cost of delay, North slope oil to United States.....	+\$1,244.6	+\$1,244.6	+\$1,244.6	+\$1,244.6	+\$1,244.6
Opportunity cost: Saving on investment.....	-464.0	-464.0	-464.0	-464.0	-464.0
Displacements:					
North slope oil:					
West coast to east coast.....		-300.9	-215.1	-925.9	-697.4
West coast to Japan.....			-281.4		-738.5
PAD II to PAD I.....	+52.6	+103.5	+103.5	+182.0	+182.0
Peru/Ecuador oil: West coast to Gulf coast.....	-54.8	-89.1	-89.1	-25.3	-25.3
Canadian oil: PAD V to PAD II.....	-17.1				
Total.....	+761.3	+494.1	+298.5	+11.4	-498.6
Major assumptions:					
Growth in district demand (percent).....	5	4	4	3	3
Minimum imports to PAD V (million barrels per day).....	None	300	300	600	600
North slope Oil to Japan (million barrels per day).....	None	None	1 200	None	1 400

<sup>1</sup> 1978-82.

<sup>2</sup> 1977-80 declining to none in 1986.

Cases 2 and 3 correspond to the base case shown in Figure 2. Both assume a 4% annual rate of growth in demand in all PAD Districts, the continuation of 300,000 barrels per day of Canadian imports to District V, and the backing out of all other imports as necessary. Both assume that 80,000 barrels per day of oil from Ecuador/Peru will be backed out of District V in 1976 and 400,000 barrels per day thereafter, with all of this oil being shipped to the Gulf Coast. Both assume that oil shipments from District III to District II decline by 75,000 barrels per day per year and that North Slope oil via a MVPL is shipped to District I for six years after the initiation of operations. Case 2 assumes that all North Slope oil via TAPS in excess of District V requirements is shipped to the East Coast. Case 3 assumes that 200,000 barrels per day of North Slope oil via TAPS is shipped to Japan from 1978 to 1982. All other North Slope oil in excess of District V requirements is shipped to the East Coast. Case 3 is considered to be the median or most probable case.

Cases 4 and 5 correspond to the low deficit case shown in Figure 2. Both assume a 4% annual rate of growth in demand in all PAD Districts, the continuation of 300,000 barrels per day of both imports from Canada and imports from Ecuador/

Peru/Indonesia to District V, and the backing out of 100,000 barrels per day of imports from Ecuador/Peru to District V and its displacement to the Gulf Coast. Both assume that shipments from District III to District II decline by 50,000 barrels per day per year. Case 4 assumes that all North Slope oil via TAPS in excess of District V requirements is shipped to the East Coast. Case 5 assumes that, beginning in 1977, 400,000 barrels per day of North Slope oil via TAPS is shipped to Japan. From 1981 to 1985, this amount declines to a level maintaining shipments to the East Coast (where all of the remainder is assumed to go) at one million barrels per day. Case 5, while not a theoretical minimum, represents a practical minimum. It assumes that exports of North Slope oil via TAPS to Japan greater than 20% of total throughput would be legally or politically restricted.

Tables 9a and 9b indicate a broad range of uncertainty in comparing the economic efficiency of a TAPS and a MVPL. With a one year delay in the construction of a MVPL, net costs vary from moderately positive for TAPS to strongly positive for a MVPL, with the median case indicating that the two are roughly equal. With a two year delay, the balance tilts towards TAPS, but there are substantial differences in degree among the various possibilities.

The inclusion of other economic considerations does, however, eliminate some of the uncertainty. Earlier, this paper analyzed the possible savings which could be realized from utilizing a single corridor for all Arctic pipelines. It indicated that the present value of savings from constructing a second oil pipeline in the same right-of-way was \$507-\$579 million with construction beginning in 1978, \$419-\$479 million for construction beginning in 1980, and \$347-\$396 million for construction beginning in 1982. The present value of savings from constructing a gas pipeline in the same corridor would be \$55-\$105 million, depending on when construction begins, and from constructing it in the same right-of-way would be \$225-\$345 million depending on when construction begins.

These savings could be realized in several potential increments. The gas line only could be constructed in the same corridor or, if possible later opportunity cost savings from a second oil pipeline were to be foregone, in the same right-of-way. Possible savings would be maximized if the gas pipeline was constructed in the same corridor and a second oil pipeline was constructed in the same right-of-way as the initial oil pipeline.

If the present value of the savings from constructing a second oil pipeline in the same right-of-way as the first and constructing a gas pipeline in the same corridor with the oil pipelines, is added to the totals of Tables 9a and 9b, several conclusions emerge: (1) In all cases, a MVPL is more economically advantageous to the nation than TAPS with only one year delay in the initiation of construction. (2) With two years delay, a MVPL is roughly equal to or more economically advantageous than TAPS unless the demand for crude oil on the West Coast grows at rates approaching 5% annually. (3) As the shift from Table 9a to Table 9b indicates, with a delay of three years, TAPS would be equal to or more economically advantageous to the nation unless the demand for crude oil on the West Coast grows at rates on only 3% annually and substantial amounts of North Slope oil are shipped to Japan. With a delay of more than three years, TAPS would be more advantageous under nearly all reasonable projections.

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#### THE PUBLIC INTEREST IN THE CHOICE OF A PIPELINE ROUTE FROM THE NORTH SLOPE OF ALASKA

(By Richard D. Nehring)

The Proposed Trans-Alaska Pipeline would be the largest private investment project ever undertaken. The proposed alternative to it, a pipeline up the MacKenzie Valley in Canada to Chicago, would be even larger. The proposed gas pipeline from the Prudhoe Bay field to the midwest United States will also be a massive investment as well. Thus, the private interest in the choice, characteristics, and timing of these projects is very great.

Massive as these private interests are however, a strong case can be made that the public interest in these decisions is even greater. The choice of routes will have major consequences for the regional balance of domestic crude oil supplies for decades. The choice poses major questions about the security of regional sources of supply. There are substantial differences in the environmental impacts of the two major proposed routes. There are also major differences in the economic spillovers resulting from each choice. These questions are the proper

focus of governmental deliberation in reviewing an application for a permit for a pipeline on either route.

This paper considers some of the major elements of the public interest in the choice of a pipeline route. It was written to provide a more detailed exposition of the points made in my oral statement. An earlier paper which I wrote when I was in the Department of the Interior ("Future Developments of Arctic Oil and Gas: An Analysis of the Economic Implications of the Possibilities and Alternatives") provides additional substantiation for that oral statement as well. This paper both complements and supplements that one.

Because the time for the preparation of this paper was limited, the analysis presented here is necessarily brief. I have worked out more extensive analyses on most of the questions discussed here; only the highlights are presented here. More details would only provide further substantiation, it would not alter the conclusions.

#### PETROLEUM SUPPLY AND DEMAND IN THE UNITED STATES: TOWARDS A REGIONAL BALANCE

During the next two decades, it is apparent that the United States will become increasingly dependent on imports for its petroleum supplies. As long as demand continues to grow, even if the rate of growth begins to decline, the gap between domestic production and domestic demand will grow as well. The only factor which could counter this trend significantly from 1975 to 1990 would be a substantial increase in the wellhead price of crude oil. However, the impact of such an increase on domestic supplies of crude oil is uncertain.

This growing gap between domestic demand and domestic supplies poses several major challenges for national policy. The conflicting economic interests of producers and consumers need to be balanced. The objections of environmentalists will have to be answered. National security needs will have to be met. Any attempt to formulate a national energy policy which copes with these problems in a responsible manner must inevitably focus on the major regional imbalances which now exist and which will become increasingly pronounced in the future.

The demand for petroleum products in the United States is heavily concentrated in the densely populated, heavily industrialized states of the Northeast, Middle Atlantic, and Middle West. In 1971, domestic product demand in Petroleum Administration for Defense (PAD) District I (the East Coast) and District II (the Middle West) averaged 10,121,000 barrels per day, approximately two-thirds of total nationwide demand. Demand in District III (the Gulf Coast States) was 17.3 percent of total demand; District IV (the Rocky Mountain states) demand was 2.6 percent of the nationwide total; and District V (the Pacific Coast states) demand was 13.4 percent of the total. Demand east of the Rocky Mountains (Districts I-IV) was thus 86.6 percent of nationwide demand.

National crude oil production and reserves on the other hand are concentrated near the Gulf of Mexico (East Texas and Louisiana), in the Midlands (Kansas, Oklahoma, West Texas, and New Mexico), in Southern and Central California, and in Alaska. In 1969, production in District I was 3.1 percent of the national total; District II production was 10.4 percent of the national total; District III production was 65.7 percent of the national total; District IV production was 7.4 percent of the total; and District V production was 13.4 percent of the national total. Production in Districts I-IV was thus 86.6 percent of the national total. At the end of 1970, Districts I-IV had 63.8 percent of national proved crude oil reserves, District V (excluding the North Slope) had 11.6 percent of reserves, and the North Slope had 24.6 percent of nationwide reserves.

A comparison of the distribution of domestic demand and domestic production and reserves suggests an obvious question: To which part of the country should the reserves and potential production capability of the North Slope be allocated? This analysis will approach that question in two ways: (1) by considering potential additions to U.S. reserves, and (2) by considering potential sources of supply to the various regions of the United States. Both of these considerations are matters of speculation, subject to considerable uncertainty. The sensitivity of conclusions to this uncertainty is thoroughly considered.

Table 1 presents a rough estimate of the current, indicated, and potential reserves of crude oil which could be made available before 1990 to Districts I-IV and District V. The estimates are drawn with a broad brush, the intent being to indicate a relative comparison, not to make a highly detailed prediction. The data for current proved reserves, indicated additions, and current North Slope reserves (9.6 billion barrels) are taken from the American Petroleum Institute's

year end report for 1970 on reserves of crude oil. The estimates of potential OCS additions are taken primarily from the report of the geological and technical working group of the recent Outer Continental Shelf Task Force (chaired by U.S. Department of Interior officials with some interagency participation). They include 2.76 billion additional barrels in the Gulf of Mexico, 4.0 billion in the Atlantic, 10.0 billion in the Gulf of Alaska, and 1.0 billion from new Southern California offshore leases. These estimates are considered to be conservatively optimistic, with the estimates for the Gulf of Mexico being the most certain and the estimates for the Atlantic being the least certain. To this was added 3.0 billion barrels for the currently shut-in Santa Ynez field in the western part of the Santa Barbara Channel. Since the estimate of current North Slope reserves is believed to be conservative, 20.4 billion barrels (all allocated to Districts I-IV) were added to that estimate, for a total of 30 billion barrels of North Slope reserves. Finally, 35 billion barrels of other reserves were added to the totals. These would come from the discovery of other new fields, the extension of current fields, and increased secondary and tertiary recovery. These are allocated among Districts I-IV and District V on the basis of the current distribution of reserves, with 85 percent going to Districts I-IV and 15 percent to District V.

The total is not an estimate of reserves in 1990. Current reserves and the indicated and potential additions will be depleted by production between this year and that one. At an average rate of 9.6 million barrels per day, total production from 1971 to 1990 will be 70 billion barrels. With production at 10.85 and 12.3 million barrels per day, total production will be 80 and 90 billion barrels respectively. These would leave reserves anywhere from 30 to 50 billion barrels in 1990.

TABLE 1.—CURRENT, INDICATED, AND POTENTIAL RESERVES OF CRUDE OIL IN THE UNITED STATES TO 1990

[Millions of barrels]

	Districts I-IV		District V	
	Number	Percent	Number	Percent
Proved reserves, end of 1970 (without North Slope).....	24,868	84.6	4,553	15.4
With indicated additions.....	28,140	81.0	6,614	19.0
With current North Slope to Districts I-IV.....	37,740	85.1	6,614	14.9
With potential OCS additions.....	44,500	68.4	20,614	31.6
With more North Slope (for total of 30,000,000,000).....	64,900	75.9	20,614	24.1
With 35,000,000,000 other.....	94,650	78.6	25,864	21.4

The comparison, rough as it is, is highly instructive. Even if 30 billion barrels of North Slope oil are allocated entirely to Districts I-IV, District V still has a significantly greater proportion of current and potential reserves than it has of national demand (21.4 percent versus 14-15 percent). The table moreover emphasizes the importance of North Slope reserves for the area east of the Rockies. In this comparison, these reserves provide nearly a third of all the domestic reserves available to this area. If 50 percent of the indicated North Slope reserves were to be allocated to District V (the situation which would exist if the Alaskan pipeline were built and later followed by a pipeline from the North Slope through Canada to the Midwest), the West Coast would have roughly 34 percent of national reserves available to it.

These conclusions are basically insensitive to major changes. If anything, the projections upon which they are based are biased in favor of Districts I-IV. In order to obtain a proportional balance between reserve estimates and indicated demand (i.e., an 85 percent/15 percent split), either the estimate for District I-IV would have to be increased by over 50 billion barrels (a near doubling of all potential additions) or the estimate for District V would have to be decreased by 9 billion barrels (nearly a 50 percent reduction of all potential additions).

Consideration of the potential supplies available to Districts I and II and District V yields the same conclusion: North Slope oil should be delivered to the Midwest and East Coast not the West Coast. The following analysis is deliberately simplified to illustrate this point. Only three cases are developed: (1) an "expected" case for District V, showing how its needs could be met without any North Slope oil; (2) a near "worst" case for District V, demonstrating how its needs could be met without any North Slope oil, even if new domestic sources were not as prolific as estimated; (3) a "best" case for Districts I and II, showing the maximum in domestic supplies to these areas which could be expected, even with large supplies of North Slope oil.

TABLE 2.—EXPECTED CASE, DISTRICT V SUPPLY AND DEMAND, 1977-89

[Thousands of barrels per day]

	Domestic demand	Production, new onshore and current fields	New OCS	Net other districts	Canada	Ecuador, Peru	Indonesia	Middle East
1977	2,606	984	300	150	319	325	250	278
1980	2,915	874	675	150	356	400	250	210
1983	3,232	776	720	165	395	475	250	451
1986	3,553	689	1,515	175	434	550	190	40
1989	3,871	611	1,730	175	473	600	250	32

The expected case for District V, shown in Figure 2, is based upon the following assumptions: (1) Demand increases from 1971, but at a declining rate, beginning with a 4.5 percent annual increase and declining by 0.1 percent per year (i.e., to 4.4 percent, 4.3 percent, 4.2 percent, etc.). (2) Production from all current producing fields and all new onshore fields declines at a steady rate of 4 percent per year. This would entail a total production of 6.42 billion barrels from these fields from 1971 to 1990, and would require additions of 3.39 billion barrels (an average of 169.5 million per year) to maintain a 7:1 reserves to production ratio in 1990 (a ratio deemed sufficient for old, declining fields). (3) Production from the Santa Ynez field in the Santa Barbara Channel (with an estimated 3.0 billion barrels of reserves) begins in 1976; production from a 1975 Southern California OCS sale (estimated to yield 1.0 billion barrels of reserves) begins in 1980; and production from two OCS sales in the Gulf of Alaska (in 1974 and 1978, each resulting in 5.0 billion barrels of reserves) begins in 1984 and 1988 respectively. Production in each case reaches a peak in the fourth year (at 7 percent—8 percent of total production) and declines on a straight line basis thereafter over a 25 to 30 year life. (4) Net shipments from other districts decline to 150 thousand barrels per day by 1976, but begin a slow rise after 1980 to a level of 175 thousand barrels in 1985 as oil shale production comes on line and North Slope oil enters the eastern half of the country in increasing amounts. (5) Imports from Canada, supplying Washington and Oregon, increase at the same rate as demand. Imports from Ecuador and Peru increase at a steady rate of 25,000 barrels per day per year to a maximum of 600 thousand barrels per day in 1989. Imports from Indonesia take precedence over Middle East imports up to a level of 250 thousand barrels per day.

Under these assumptions, District V would rely heavily on imports for its total supplies, particularly before 1985. In 1983, the peak year, nearly 49 percent of District V supplies would come from imports. But, these imports would be spread out over several different sources. Most would come from the Western Hemisphere. Imports from the Eastern Hemisphere would be basically split between Indonesia and the Middle East. The absolute level of imports from any one major source would also be relatively low. Thus, no undue dependence would exist.

Projections of this nature are obviously subject to a high degree of uncertainty. No single projection can be expected to be correct. Events may occur quite differently than predicted. If specific conclusions about future trends are to be maintained with any confidence, they must hold up under a broad range of assumptions. Particularly, those situations where events do not turn out as well as expected must be considered. This can be done by engaging in what is known as a "worst case" analysis.

Table 3 presents a near worst case projection for District V, based upon the following assumptions: (1) Demand increases at a constant rate of 4 percent annually to 1990. This results in higher demand estimates for District V after 1980. (2) Production from all current producing fields and all new onshore fields declines at a steady rate of 4 percent per year. (3) Production from all OCS leases (Santa Ynez, Southern California, and Gulf of Alaska) is delayed two years and production from the new Southern California and Gulf of Alaska leases is only half of that used in the expected case. (4) Net shipments from other districts are the same as that in the expected case. (5) Imports from Canada, supplying Washington and Oregon, increase at a rate of 4 percent annually. Imports from Ecuador and Peru increase at a steady rate of 50,000 barrels per day per year to a maximum of one million barrels per day in 1990. Imports from Indonesia take precedence over Middle East imports up to a level of 300 thousand barrels per day.

Under these assumptions, District V would be even more heavily dependent on imports than in the expected case. However, except for the period of the middle 1970s, these imports would come primarily from the Western Hemisphere. They would also be spread out over four major sources, like in the expected case. In other words, because of the relatively low absolute level of demand in District V, these changes would have a significant effect.

TABLE 3.—A NEAR WORST CASE, DISTRICT V SUPPLY AND DEMAND, 1977-89

[Thousands of barrels per day]

	Domestic demand	Production, new onshore and current fields	New OCS	Net other districts	Canada	Ecuador, Peru	Indonesia	Middle East
1977	2,570	984	-----	150	316	350	300	470
1980	2,891	874	450	150	355	500	300	262
1983	3,252	776	625	165	400	650	300	336
1986	3,658	689	730	175	450	800	300	514
1989	4,115	611	990	175	506	950	300	583

Table 4 presents a projected best case for Districts I and II, best being defined as maximizing domestic supplies to these areas. It is based on the following assumptions: (1) Demand increases, but at a declining rate, beginning at 4 percent from 1970 to 1972 and declining at 0.1 percent thereafter (to 3.9 percent, 3.8 percent, 3.7 percent, etc.). (2) The estimates for onshore production are taken from the estimates made by the Bureau of Mines in Appendix L-3, *An Analysis of the Economic and Security Aspects of the Trans-Atlantic Pipeline*. These are the highest published estimates available. (3) The production estimates from two Atlantic OCS sales assume that production from the first (3.0 billion barrels reserves) begins in 1984, and production from the second (1.0 billion barrels reserves) begins in 1988. Production peaks in the fourth year at 8 percent of total reserves and declines thereafter on a straight line basis over a twenty-five year productive life. (4) The estimate for net shipments from other districts is derived from the Bureau of Mines estimates in Appendix L-3. But unlike those estimates, this one assumes that demand in Districts III and IV will be lower than the low USBM projection after 1980, and it assumes one million barrels per day of imports into these districts as well. (5) The estimates for shipments from the North Slope/Mackenzie Delta assume that shipments from the initial pipeline begin in 1978 and that shipments from the second pipeline begin in 1983. Shipments build up to full design capacity of two million barrels per day in three years. (6) The import estimates for Canada assume a gradual, steady increase to a level of 1.2 million barrels per day in 1985, stabilizing at that level after that time. (7) The import estimates for the Caribbean are taken from the estimates made by the National Petroleum Council, with a minor upward adjustment. Imports from the Middle East/Africa are calculated as a residual.

Under the assumption of this best case, Districts I and II are slightly less relatively dependent on imports than District V under the assumption of a near worst case. However, imports into Districts I and II are more concentrated by source and are more heavily concentrated in the Middle East. Moreover, the comparison between the two different situations in methodologically inappropriate. This best case implies a level of total domestic production after 1985 greater than 15 million barrels per day. It is highly unlikely that such levels

TABLE 4.—BEST CASE, DISTRICT I AND II PETROLEUM DEMAND AND SUPPLY, 1977-89

[Thousands of barrels per day]

	Domestic demand	District onshore production	Atlantic OCS	Net, other districts	North Slope/Mackenzie Delta	Other Canada	Caribbean	Middle East/Africa
1977	12,625	1,360	-----	5,000	-----	880	2,500	2,885
1980	13,916	1,300	-----	5,009	1,600	1,000	2,500	2,516
1983	15,205	1,240	-----	4,400	2,600	1,120	2,200	3,645
1986	16,470	1,180	600	4,000	4,000	1,200	1,900	3,590
1989	17,667	1,120	750	4,000	4,000	1,200	1,600	4,997

would be attained without substantial increases in the price of crude oil (assuming that they could be attained at all). However, if the incentives of price increases are operative in Districts I-IV, they would also be operative in District V as well. Hence, the worst case assumptions used for it would not be appropriate. One would have to expect higher domestic production there as well. The comparison thus clearly illustrates the need for shipment of North Slope oil to Districts I and II if healthy levels of domestic supply are to be maintained to those regions.

#### NATIONAL SECURITY ASPECTS OF A PIPELINE FROM THE NORTH SLOPE

There are one major and several minor national security criteria involved in the evaluation of the two proposed transportation routes from the North Slope to U.S. markets. The major criteria, maintaining reliable, low risk sources of supply, is discussed here at length. The minor criteria are only briefly reviewed, the review relying heavily on the joint analysis by the Department of Defense, the Department of State, and the Office of Emergency Preparedness on the national security aspects of Alaskan Oil. (See Appendix M-5, *An Analysis of the Economic and Security Aspects of the Trans-Alaska Pipeline.*)

##### *Reliable, low risk sources of supply*

The major national security objective of a national petroleum policy is defined here as maintaining domestic sources of petroleum supplies and petroleum imports from secure foreign sources and obtaining petroleum imports from a diversity of insecure foreign sources so that no region of the United States is dangerously dependent on any single insecure foreign sources for its petroleum supplies.

The regional aspects of this criterion should not be overlooked. The United States is a large country. The transportation of crude oil and petroleum products between different regions requires expensive transportation facilities. Only pipeline and tankers are suitable for the transportation of large volumes of crude oil products. These require some lead time to construct. If an international crisis occurs and supplies from any single foreign source are unavoidable, either other sources of supply must be readily available to those regions which are deprived or there must be a rough balance in reductions spread over all regions of the country. This requires either (1) the storage of emergency supplies in potentially threatened regions, (2) construction of stand-by transportation facilities for emergency use, or (3) a balanced energy policy from the start, so that the risks of disruptions in supply are spread among major using regions. For the foreseeable future, the third is clearly the most economic of these three alternatives.

The criterion also requires a concrete specification of the level of dangerous dependence. This is clearly a matter of judgment. Most authorities would probably place this "peril level" between 20 percent and 40 percent of the total supply for any region of the country. That range will be used here.

Logically, timeliness in developing domestic sources of supply is not a separate objective. Instead, it is an important consideration in meeting this objective over time. Developing new sources of supply requires considerable lead times. In planning to meet this objective five to fifteen years in the future, these lead times must be taken into consideration.

A comparison of the national security implications of the two proposed pipeline routes on the basis of this criteria shows the clear superiority of a pipeline route through Canada. Even under the assumptions of the best case discussed earlier, the dependence of Districts I and II on oil from the Middle East/Africa would rarely be less than 20 percent of total demand. With only one pipeline from the North Slope/Mackenzie Delta through Canada to these two districts, the dependence upon imports from the Middle East/Africa would be more than 30 percent after 1980. Under more realistic assumptions than those used, the level of dependence would rise above 40 percent. Moreover, this level of dependence would be absolutely large as well. If the national security argument is taken seriously, such levels of dependence would require very large emergency stocks if their effect was to be minimized.

On the other hand, District V, even under the near worst case, would never exceed a level of 20 percent dependence on Middle East or Indonesian oil during this period. Only in a few years would the level of dependence exceed 15 percent. And, this case assumes that no North Slope oil would go to District V. Under

the assumptions of the expected case, the levels of dependence upon either source would only exceed 10 percent in four years during the fifteen-year period from 1976 to 1990. The level of absolute dependence would be low as well. An expansion of the emergency production capability at Elk Hills to 350,000 barrels per day would enable the West Coast to live through a total interruption of supplies from any one source with little need for a reduction in overall supply. If TAPS were built, the clear implication of that decision would be that no imports from the Eastern Hemisphere to the West Coast would be required after 1978. Most, if not all, imports from Western Hemisphere sources would be backed out at well.

#### *U.S. control over oil transport*

Some people have argued that it is in the national interest for the United States to maintain total control over the transport of oil from the North Slope. The Defense/State/OEP analysis of this question implies that in light of the "long record of close cooperation in national security matters" between the United States and Canada that total U.S. control is not necessary for the transport of oil through Canada. On this criterion, the two routes are thus basically equal.

#### *Physical security*

The Defense/State/OEP analysis stated that the Alaskan route, despite its shorter length, would in all probability require more military resources to defend because of its sea route segment. It also concluded that the reliability of delivery on a Canadian pipeline would be better, as that route is less subject to earthquakes and landslides and because an all pipeline route is relatively unaffected by the weather. Overall, the Canadian route is superior on this criterion.

#### *Ability to help friendly nations experiencing oil shortages*

The Defense/State/OEP analysis stated that oil through Alaska could be diverted to meet Japanese needs. Oil transported through Canada would permit shipments to Europe. Assuming no preference between the two, on this criterion the two routes are equal.

#### *Bargaining position of the U.S. vis-a-vis major exporting nations*

The Defense/State/OEP analysis concluded that the U.S. bargaining position would be enhanced by the shipment of North Slope oil to U.S. markets, such shipment reducing our dependence on imports. However, the choice of route was considered to be irrelevant to this consideration.

### ENVIRONMENTAL ASPECTS OF A PIPELINE SYSTEM

Once a decision to bring North Slope oil and gas to U.S. markets has been made, it is in the national interest to minimize the adverse environmental impacts of the transportation system. Two steps must be taken if this is to be done.

(1) Pipelines should be designed and constructed in such a way as to avoid environmental damage wherever possible. (2) Pipeline routes should be chosen to avoid a multiplication of transportation corridors and consequently a multiplication of adverse environmental impacts. This analysis covers only the second question, demonstrating how the use of a single corridor has major environmental advantages.

Table 5 presents a summary comparison of the relative environmental impacts of proposed Arctic pipeline systems. The comparisons are made for a single oil pipeline only, an oil and a gas pipeline system, and a system with two oil pipelines and one gas pipeline. The table is based on the following assumptions: (1) All pipelines using the same route will be constructed in a single corridor (up to five miles wide). (2) The gas pipeline will use a different right-of-way than the oil pipeline, even when both are constructed in the same corridor. (3) If the second oil pipeline is constructed in the same corridor as the initial oil pipeline, it will use the same right-of-way as the initial line.

The comparison of the initial oil pipeline routes between an all-Alaskan pipeline (TAPS) and an Alaskan/Canadian pipeline up the Mackenzie Valley (MVPL) is based upon the comparison used by the Department of the Interior in its Environmental Impact Statement (Volume 5, p. 238). It demonstrated that TAPS had fewer unavoidable impacts on the terrestrial abiotic environment, that the two routes were roughly equivalent in their impact on the terrestrial biotic environment, and that a MVPL had fewer unavoidable impacts on the marine

TABLE 5.—SUMMARY COMPARISON SYSTEMS RELATIVE ENVIRONMENTAL IMPACTS OF FUTURE ARCTIC PIPELINES

	Initial oil		Gas and oil		Gas and 2 oil	
	TAPS	MVPL	TAPS, oil; MVPL, gas	MVPL, oil and gas	TAPS, oil; MVPL, gas; MVPL, oil	All MVPL
<b>Unavoidable impacts:</b>						
Terrestrial abiotic:						
Terrain disruption—Pipeline	0	0	0—	0+	—	+
Terrain disruption—Terminal	—	+	—	+	—	+
Induced terrain disruption	0	0	0—	0+	—	+
Construction materials	+	—	0	0	—	+
Physical space commitment	+	—	0	0	—	+
Surface and groundwater	0	0	—	+	—	+
Air quality	+	—	—	+	—	+
Terrestrial biotic:						
Vegetation/habitat disruption	+	—	0	0	—	+
Fisheries	—	+	—	+	—	+
Wildlife (includes birds)	0	0	—	+	—	+
Socioeconomic systems:						
Recreation/aesthetics	—	+	—	+	—	+
Wilderness	+	—	—	+	—	+
Communities	—	+	—	+	—	+
Native culture and subsistence	—	+	—	+	—	+
Marine environment:						
Port waters—Alaska	—	None	—	None	—	None
Port waters—Destination	—	+	—	+	—	+
Fisheries	—	+	—	+	—	+
Wildlife (includes birds)	—	+	—	+	—	+
<b>Threatened impacts:</b>						
Terrestrial environment:						
Seismic risk—Pipeline	—	+	—	+	—	+
Seismic risk—Terminal	—	None	—	None	—	None
Permafrost degradation	0	0	0—	0+	—	+
Slope failure	0	0	0—	0+	—	+
Flooding risk	0	0	—	+	+	—
Marine environment:						
Tanker casualties	—	None	—	None	—	None
Oil transfer operations	—	None	—	None	—	None

## Notes to table 5:

1. (+) denotes lesser adverse environmental impact; (—) denotes greater environmental impact; (0) denotes equal impact; (0—) and (0+) denote roughly equal impact with possible marginal advantage to route designated (0+).

2. A (+) in one row is not necessarily equivalent to a (+) in another row. The table does not attempt to weigh different criteria or to indicate the absolute difference in impacts on any single criterion. On any general criterion (e.g., marine environment), one route is clearly superior to the other only if it is superior or equal to it on each of the individual criteria in that category.

environment and on the socioeconomic systems of the region. A MVPL clearly minimized threatened environmental impacts as well. Given the absolute differences of these various impacts and permitting considerable variation in weighing the various criteria, this analysis suggested that the Alaskan/Canadian route had less of an adverse environmental impact.

However, this comparison only evaluates the initial oil pipeline. It ignores other developments which are to follow its construction. We know that a gas pipeline will have to be built to transport both gas from Prudhoe Bay and from the Mackenzie Delta. It is also probable that a second oil pipeline will be built within ten years after construction of the initial line. The inclusion of these future developments in the comparison gives the Alaskan/Canadian route substantial and unambiguous environmental advantages.

With one oil and one gas line, a system based on one corridor through Canada with both pipelines has equal or less adverse environmental impacts on all individual criteria than a system with the oil pipeline through Alaska and a gas pipeline through Canada. When a second oil pipeline is included in the comparison, the superiority of the single corridor system through Canada is even more pronounced. On each of the twenty-five criteria, the all-Canadian system has fewer adverse environmental impacts.

This comparison points out the crucial importance of making the right decision on the initial route. The environmental economies of a single corridor through Canada can, by definition, only be realized if the initial oil pipeline is built through Canada as well. If the initial pipeline is built through Alaska, this opportunity for far-seeing development of the Arctic will be irretrievably lost.

## ECONOMIC ASPECTS OF THE CHOICE OF A PIPELINE ROUTE

The economic and security analysis by the Department of the Interior argued that a Canadian pipeline and an Alaskan pipeline were, in themselves, of equal economic efficiency. This analysis basically accepts that conclusion. A Canadian route may yield a marginally higher netback (\$0.10-0.15) than the Alaskan route. However, this is at the outer margin of error of the calculations; subsequently I do not put great significance upon it. It does however give the Canadian route a marginal economic advantage, providing a cushion against some economic uncertainties.

The Canadian route is economically superior to the Alaskan route in terms of its external economies and diseconomies. Building all pipelines in a single corridor permits substantial economies in construction costs. The shipment of North Slope oil to Midwest markets is less disruptive of existing markets than the shipment of North Slope oil to the West Coast. These effects were analyzed in some detail in my earlier paper, "Future Developments of Arctic Oil and Gas: An Analysis of the Economic Implications of the Possibilities and Alternatives." That paper concluded that these external effects were sufficient to offset the costs of two years delay. That paper was written before I was fully aware of several possibilities. Hence, the assumptions which it uses do not cover all relevant cases. Other key assumptions were not supported in detail. This paper will briefly discuss those omissions and their effects. These changes do not detract from the advantages of a Canadian pipeline. If anything, they reinforce its superiority.

The earlier paper examined the effects of a one-to-two year delay. That estimate was based on published statements by officials of the Canadian government. It was also in sharp contrast to the three-to-five year estimate used by Secretary Morton in his statement of reasons. The basis for the one-to-two year estimate was as follows: The Canadians have announced that they will be ready to accept applications for pipeline construction late in 1972 or early in 1973. By this time, the studies of the impacts of northern pipeline development which they began several years ago will be substantially complete. Thus, unlike the U.S. Government, they will have done most of the necessary studies *before* an application was received. Thus, the National Energy Board would be in a position to grant a permit in the latter part of 1973. The Canadian Government obviously cannot guarantee that a permit will be granted; however, given their desire to encourage development of the Canadian north, there is a 99 percent + probability that a responsible application for a permit would be granted. Allowing twelve to eighteen months to arrange for financing, to conclude the necessary agreements between the United States and Canada, and to mobilize construction equipment, construction on a Canadian route could begin early in 1975. By contrast, construction on an Alaskan line can begin no earlier than 1973. If the challenge in the courts on the basis of the Mineral Leasing Act is upheld, it seems likely that construction on the Alaskan route could not begin before 1974. Hence, the one-to-two year estimate of delay.

The earlier paper estimated that the present value of the cost of delay (using a 10 percent discount rate) was \$636 million for a one-year delay and \$1,245 million for a two year delay. Those estimates could be overstated for several reasons. (1) They assumed a three-year buildup to full design capacity. Alyeska has since that time reiterated their intent to use a seven-year build-up schedule. From their statement, it appears that a rapid build-up is possible, given present engineering constraints. However, they are apparently using a slower build-up schedule for marketing reasons. Hence, the relevant comparison here is between a seven-year build-up on the Alaskan route and a three-year build-up on the Canadian route, where no marketing constraints exist. (2) These estimates assume that the pipeline would reach its full design capacity of 2.0 million barrels per day. Department of Interior experts have however estimated that the pipeline may only be able to attain a capacity of 1.6 million barrels per day. This would apply to both proposed pipelines. (3) The estimate of the resource cost differential between the cost of North Slope oil delivered to U.S. markets is probably overstated. If the maximum throughput is only 1.6 million barrels per day, transportation costs per barrel of North Slope oil will be roughly \$0.20 per barrel more. The resource cost estimate for oil imported from the Middle East included \$0.30 for oil company profit, following the argument of the CEA that this is an insurance premium against potential expropriation without compensation.

However, inclusion of this as a resource cost is appropriate only if previous oil company investment has not already been amortized. Otherwise, it is a profit beyond the normal rate of return. The available evidence suggests that the latter is more correct. These two factors together could reduce the resource cost differential by up to \$0.50 per barrel.

These three assumptions, taken together, have a very substantial impact on the resource cost of delay. If all are used, the present value of the resource cost of a two-year delay is reduced from \$1,245 million to \$378 million. The use of any one or any combinations reduces the resource cost of delay somewhere in the range between those two numbers, with the reduction in the resource cost differential having the greatest single effect.

The earlier paper gave several estimates for the possible diseconomies of market displacements. These can be further refined. When the estimates were made, I was not aware of the potential of OCS developments off Southern California and in the Gulf of Alaska. These earlier estimates also assumed a three-year build-up schedule and a maximum capacity of 2.0 million barrels per day. Slower build-up schedules (such as the one in the Alyeska project description) and lower estimates of maximum capacity (such as 1.6 million barrels) may be more appropriate. The earlier estimates only calculated effects up to 1985. Calculations to 1990 could be made as well. These changes partially offset each other. Their net effect is to reduce the diseconomies from market displacements attributable to the Alaskan pipeline.

For example, using the assumptions of the expected case for the West Coast used earlier in this paper and assuming that no North Slope oil is shipped to Japan, all excess oil going to the East Coast, and that all excess imports from Canada, Ecuador, and Peru are shipped to other U.S. markets, the expected net diseconomies from an Alaskan pipeline are reduced from a present value of approximately \$300 million (Table 9b, Case 2) to a present value of roughly \$200 million.

Other cases could obviously be examined. This brief discussion has only indicated the direction of change which occurs when certain crucial assumptions are altered and the outer quantitative range in the sensitivity of the conclusions to these changes. They indicate the basic soundness of the earlier conclusions: (1) An initial oil pipeline through Canada has intrinsic economic advantages to the nation. (2) Taking into account the various uncertainties of all projections, these advantages are great enough to offset the costs of two to three years delay.

Chairman PROXMIRE. Well, thank you very much, Mr. Nehring and Mr. Cicchetti.

Mr. Nehring, you were a member of the Interior Department staff responsible for doing the actual analysis of the Alaskan pipeline; is that correct?

Mr. NEHRING. Yes.

Chairman PROXMIRE. Apparently much of this was good analysis because even many of the critics of the pipeline praise it. Yesterday, David Freeman said that the decision made by Interior Department leadership did not follow from the staff analysis.

You resigned in reaction to Secretary Morton's decision to approve the Alaska pipeline. In your letter of resignation, which you have made public, you indicate some of the reasons for your decision. I want to develop those fully for the record. First, you say:

I am appalled by the attitude, bordering on contempt, exhibited by the leadership of the department toward meaningful public participation in the evaluation of the TAPS proposal and alternative to it. Thus far, public groups and interested individuals have contributed many valuable insights, along with some excesses, about a proposal of which we all still have much to learn. In speaking of this attitude, I refer particularly to the refusal to hold public hearings, despite issuing a wholly new environmental impact statement, and Secretary Morton's peculiar reluctance to meet with the press or to show himself at any occasion where major pipeline documents were released to the public.

Now, this seems to me to be in direct conflict with the Council on Environmental Quality guidelines, which state that on major environ-

mental matters "the heads of Federal agencies shall \* \* \* include, whenever appropriate, provision for public hearings, and shall provide the public with relevant information, including information on alternative courses of action."

This requirement surely applies to the pipeline decision, and I don't understand why all this was done behind closed doors. Was there any reason for all this secrecy?

Mr. NEHRING. Well, some senior officials in the department have said to me that they felt that there had been adequate public participation in the last two years. My opinion on this is that we had produced a very large document: an environmental impact statement six volumes long and an economic and security analysis three volumes long. It simply takes time for public groups to assimilate all this material and to make their own private evaluations of the subject matter.

Chairman PROXMIRE. What do you mean by time? How much time? Is this a factor that would be highly significant?

Mr. NEHRING. I mean it took us six to nine months to prepare these documents. After we prepared it, I was still discovering what I thought were significant implications of the different proposed routes.

I would certainly give private groups approximately three months to evaluate the documents thoroughly, to do some independent studies and critiques.

Chairman PROXMIRE. At any rate, you have not been given any reason for the secrecy, why this couldn't have been perhaps in the time allowed and then hearings held?

Mr. NEHRING. Personally I found it inexplicable.

Chairman PROXMIRE. Secondly, you state in your letter of resignation that:

The overall attitude of the leadership was to do only what was necessary to meet the minimum of NEPA, not to fulfill its spirit. This was demonstrated in their clearly reactive stance; many critical elements of the evaluation—and these often in a halfhearted, tacked-on manner—were included only after extensive public comment and criticism.

Could you give the committee any additional details that would reflect this attitude on the part of the leadership, such as meetings or discussions in which you took part?

Mr. NEHRING. Well, I think it was primarily noted in the attitude of top officials of the Department toward the whole question of pursuing alternatives. I recall a meeting which I sat in last October with members of the Alaska State Legislature. They have a pipeline impact committee which is a joint committee of both their house and senate. Something like 7 or 8 members from that committee came down to the Department on the 26th and 27th of October, meeting with Secretary Morton, Under Secretary Pecora, and other officials of the Department to discuss with them the work the Department was doing.

During these meetings the members of the committee asked a considerable number of questions to these senior Department officials. I took notes on some of these questions and answers, and I will just quote from these notes at this point.

One of the members of the legislature asked:

What was the obligation of the department to generate alternatives?

Mr. Pecora replied in one instance that the role of the Interior Department here was one of reaction.

Chairman PROXMIRE. It was what?

Mr. NEHRING. It was one of reaction, not of taking the initiative.

In another question again asked about that same subject, Mr. Pecora said:

Well, we have imposed alternatives already. We have required more valves; we have required the companies to construct more of the pipeline above ground, but we are prepared to go beyond this as well to meet the courts' demands.

Secretary Morton said:

This is a private project. If the investor does not want to put his money in it, then it is not a real alternative.

And I think this attitude was typical of the situation in the Department. I know that in the preparation of the environmental impact statement the decision was not made to include the gas pipeline section in the statement until sometime in January, in other words, approximately a month and a half before the environmental impact statement was completed.

The person who was supervising the preparation of the environmental impact statement was not even allowed time to include a detailed comparison of the gas and oil pipeline routes to go in the environmental impact statement. I think this is indicative of an attitude simply to do in preparation for a decision what they thought could get by the courts, rather than to investigate thoroughly the whole subject with its very broad implications.

Chairman PROXMIRE. From what you say, I wonder if the Department would accept, was of the mind to accept the staff recommendations regardless of what they showed or what the merits were. Do you have any direct experience with the situations where the Interior Department leadership altered or reversed the conclusions of the staff?

Mr. NEHRING. Well, in my own analysis, I was never told that I should change anything that I had written except for, of course, the standard professional criticism one gets from other members of one's office. This is to be expected. It is an essential part of the process of writing an adequate document. With one exception, I am not aware of any other.

Chairman PROXMIRE. What is that exception?

Mr. NEHRING. Well, the first volume of the Environmental Impact Statement concludes with a comparison of all of the alternative routes which were examined.

The staff draft of that comparison concluded with a statement—after reviewing the various impacts of the alternative routes that said that on balance it appears that a trans-Alaska-Canada route has fewer adverse environmental impacts than any other route.

Chairman PROXMIRE. The trans-Alaska-Canada route?

Mr. NEHRING. Yes; in other words, one coming down through the Mackenzie Valley. That statement does not appear in the document which was released to the public.

Chairman PROXMIRE. What happened to it? How was it deleted?

Mr. NEHRING. Well, I was not present. I understand that it was changed in a meeting with Under Secretary Pecora.

Chairman PROXMIRE. Any reason given for deleting it? Was it ever challenged? Was it ever discussed?

Mr. NEHRING. Secretary Pecora has placed great stress on those five environmental impacts in which the oil pipeline route alone through Canada has a greater adverse impact than the oil pipeline route through Alaska. Perhaps in his judgment that was sufficient not to justify that conclusion.

I have evaluated those. The five impacts in this category are construction materials, primarily gravel used in construction of the pipeline; physical space commitments; air quality; vegetation habitat disruption, and wilderness.

With several of these, we can make almost a direct quantitative comparison. For example, on construction materials, the pipeline through Canada would require 25 percent to 35 percent more gravel. We can also make a direct comparison with the gas pipeline included in the evaluation; on air quality the route through Canada is superior; on physical space commitments there is probably no difference; on vegetation habitat disruption there is probably no difference; on wilderness the route through Canada is superior. And just by making that comparison the route through Canada is superior on almost everyone of the 25 criteria which the department used to evaluate these.

So I personally feel that a case for excluding that statement on substantive grounds was very weak.

Chairman PROXMIRE. Weak? I get from you there wasn't any justification.

Mr. NEHRING. In saying that it is weak, I was trying to be as kind as possible. I would agree with you.

Chairman PROXMIRE. Then, of course, the trans-Canada pipeline would not have the environmental, adverse environmental impact on the ocean, would it?

Mr. NEHRING. No, not at all.

Chairman PROXMIRE. So there you have a very decisive advantage of the trans-Canada compared with the trans-Alaska?

Mr. NEHRING. Yes. There is a statement that the comparison between the two pipelines depends on how you weigh the various criteria. On those few individual criteria on which the Alaska pipeline is superior, you would have to weigh them extremely heavily for it to come out ahead of the Canadian pipeline. Some other criteria, however, such as the effect on the marine environment, are considered to be very important. In other words, a weighing system that would give the Alaska pipeline preference is probably unjustified on any professional grounds.

Chairman PROXMIRE. My time is about up.

As I understand it, your conclusion is the staff indicated that the Canadian route was environmentally superior, and that observation was deleted by the department?

Mr. NEHRING. Yes; that is correct.

Chairman PROXMIRE. Thank you.

Congressman Brown.

Representative BROWN. Mr. Nehring, in your statement, you refer to the national security implications of the two proposed pipeline routes. Yesterday this committee received extensive testimony on the probable increasing U.S. dependence on foreign oil in the next ten to

fifteen years, with accompanying severely unfavorable effect on our balance of payments position.

Have you made any computations on the balance of payment effects on opting for the Canadian route which you say would have a two year delay?

Mr. NEHRING. They would essentially be short-term effects during the period of delay. I have not made any detailed computations on the subject.

Representative BROWN. Also in your statement, you refer to the defense-State-OEP analysis of the national security aspects involved in selecting a pipeline route. This analysis concludes, according to your statement, that in light of the long record of close cooperation in national security matters between the U.S. and Canada, a total U.S. role is not necessary for the transport of oil through Canada. What does the Department of the Interior analysis say about this?

Mr. NEHRING. Well, this was the document prepared by State, Defense and OEP in direct response to questions by the Department of the Interior. We did not independently analyze national security questions. The decision was made that these were to be analyzed—

Representative BROWN. When you say “we” who do you mean?

Mr. NEHRING. Well, our office, the office of Economic Analysis, which was handling these questions; the decision was made that we would accept the judgments of Defense, State, and OEP.

Representative BROWN. That was an Interior position?

Mr. NEHRING. Yes.

Representative BROWN. That was their total conclusion?

Mr. NEHRING. Yes, but then in the statement of reasons which Secretary Morton issued, he came out with a statement directly contrary to that; namely it is in the—

Representative BROWN. Do you know where that came from? Do you have any idea where that came from?

Mr. NEHRING. It was the first time I had ever seen it.

Representative BROWN. Perhaps we can get that testimony from Secretary Morton?

Mr. NEHRING. Yes.

Representative BROWN. Did you take into account that the trans-Alaska pipeline was first proposed in 1968; construction hasn't yet begun. In other words, we have had a considerable lag already in terms of time and in your consideration of the trans-Canada pipeline, in other words, with reference to the environmental concerns, have these been fully identified in the trans-Canada pipeline?

Mr. NEHRING. Well, in this regard, I did a fairly thorough examination of speeches, documents which have been prepared by the Canadian government on this question.

Representative BROWN. My question is specifically on the question previously of the trans-Canada pipeline.

Mr. NEHRING. I believe they began their investigation sometime in 1968 and 1969. By the end of this year they will have spent more dollars and more in man-years investigating environmental impact, the socio-economic impact, the financial implications of this than I believe our own government did in preparation of the Environmental Impact Statement.

Representative BROWN. What about the design work on the trans-Canada pipeline, has that been completed?

Mr. NEHRING. No, it has not. It obviously has not. My only comment on that is that the specific design problems for the Arctic environment have been worked out, I presume, for the trans-Alaska pipeline.

Representative BROWN. These would be the same on the trans-Canada pipeline as on the trans-Alaska pipeline?

Mr. NEHRING. Yes, you are dealing with the same problems—permafrost.

Representative BROWN. I thought the trans-Canada pipeline is somewhat longer?

Mr. NEHRING. Yes, but it is going through the same type of terrain.

Representative BROWN. Full length through the same type of terrain?

Mr. NEHRING. Yes.

Representative BROWN. Where does it go? Where would it go?

Mr. NEHRING. There have been two proposed routes; one goes from Prudhoe Bay along the coast of the Beaufort Sea to the Mackenzie River and then up the Mackenzie River into Alberta, then across Alberta, Saskatchewan, Manitoba into Minnesota, Wisconsin, and into Chicago. The other route—

Representative BROWN. That is essentially the same kind of terrain involvement as the Canadian pipeline.

Mr. NEHRING. As the Alaskan pipeline?

Representative BROWN. Or as the Alaskan pipeline?

Mr. NEHRING. Yes, sir.

Representative BROWN. Alberta is the same as Alaska?

Mr. NEHRING. Well, once you get down to Alberta you are getting down into an area in which people have been constructing oil and gas pipelines for several decades.

Representative BROWN. So you think there would be no planning lag at all?

Mr. NEHRING. Well, there would be some, of course, but I think we are talking about maybe six months, nine months, in this term.

Representative BROWN. Have you taken that into account in your two-year difference in terms of—

Mr. NEHRING. Yes.

Representative BROWN (continuing). The construction and all?

What about the question of indigenous land, indigenous people's claims with reference to the rights-of-way on land and that sort of thing? Do you think that would have any impact on the delay prospect?

Mr. NEHRING. I simply have no information on that one way or another.

Representative BROWN. Well, did you include that in your two-year delay analysis or would you just ignore it?

Mr. NEHRING. The Canadian government has not indicated that they have any particular problems in this regard, so I took their word at face value.

Representative BROWN. You think they would have no problem then in dealing with it?

Mr. NEHRING. No; I don't think so.

Representative BROWN. Have they spoken to this specifically?

Mr. NEHRING. I recall a few remarks in speeches which Canadian officials such as Minister MacDonald have made on this subject in which they just cover it briefly.

Chairman PROXMIRE. If the Congressman would yield, we had a member of the Canadian Parliament who testified before you came in that the Canadians believed it would be a two-year delay.

Representative BROWN. He is speaking for the Canadian government.

Chairman PROXMIRE. He is a liberal member of a province and speaking for himself.

Representative BROWN. Not from the government. Thank you.

What about the question of the environmental impact statement in the Canadian context. Has that been resolved in the trans-Canada pipeline?

Mr. NEHRING. Will you explain the question further?

Representative BROWN. Well, has there been any conclusive study that the government of Canada has resolved with reference to the environmental problems that a trans-Canada pipeline would create for them and their government?

Mr. NEHRING. Well, they have stated that they have been engaged in serious studies of this matter since at least 1970; and they also stated they will have substantially completed such studies by the end of this year.

Representative BROWN. And you think the study, if the result is positive, would have no conflict in the Canadian—

Mr. NEHRING. No.

Representative BROWN. No reason for delay—in other words, that their government decides and that is it?

Mr. NEHRING. No reason for further delay after the National Energy Board has reviewed these findings and given it their thorough consideration.

Representative BROWN. What about their Canadian due process of suits and so forth with reference to the trans-Canada pipeline, are there problems with the Canadian law?

Mr. NEHRING. Well, they certainly don't have anything like our National Environmental Protection Act. From what I understand most of their citizens, particularly in British Columbia, have been primarily exercised about the prospect of tankers coming down from Alaska. So far they have not indicated any objection to a line through Canada.

Representative BROWN. That is British Columbia. How much of the line would go through British Columbia?

Mr. NEHRING. None of it.

Representative BROWN. Oh, so the British Columbia people have no objection to a pipeline that would go through somebody else's territory, is that what you are talking about?

Mr. NEHRING. Well, I have seen no sign of objections from the people of the Northwest Territory, from the people of Alberta, and from the people of Saskatchewan; it would go through their territory.

Representative BROWN. So you think they would cheer the trans-Canada pipeline as opposed to a trans-Alaska pipeline?

Mr. NEHRING. Well, maybe they wouldn't cheer it, but they would probably accept it.

Representative BROWN. I am just trying to get to the point of delay, whether the one to two year delay which you mentioned is an appropriate difference.

What did you take into account then, as the cause of the delay?

Mr. NEHRING. Well, I went into some detail in this in the statement entitled "The Public Interest in the Choice of a Pipeline Route From the North Slope of Alaska" that I submitted for the record.

Representative BROWN. It sounded to me like what you told me, the trans-Canada pipeline could probably be built quicker than the trans-Alaska pipeline; is that what you are talking about?

Mr. NEHRING. No, I was quite explicit in my longer statement entitled "Future Development of Arctic Oil and Gas: An Analysis of the Economic Implications of the Possibilities and Alternatives" that I submitted for the record that it would start construction one to two years after the Alaska pipeline starts construction.

Representative BROWN. Why? What takes that time?

Mr. NEHRING. Okay. Well, we will just start with the Alaska pipeline first. Given the delays which will be expected in the courts, Judge Hart has indicated he will give a ruling sometime in August or September. After that time, either way the decision goes, it will go up to the Court of Appeals and I presume it will go up after that to the Supreme Court.

Representative BROWN. Now, am I correct in saying that you are assuming delay because of the due process of law—

Mr. NEHRING. Yes.

Representative BROWN (continuing). In the trans-Alaska pipeline which would not be the case in the trans-Canada pipeline, is that right?

Mr. NEHRING. Well, I am assuming that the Canadian due process would take place. The Canadians have said they will be able to accept applications for a permit either—

Representative BROWN. Just in a simple comparison, what are you allowing for due process in the case of the trans-Alaska pipeline as opposed to what you are allowing in your terms of delay for the trans-Canada pipeline?

Mr. NEHRING. Well, I am allowing something like nine to twelve months for the Canadians to process an application and consider it after they receive it from the oil companies on the assumption that they will already have their studies substantially completed at the time at which they receive the application.

Representative BROWN. Nine to 12 months of the Canadian, and what of the trans-Alaska?

Mr. NEHRING. I would say a trans-Alaska pipeline could begin construction possibly by the beginning of next year, which is only allowing six more months to go through the process.

Representative BROWN. Tell me what are the two due process allowances you are making? I think the question is very simple, don't you?

Mr. NEHRING. Well, do you want me to go back to the Alaska pipeline on the very start of the process?

Representative BROWN. Yes; what are you allowing in your consideration for due process claims in Canada versus the due process claims that have taken place in due process of Alaska? That is what I am asking. Do you understand my question?

Mr. NEHRING. Yes. I am allowing approximately 9 to 12 months after the applications will be granted—will be received in Canada: I am allowing six months more for due process to take place in this country; you also have a problem—

Representative BROWN. What was your total or what was the total due process that has taken place in this country? Could you tell me that?

Mr. NEHRING. Well—

Representative BROWN. Up to now.

Mr. NEHRING. Total due process, the first environmental impact statement came out roughly 16, 17 months ago; it was clearly inadequate; the Interior Department was enjoined in the courts, and it had to go back and do detailed—

Representative BROWN. I don't know how to ask the question any more simply.

What will have been the total due process time in the United States?

Mr. NEHRING. Okay. I would like to split that into two parts because part of it—

Representative BROWN. I don't care how you split it, just so long as you try to answer the question.

Mr. NEHRING. Okay. But part of it is due process; part of it is taking the time which the Interior Department needed to make an adequate evaluation of the subject; I don't think you can separate those easily.

If you go back to January 1971, when the Interior Department first gave out its statement, it had given it vary inadequate consideration. Now, the Canadian government has been undertaking very detailed studies of this subject back through 1970, roughly overlapping the same time in which the United States Government has been studying the subject. In fact, by the time they are ready to accept applications by the end of this year, they will have spent more time studying the matter than we spent. So if you consider that, then they are actually spending more time studying it and giving due process.

Representative BROWN. My time is about up; as a master of fact, it is up and I am still working on the question that I asked before the time expired.

Let's say the time from application to construction on the pipeline—can you give me an answer on that?

Mr. NEHRING. On the Canadian pipeline, I would say from the time the application is received to the time the pipeline is completed would be five years.

Representative BROWN. And the United States?

Mr. NEHRING. From the time the application was first received to the time the pipeline would be completed will be, roughly, the same time; five years or five and a half years.

Representative BROWN. And has due process begun at all in Canada on the subject?

Mr. NEHRING. Well, not the legal aspects of due process, no.

Representative BROWN. I guess that is all. Thank you.

Chairman PROXMIRE. Senator Sparkman, permit me before I yield, I do want to say to Congressman Brown I just informed him the testimony which I had not read all the way of David Anderson did indicate the following on March 30, 1972, following his meeting with Secretary Morton, Minister MacDonald, who was the opposite number of Secretary Morton, in the Canadian government, he is the Minister of Mines, Energy and Resources, when asked for his estimate of the delay that would be involved should the Canadian route be pursued, responded that the period of delay, originally presumed to be four

years, had by all best estimates narrowed to two. And he speaks—if anybody speaks for the Canadian government he does, just as Secretary Morton speaks for our government.

Senator SPARKMAN.

Senator SPARKMAN. Mr. Nehring, I have listened with interest to your testimony and I followed you with your statement and I want to ask just a few rather simple questions regarding this.

If I construe correctly your testimony, you definitely favor the Canadian route; is that right?

Mr. NEHRING. As a result of my examination of all the implications of the subject, I do, yes.

Senator SPARKMAN. Well, now, in your opinion, is the Canadian route better from a cost standpoint?

Mr. NEHRING. Well, in the analysis we did of this subject we looked at it in this way: You know each route requires a certain cost to get the oil to market, and we felt that a Canadian route would cost roughly 20 cents more per barrel to get the oil to market in Chicago rather than the Alaskan route to get the oil to the West Coast.

We also concluded, and Mr. Cicchetti and I have had some friendly disagreement on this subject, that the price in Chicago was roughly 20 to 30 cents higher than the price on the West Coast for similar quantities of crude oil. So they both yield the same price back at the wells at Prudhoe Bay; in other words, they are of equal economic efficiency; we just couldn't find any significant difference between them on that sort of direct comparison.

Senator SPARKMAN. You think the bringing of it through the Canadian route to the Chicago area would afford perhaps a better distribution than bringing it the other way?

Mr. NEHRING. Yes, definitely. Most of the oil in this country, as you know, is produced either on the West Coast or down in Texas, Louisiana, Oklahoma, New Mexico, and Kansas. Most of the oil that is used in this country is used on the East Coast and in the Midwest. The only new large domestic source we can bring into the Midwest and the East Coast at or near current prices is the oil from the North Slope of Alaska.

Senator SPARKMAN. And you think the distribution advantage would recompense for the additional cost; is that it?

Mr. NEHRING. Well, the point on the initial cost is yes; it costs more to bring it through Canada but then the people in Chicago are willing to say more for it, too, and those two things offset each other, so we don't really have an economic problem there.

Senator SPARKMAN. And I believe you testified that so far as the environmental consideration is concerned, it is practically the same?

Mr. NEHRING. No, my testimony is that a route through Canada is quite superior in this—

Senator SPARKMAN. Is what?

Mr. NEHRING. Superior in this regard.

Senator SPARKMAN. Superior?

Mr. NEHRING. Yes. We know we have to build a gas pipeline; that would have to come down through Canada. It makes sense to build all your pipelines in a single corridor environmentally, because you are going to minimize all the environmental disruption that will occur. When you do that you also avoid the environmental hazards of marine transport from Alaska to the West Coast, and you avoid what is considered

to be a very substantial earthquake risk in southern Alaska. Geologists are still discovering where major faults are located in the Chugach Range which runs across southern Alaska. The risk there is great—you are talking about earthquakes on the Richter scale of magnitude of 8 or greater, which are very substantial. There are still great doubts and designing a pipeline to withstand an earthquake of this magnitude.

Senator SPARKMAN. So far as the time element is concerned, I believe it has been pretty well agreed it would require two years longer to build the Canadian pipeline?

Mr. NEHRING. Yes, I think that is a fair estimate.

Senator SPARKMAN. I believe you discussed also the security element, did you not?

Mr. NEHRING. Yes.

Senator SPARKMAN. Is there any particular difference between the two?

Mr. NEHRING. Well, I discussed what might be called a balance of supply argument. If we built the Alaska pipeline, the western half of the country is essentially self-sufficient in crude oil; that is, it can be supplied from domestic production. The eastern half of the country is largely dependent on imports. If there is an international crisis and the flow of imports is interrupted, the eastern half of the country is severely hurt by this, while the western half is not. It would be very difficult to transfer large supplies from the western half of the country to the eastern half of the country quickly simply because we just don't have that much excess transportation capacity in terms of pipelines and tankers.

Senator SPARKMAN. Has the Canadian government manifested considerable interest in having it built through Canada?

Mr. NEHRING. Well, I have read over half a dozen speeches by Prime Minister Trudeau, by Minister Macdonald, by Minister Chretien who is, I think, Minister for Indian Affairs and Northern Development, who also has a major interest in this. They press very strongly the idea of using a single corridor for all pipelines from the North Slope of Alaska and the Mackenzie Delta region of Canada.

Senator SPARKMAN. I believe that is all. Thank you very much.

Chairman PROXMIRE. I would like to get to Mr. Cicchetti. We have kind of neglected you.

You both agree that a single gas/oil corridor through Canada is environmentally superior. An even stranger bit of evidence, from Mr. Nehring's testimony, is that the Interior Department staff concluded that a single oil pipeline through Canada was environmentally superior to a single oil pipeline through Alaska. I think it is clear on environmental grounds the Alaska pipeline fails to meet the test. But national security and economic benefits must be balanced with these environmental costs.

Therefore, Mr. Cicchetti, I would like to hear your views on the national security and economic benefits.

Would you elaborate on how the economic benefits of the Canadian route are greater than the economic benefits of the Alaskan route?

Mr. CICHETTI. On the analysis that I understook, I found considerable difference in prices in the Midwest and the West Coast than those admitted by the Department of the Interior. The interesting thing about this was when I first came out with my initial draft, I showed prices that were about 50 cents difference between the price in Chicago

and the price in Los Angeles. The oil industry, represented by Alyeska Pipeline Service Company, didn't like that 50 cent price difference and quickly came out and said my prices in Los Angeles were much too low and my prices in Chicago were fine. The Interior Department, on the other hand, came around the other way and said:

Well, your prices in Los Angeles are fine but your prices in Chicago are much too high.

So they tried to chip away essentially at this 50-cent price difference and get it down to maybe a 20 or 25 cent price difference which is about what the cost per barrel difference would be for delivery.

Chairman PROXMIRE. In light of that, what is the significance of the price difference?

Mr. CICHETTI. The significance of the price difference is the prices affect the economic impact to the nation; they affect the taxes to the State of Alaska and profits to the oil companies.

Chairman PROXMIRE. They also reflect the demand for gas, the need?

Mr. CICHETTI. That's right, but prices in the U.S. are also set by various regulations that constrain domestic supplies as well as foreign supplies and this helps push up prices as well. So if you were to supply an area with higher priced oil at lower cost you would also be having economic savings to the nation.

I might say also that it is my very strong opinion that it would be wrong for the nation to build a pipeline through Alaska to export oil to another country as would be included in the plan for export-import oil to go to Japan and at a time when most analysts are saying that the oil exporting petroleum countries will be increasing their taxes and increasing their anticipation of oil in the future.

Chairman PROXMIRE. The Interior Department differs with you very strongly but they stipulate, as I understand, they do not concede there would be a surplus on the West Coast; they feel all this oil and gas would be consumed on the West Coast.

Mr. CICHETTI. I think Mr. Nehring covered some of the questionable assumptions they made. It would essentially assume that West Coast production will fall by more than half relative to its current level, that the present oil that flows between some of the western states into District V; that is, the West Coast, will not flow, that present imports into the West Coast from Indonesia and from other sections in Venezuela as well as from Canada will be cut off. Essentially, they are assuming away roughly about a million barrels of oil that presently goes into the West Coast will in 1980 and therefore they conclude all the oil will be used on the West Coast in 1980.

If these things did not take place, and I have very strong reasons to doubt that they would, that would leave an extra million barrels of oil in 1980 to be sold to Japan to be shipped via Central America to the Virgin Islands.

Chairman PROXMIRE. Let's get to the national security benefits.

As I said the other day, these are the kind of generalized benefits that all bureaucrats and politicians like to rely on when they have no other argument. They will say this is in the interest of national security; just by the oil importing program, on that basis we are in favor of a strong country. We have to have capability in the national security area; it is vague and it relies on some kind of expertise most of us can't pretend to have and it is a good flag-waving argument, so let's precisely define national security needs in the energy context.

The most authoritative definition was set forth by President Nixon's Cabinet Report on the oil import question. National security needs were defined as ". . . protecting military and essential civilian demand against reasonably possible foreign supply interruptions that could not be overcome by feasible replacement measures in an emergency."

Would you, Mr. Cicchetti, evaluate the national security benefits of the Alaskan and Canadian pipeline alternatives in the context of that definition—interruption of essential services and supply?

Mr. CICCETTI. I think two points have to be made which have not been brought out today, and that is the Interprovincial Line, which Mr. Anderson talked about this morning, currently, transports oil from western Canada to some of Canada's eastern provinces; it travels through the Midwest and passes through your own State as well as through the other Midwestern States and then goes on up to the eastern provinces of Canada. I don't see Canada being very concerned about the security of that Interprovincial Pipeline.

In addition, foreign oil comes into Portsmouth, Maine, and is then shipped, without being used in the United States, to the city of Montreal. Again, that pipeline passes through U.S. territory and indeed uses a U.S. port, and I see very little concern over the national security of either of those pipelines.

If Canada for some reason should seek to cut off the land bridge between Alaska and the lower 48 for some national security reason, I would say that the United States would be in a position to do just the same thing to Canada, although I think the history of our two countries clearly indicates that it is more one of cooperation than of threats.

Chairman PROXMIRE. I think it is a much more likely hypothesis in the event we don't build a trans-Canada pipeline and we would then have to rely increasingly on the importation of foreign oil, increasingly from the Middle East going to Ohio, going to Wisconsin and to the East Coast, and that there is every likelihood that sometime over the next few years—this has happened in the past, that that oil might very well be interrupted; isn't that correct? And it could be for a considerable period of time?

Mr. CICCETTI. I think that is right. I think that is why it is particularly dangerous for the United States to have one part of its country overly supplied with oil and have the other part of the country; namely, that part of the country east of the Rockies, become overly dependent upon Middle Eastern sources of supply.

Once again, I should point out that at the present time approximately less than 5 percent; it is probably more like 2 or 3 percent, of the total oil consumed in the United States comes from the Middle East, and half of that comes from Iran which is a friendly country.

Chairman PROXMIRE. Right now—but that situation will change in the next—we are talking about ten years from now.

Mr. CICCETTI. That is the presumption.

Chairman PROXMIRE. Fifteen years from now, won't a great deal more come from the Middle East?

Mr. CICCETTI. That is likely.

Chairman PROXMIRE. In the event we don't build a pipeline through Canada?

Mr. CICHETTI. I would say it is likely but I don't view it as a certainty. We have had, I think, a history—well, let's look at the domestic crude oil industry in California as compared with the domestic crude oil stresses of the Rockies. In California we see reliance on secondary and tertiary techniques to produce additional oil from wells that would not be used east of the Rockies.

At the present time we have come close to reaching a hundred percent of the allowables prorationing as far as east of the Rockies, but I believe technological means to get additional production from domestic sources are known. We also have the possibility of developing oil from synthetic sources. The estimates of oil that could be recovered at the present U.S. price in Canada from tar sands would be several times the estimates of the reserves of oil in the Middle East. So I hardly think that it is a certainty that we are going to depend upon the Middle East in the future.

Chairman PROXMIRE. It is a possibility then but you don't think it is a certainty? Perhaps it is a likelihood?

Mr. CICHETTI. Yes, sir; and prices and demand for oil would be a factor in the whole situation.

Chairman PROXMIRE. We have already heard from Senator Gravel and we are going to hear from Senator Stevens and Governor Egan is flying down especially to testify before this committee a week from Monday, so you can understand about the concern of these people from Alaska. They seem to be very sure where Alaskan interests lie and that seems to contradict your position.

You indicate that the State of Alaska would get greater benefits from the trans-Canadian route. I find it incredible that people who know as much about this state as Senators Gravel and Stevens and, of course, Governor Egan, would be so badly mistaken. Would you explain why they are wrong, if they are?

Mr. CICHETTI. I think I can.

First, I think that they are wrong as far as the present situation, if prices were determined via the net back technique which is presently on the legislative books in the State of Alaska.

However, if you talk to people in the industry you find them complaining very bitterly about the fact that the State of Alaska is presently considering posting a price of \$2.50 which will be used as the minimum net back calculation per barrel. If this price would be put into effect, this would essentially mean that losses to the State of Alaska from having oil sold to Japan and to the Virgin Islands will not take place.

Chairman PROXMIRE. What do you mean by net back?

Mr. CICHETTI. By that I mean the difference between the price in the market the oil is being sold at and the cost of transporting it to the market. At the present time the net back is probably about \$2.50 Chicago to the North Slope. It is about \$2 from Los Angeles to the North Slope. If it were to be sold in foreign countries, such as Japan or else be sold to the Virgin Islands, that net back might fall to \$1.50 or \$1.

Now, the State of Alaska by passing a law to protect themselves, and I don't deny they have the right to protect themselves by making the posted price \$2.50, they can essentially get the same benefits of the Canadian pipeline through legislation. This is what is being opposed,

however, by the industry because this will cut more heavily into industry profits. So I think the State of Alaska is aware of these differences.

In my conclusions I pointed them out as though the legislation had not been passed but I think you should ask the Governor and some of the representatives of the State of Alaska just what their intention is for increasing its posted price because I think it is to protect themselves from some of these ingenious industry plans.

Chairman PROXMIRE. Just one question before I yield to Congressman Brown.

Can you give us a picture of how much of a difference it would make to the average consumer of natural gas and of oil in the Middle West if we follow the trans-Canada approach instead of the Alaskan approach?

Mr. CICCETTI. I think I can. Natural gas interests, clearly and simply, if the Middle West had to rely on foreign imports of natural gas, my estimates show the price of natural gas would be—liquefied natural gas into the Midwest would be anywhere from \$1.20 to \$1.30 for 1,000 cubic feet. The estimates I have seen for delivering Alaskan and Canadian gas into the Midwest are between 75 and 80 cents so you are talking roughly 50 cents per thousand cubic foot of saving and that is a very substantial saving in the price of natural gas, I think, in the Midwest, when we are talking about the price of oil.

Chairman PROXMIRE. Have you ever tried to put that in terms that a householder could understand? For example, if you are heating your home with gas this year, would it make a difference of \$100, \$150 a year or something of that kind?

Mr. CICCETTI. Unfortunately, I have not, but it would be fairly easy to do and provide it for the record.

Chairman PROXMIRE. Do that and provide it for the record, because this is what people are interested in and will concern themselves, because when we talk about these other terms, in thousands or trillions of cubic feet, it does not mean a great deal.

(The following information was subsequently supplied for the record:)

Using my present consumption of natural gas here in the suburban Maryland area as a guide, I find that my family of 4 in a three-bedroom gas-heated brick house uses about 200 (MCF) thousand cubic feet per year. At this rate of consumption the 50¢ difference between Alaskan and imported liquid natural gas would cost consumers about \$100 per family per year in the Midwest. Given the expected more severe winters in the Midwest and its longer duration, consumption would be greater which could mean a cost difference of as much as \$200 per family per year.

Mr. CICCETTI. The second half of your question on the price of oil is much more difficult, I think, to answer because I see very little reasons, given our present regulations in the oil industry, for the price of oil to decline. We had a situation of oversupply in one market, an undersupply—

Chairman PROXMIRE. It wouldn't go up as much, right?

Mr. CICCETTI. I think that is the issue. There would be less likelihood of the price of oil increasing in the Midwest and certainly if we take into account the possibility of rising taxes from foreign countries, if they are going to supply the Midwest and east coast, I think this is a very important factor to keep in mind. I see very little reason to

think the domestic price of oil will be rising rapidly but I think every indication is that foreign oil will be rising rapidly.

Chairman PROXMIRE. The very thing I have said about the Midwest can apply about the same to the East, in New York?

Mr. CICCHETTI. I would say for all practical purposes the price of oil is about 25 cents higher on the east coast than in the Midwest.

Chairman PROXMIRE. But the trans-Canadian pipeline would not only service the Midwest but also reach the shortage in the East?

Mr. CICCHETTI. That's right; the transportation cost to get it to Chicago, New York, and Philadelphia would essentially equal the price difference between the two places so if Alaskan oil were to be shipped further east to a new pipeline, whether you would have Texas and Louisiana oil, which some of it is going to the Midwest instead of the East, sort of a trade relationship displacement, your conclusion about considering the east coast and Midwest would be correct.

Chairman PROXMIRE. Congressman Brown.

Representative BROWN. You discussed the possibility that if the oil is brought to the west coast there would be surplus oil shipped in foreign tankers to Japan and at the same time that we would be importing oil on the east coast. Could you give me some version of price differential, of how this would be beneficial to an oil company to export oil?

Mr. CICCHETTI. Yes.

Representative BROWN. What would the price factors be?

Mr. CICCHETTI. There was a proposal made—I think it was before the House Interior Committee—by the president or chairman of the board of Phillips Petroleum, by the name of John Houchin, and that was a plan that called for the exportation of excess supplied Alaskan oil to Japan, and that the company that exported that oil, he averred or it was his position that they would be adding to the balance of payments of the United States by selling oil to another country, and that if there was any national security threat that might result in cutting off of foreign oil in the eastern part of the country, some of this oil or all of this oil could be moved onto the eastern markets.

So he proposed that the company that was permitted to export a barrel of oil would be given the right to import a barrel of oil on the east coast outside the formal allocation of that company under the mandatory oil import quota program. So, for example, if a company took Alaskan oil and sold it to Japan it might cost \$1 a barrel to get it to Japan; it would be sold in Japan for about \$2 a barrel, bringing a profit before taxes of about \$1 a barrel.

On the other hand, that same company would then be allowed to bring foreign oil into New York where the present price is approximately \$2, although it is expected to go to \$2.50 by 1975; it would then be able to sell that oil in New York with the prices currently at about \$4 a barrel and make an additional \$2 a barrel in profit adding the dollar and two dollars together result in a \$3 a barrel profit for a cost of about \$1.

Representative BROWN. That was his proposal and I understand the attractiveness of the proposal but under the quota system what would be the effect?

Mr. CICCHETTI. For that plan to be approved it would require an Executive order of the President. There are about two or three Execu-

tive orders from each President per year in office, so the probability or possibility of that plan would ride on—I don't know, I guess the political and economic decisions of whoever happened to be in the White House at the time.

Representative BROWN. Let's assume for a minute, if we may, even though it might be a radical assumption, that that executive order didn't get made. What would be the economic situation?

Mr. CICCCHETTI. All right. Step two, there is another plan which has also been proposed.

Representative BROWN. Well, what would be the impact? Never mind what has been proposed; what would be the impact under the present regulations? Can we stick to what the situation is rather than what somebody has thought of as a means of making money on it?

Mr. CICCCHETTI. Yes; sure.

The present plan, at the present time, present regulations permit the sale of oil, for the transportatin of oil from Alaska in foreign built tankers to a foreign country. The oil could be shipped from Alaska to Central America—

Representative BROWN. Let's ship it to Japan, if you don't mind, because that is the predicate that you have in your statement.

Mr. CICCCHETTI. I think if you will read my statement you will see I will be talking about the second plan.

Representative BROWN. Let's talk about Japan if you dont' mind.

Mr. CICCCHETTI. All right, in my view—

Representative BROWN. Can we go ahead and use Japan as the example? We are shipping it to Japan from the West Coast and we are importing it from the Middle East to the East Coast under present regulations.

Mr. CICCCHETTI. In my view, the oil would not go to Japan, instead it would either go to the West Coast of the U.S., where a new pipeline would be built either from Puget Sound to the Midwest at much higher cost than a direct route to the Midwest or it would be built from California to the Gulf states where it would then be refined and shipped on to eastern markets again at much higher costs to the U.S.

If you don't like either of those plans, the more likely plan, because it is the more profitable, would be for the oil to go to Central America in foreign oil tankers, be piped across Central America through pipeline, be transferred from the other end of that pipeline to the Virgin Islands which is a free trade zone and only one company, Amerada Hess, is permitted to refine oil in the Virgin Islands, and they, by the way, expanded their capacity to from 50,000 to 450,000 barrels per day in anticipation of North Slope crude. It would then be refined in the Virgin Islands but the price paid would be the world price, thus minimizing taxes back to the State of Alaska unless Alaska changes its posted pricing as I indicated earlier and then the oil could be shipped up to New York as a product outside the quota system because after all it started as domestic oil and still is domestic oil.

Representative BROWN. Is that the only way that it would get to New York?

Mr. CICCCHETTI. How else can it get to New York? It could get to New York in foreign tankers around the Cape Horn.

Representative BROWN. Anyway, it can get to New York.

Mr. CICCCHETTI. Domestic tankers around Cape Horn.

Representative BROWN. Anyway, it can get to New York from the West Coast terminal?

Mr. CICCETTI. Only by building new pipelines at much greater cost than a direct pipeline to New York.

Representative BROWN. What would that entail?

Mr. CICCETTI. You have to build a new pipeline. I think the most economical pipeline because it minimizes tanker costs would be to build a pipeline in one of two ways: One way would be to build a pipeline from Seattle to Chicago; another would be to an already existing pipeline from Chicago to Seattle via Edmonton thus avoiding a very major capital investment of at least \$2 to \$3 billion, and attempt to persuade the Canadian government—

Representative BROWN. Domestic; let's keep it domestic.

Mr. CICCETTI. All right. Domestically, then, you are talking about an additional \$2 to \$3 billion investment to move it.

Representative BROWN. Seattle to Chicago, would then be the choice?

Mr. CICCETTI. And it is unlikely that that investment would take place.

Representative BROWN. Is Chicago to Seattle the only choice?

Mr. CICCETTI. The other would be from Lower California to the Gulf States. The advantage of that pipeline is pipelines presently exist between the Four Corners Area and California as well as the Four Corners Area and New Mexico; there are also pipelines from New Mexico to the Gulf States so if you are talking about a—

Representative BROWN. What would be the cost of such a pipeline?

Mr. CICCETTI. I have cost estimates in terms of cents per barrel.

Representative BROWN. Do you know what the costs would be, just use the cost in terms of billions of dollars?

Mr. CICCETTI. I think its cost would probably be roughly half a billion to a billion dollars more than the \$2 or \$3 billion I talked about for a northern pipeline. It would be longer; it would also bring the oil to a place where it could be refined but not where the product would be consumed; namely, it would be bringing it to our major source of domestic supply which is also a center for major refineries so it certainly could be used there but the cost would be very high and it would seem to me it is more economical for the nation and more profitable for the companies, especially the major international companies, to bring the oil to be refined near consumers; namely, Chicago and New York as crude, because it is cheaper to transport crude than it is product.

Representative BROWN. Let's try to look at the two-year delay that would be—at least two-year delay if we have the same difficulties in Canada as we have in the U.S., perhaps a much longer delay in building the pipeline directly to the Midwest versus the possibility of bringing the oil to the West Coast and then using the southern route. Does that—what delay do you think would be entailed in seeing it entirely controlled in domestic U.S. transportation?

Mr. CICCETTI. If I wanted to get the oil quickest to the Midwest, I wouldn't go to Southern California; I would go through an alternative which you wouldn't let me describe earlier which is to take the pipeline that goes from Edmonton, Canada, and Seattle and the pipeline that goes between Edmonton and Chicago and reverse the flow of oil that goes between Edmonton and Seattle.

Representative BROWN. Are we talking about total domestic pipeline here, total U.S.?

Mr. CICCETTI. No; we are not.

Representative BROWN. That is the predicate laid; if you don't mind, I would like to stick to it.

Mr. CICCETTI. That is the quickest way to get it. If we don't go that way, then the other alternative would be—I suspect the quickest way would be to build a pipeline along already existing rights-of-way. There probably wouldn't be any legal action against it because the rights-of-way have already been granted; that would therefore be a plus for a southern route rather than a northern route. I don't know how long it would take. If they started construction of the pipeline the same time—if they started the construction of the Alaskan pipeline it could probably be built about the same time. It is unlikely because it is uneconomical to do that, however. You are talking about companies losing significant amounts of dollars in profits because of the higher cost of this kind of an alternative, it is probably for a period of only ten year life that this thing would be in operation—

Representative BROWN. We are talking about serving the consumers in the Midwest, and bringing the product into the Midwest to lower the cost of oil.

Mr. CICCETTI. My point is, it wouldn't lower the cost of oil because the plan would cost so much even though it could be done faster; that is the point.

Representative BROWN. I am hard-pressed to see why that is the case if you could complete it earlier, if you are talking about an additional half billion dollars to complete that line.

Mr. CICCETTI. Let me give you some numbers. Maybe it will make it easier for you to understand.

If we could go directly between the North Slope of Alaska and Chicago, the Interior Department estimate of the costs is roughly \$1.10 to deliver. It is probably low; it is probably more like \$1.25, but let's say it is between \$1.10 and \$1.25 to deliver Alaskan oil to Chicago through Canada.

If we build the Alaskan pipeline at a cost of approximately 60 cents a barrel to bring it out to the southern port of Alaska, we then transport it by U.S. tankers to California which is required by law, we might be talking about 35 cents per barrel to get it to California. That is up to 95 cents. The 95 cents and \$1.10 or \$1.25 are roughly the cost difference to get it to California versus to get it to Chicago. If we then build a new pipeline at a cost of approximately 60 cents per barrel to get it to Texas, and then have another cost of getting it to Chicago of 30 cents or to New York of, say, 50 cents you have to add this extra \$1 or so to the dollar for getting it to California, and that is \$2 and delivered to the Midwest or East Coast market as opposed to \$1.25, that is a loss then of 75 cents per barrel and at the number of barrels we are talking about, it is uneconomical to do it.

Representative BROWN. What does the delay factor do to the cost?

Mr. CICCETTI. What does delay do to cost? The analysis I have used is based upon a net value calculation. Roughly, when we talk of delay there are two other points to consider. One is that if the delay through Canada results in faster production, simply because we are talking not only about Alaskan oil being able to use the line but also

Canadian oil using the line, delays of two years, may be canceled out by increased production.

Representative BROWN. Canadian oil—I am sorry; my time is up but I am curious about the Canadian oil, where is the Canadian oil?

Mr. CICCHETTI. Where is the Canadian oil? Where is it proved up or where is it expected to be?

Representative BROWN. Where is it to be brought in?

Mr. CICCHETTI. Most of the geologists in Canada and the U.S. in the Department of the Interior have indicated they expect large oil provinces along the route that has been called the Mackenzie Valley route. There have been some strikes of natural gas; in fact, considerable strikes of natural gas and also some very recent strikes of crude oil by Imperial, Limited, which is an affiliate of Standard Oil of New Jersey which is one of the largest companies on the North Slope, so it is now beginning to look like some Canadian oil will be available. It is probably safe to say at the present time there isn't enough Canadian oil just by itself to justify a solely owned and operated Canadian pipeline which is probably one of the other reasons why Canada is interested in a joint venture; but I think it is wrong to ignore that Canadian oil if one is looking at delays because it does mean that faster production will essentially cancel out two years of delay.

Chairman PROXMIRE. I might announce at this point that I regret very much that former Interior Secretary Udall, who had intended—who was scheduled to appear this morning, could not appear.

Representative BROWN. Mr. Chairman, are we going to have anybody from the Canadian government speak to us on this subject.

Chairman PROXMIRE. We had David Anderson.

Representative BROWN. I mean who represents the government officially rather than individually a member of Parliament?

Chairman PROXMIRE. We did make a request of the State Department asking them to arrange that and they have not written yet.

Representative BROWN. Or any oil producing companies or anybody who can give us some of the technical background of the production of oil? For instance, I want to ask about the oil and gas thing. Do oil and gas come out at the same time?

Mr. NEHRING. Yes.

Chairman PROXMIRE. Let me answer the question, Congressman.

We did ask the oil companies if they would like to appear and I think if we press for it we could be successful in procuring witnesses later on.

Representative BROWN. I wish we had a panel of witnesses here because obviously they have the same viewpoint.

Chairman PROXMIRE. We have Secretary Morton coming up a week from Monday. We also have a number of congressional witnesses all of whom take a contrary view. I think the preponderance of witnesses we are going to have are going to come down against what Mr. Nehring and Mr. Cicchetti are saying.

Representative BROWN. I understand Mr. Cicchetti is an economist. Do you have a background in the oil industry?

Mr. NEHRING. No, essentially what I have learned is from what I have talked to people who are petroleum geologists in the Geological Survey and people in the Division of Oil and Gas in the Interior Department.

On the question you were asking, the fields in the Mackenzie Delta region, specifically on Richards Island, which Imperial Oil has discovered, are separate gas fields which can be produced immediately. In the Prudhoe Bay area, gas is dissolved in the oil or it is in the rock immediately above the oil. When you produce the oil, you will also produce the casinghead or dissolved gas with it as well. There is some question about whether you will be able to produce the gas that is in the gas cap—the associated gas—immediately as well.

The State of Alaska wants to make sure that producing that gas won't injure production of the oil, whereas—

Representative BROWN. What are you telling me as an expert? This is what I would like to know. Are you telling me oil and gas come out at the same time, that gas comes out first? I am not sure I understand what you are saying.

Mr. NEHRING. OK. There are two processes: Oil and gas come out at the same time. You could also separately tap the gas cap and have gas coming out separately.

Representative BROWN. So you could have gas come out first. Why don't we build the gas pipeline first then?

Mr. CICHETTI. You wouldn't be able to go through Alaska on a gas line.

Mr. NEHRING. Yes, sir, and you should also know that the oil is the more valuable resource as far as the oil companies are concerned. If you take the gas out first, it might damage their ability to extract all the oil out of it.

Representative BROWN. Is that a factor or not?

Mr. NEHRING. Yes, I know the state—

Representative BROWN. What is the economic significance of that?

Mr. CICHETTI. If you want to produce oil in the cheapest fashion in the early period, the pressure from the gas makes it easier to pump the oil out, so it makes it cheaper to produce the oil.

Now, if gas comes out along with it—

Representative BROWN. That would seem to be an economic advantage to taking the oil out first and bringing the gas out later; is that right?

Mr. CICHETTI. Well, the point I wanted to make is that you also are going to produce some gas along with it and the State of Alaska doesn't want to see its gas resources destroyed so they have passed what is called an antiflaring law which prevents the gas from being burned away as waste and it would require the oil companies to install reinjection equipment where the estimates have been about \$300 million for this equipment, where the gas produced along with the oil would be pumped back in. This has economic benefits in terms of reducing the costs of producing the oil; however, U.S. oil companies realize the present discrepancy between the domestic price of oil and gas, and they realize that the profits in the U.S. at the present time could be made from oil and not from gas. I think that is what the hearings the previous two days were about.

Therefore, there is very little economic incentive to produce that gas. A gas pipeline through—

Representative BROWN. You mean to bring it out early?

Mr. CICHETTI. To bring it out early.

Representative BROWN. So the economic incentive is to leave the gas there until later?

Mr. CICHETTI. Excuse me?

Representative BROWN. The economic incentive is to leave the gas there until later?

Mr. CICHETTI. Or to burn it away.

Representative BROWN. But you can't do that in Alaska you just told me under the law?

Mr. CICHETTI. That's right.

Representative BROWN. So it will be left there until later?

Mr. CICHETTI. It has to be reinjected; it will never come out through Alaska.

Representative BROWN. There has been some discussion—one of the reasons we ought to build the oil pipeline through Canada is that we should build the oil and gas pipeline at the same time. When would the oil pipeline deliver and when would the gas pipeline deliver?

Mr. CICHETTI. In my view the two could be built almost at the same time.

Representative BROWN. They could be built at the same time; I understand that; but would they deliver at the same time? When would the gas pipeline—

Mr. CICHETTI. Since you have gas along the route which could be produced by itself—

Representative BROWN. I am talking about from Alaska now; that is, the Alaska delivery system we are talking about. Could you tell me when the gas pipeline of Alaskan gas will deliver?

Mr. CICHETTI. It would deliver immediately.

Representative BROWN. It would?

Mr. CICHETTI. Except that it wouldn't be delivering at a rate—

Representative BROWN. I am sorry. I did not understand what you said. It would deliver immediately?

Mr. CICHETTI. It could be delivered immediately.

Representative BROWN. Well, will it or won't it? I am not sure I understand. With the constraints of the law and the geological requirement, this is what I am trying to get an understanding of. I am sorry; I am not an expert in the field but you two are.

Mr. CICHETTI. But I am an economist and when I say would or whatever, I am thinking in economic terms.

Representative BROWN. Maybe Mr. Nehring could help us.

Mr. NEHRING. Let me just give you the economics of it. The economics are that unless there was additional gas to go into the gas pipeline, it would be uneconomic to produce or to transport the gas from Alaska at the same time that the oil operation started. That is, you would need probably a period of a year or two if you were just sticking to Alaskan gas to get gas production to the point where it would be great enough to justify the line. But that doesn't—

Representative BROWN. So we are talking about seven years' delay in getting the gas to the Midwest; is that what you are talking about?

Mr. NEHRING. Considering construction—

Representative BROWN. Yes.

Mr. NEHRING. Considering—

Representative BROWN. And the gas would come out?

Mr. NEHRING. Seven years, along in 1978, but I guess it is seven years.

Representative BROWN. Is that right? Seven years?

Mr. NEHRING. I suspect if you don't put any Canadian gas on the line, which wouldn't make sense to me, you might be talking 1978 before you would get gas into the Midwest from Alaska; you might probably get it earlier if you brought it in from both Alaska and from Canada. And this would make sense. But decisions like this usually are not made by governments; they are usually made by oil companies, it is interesting to note—

Representative BROWN. It seems to me with all the involvement this is going to be a government political decision and one that—I mean, I thought this is what this was all about. Is that government political decision on pipelines once they are in operation or pipeline construction?

Mr. NEHRING. It seems to me the decision for governments is one of construction. Once they are built, it seems to me, operational decisions will be made by the companies themselves and should be subject to regulations such as common carrier regulations, but governments are not going to be saying you can't produce the gas from here or the oil from here. I don't foresee that kind of stipulation in the future.

Representative BROWN. Let me ask the question this way: If we got the oil out quicker?

Mr. NEHRING. Quicker, such as bringing it from Alaska and sending it to Japan if it has to be—

Representative BROWN. Bring it from Alaska and sending it to the West Coast.

Mr. NEHRING. West Coast.

Representative BROWN. It is your assumption that it will all be shipped to Japan?

Mr. NEHRING. Not all of it.

Representative BROWN. But if we get the oil out quicker then can we get the gas quicker to the Midwest on a trans-Canada gas pipeline?

Mr. NEHRING. We are just talking about Alaskan gas?

Representative BROWN. Yes.

Mr. NEHRING. Not Canadian gas?

Representative BROWN. Let's talk about Alaskan gas. If I may, it occurs to me what the Canadians do with their resources is a Canadian matter and what we do with our resources may become a U.S. matter.

Mr. NEHRING. That is not true; that is too simple. The fact is that at the present time the Canadian government has had its oil exports to the U.S. limited and for the first time it is being considered as foreign oil. Up until the present Administration took office the Canadian oil was considered domestic oil for national security purposes and for the purposes of the mandatory oil import program. Canada is not very happy about that decision.

I think it is very naive to say let's let Canadians deal with their resources of oil and gas and we will deal with our resources of oil and gas, to say that we will just build a gas pipeline through Canada regardless of what we do to Canada as far as their oil and gas resources.

I will answer the question, but it just does not make any sense to me answering the question as put without at least pointing out a reasonable future set of conditions.

Representative BROWN. It seems to me though, Canada is an independent country and if they would like to restrict the use of their gas or if they would like to use gas or oil primarily domestically they have a right to do that. Is that too simple?

Mr. NEHRING. Perhaps I did not make myself clear. It seems to me you were proposing for Canada—

Representative BROWN. I am not proposing anything, but asking questions to try to get some understanding of it.

Mr. NEHRING. I might be wrong.

Representative BROWN. You are the one proposing. You are proposing the trans-Canadian—and all I am trying to do is get an explanation of the two.

Mr. NEHRING. I think the question you asked me, could we get the gas into the Midwest sooner if we build the Alaskan pipeline rather than building a Canadian pipeline?

Representative BROWN. Yes.

Mr. NEHRING. My answer is I don't think we will get a gas pipeline through Canada immediately if (1) we don't put the oil pipeline up there, (2) certainly we won't get a pipeline in Canada if Canadian gas is not allowed to go through that pipeline, and (3) it seems to me if we continue to limit Canadian exportation of oil we are not going to get either pipeline through Canada.

Representative BROWN. Tell me why you don't think they will get the gas pipeline through Canada?

Mr. NEHRING. I don't think, as Mr. Anderson said earlier, that (1) the Canadian government will risk the domestic political consequences of approving a gas pipeline going between Alaska and the United States if we continue to have an oil policy between Canada and the U.S. the way it is, and (2) if we can't permit that gas pipeline to carry Canadian gas, which is the case you stated.

Representative BROWN. Let's change it and we permit them to carry Canadian gas.

Mr. NEHRING. I think the probability goes up 50 percent but not a full 100 percent.

Representative BROWN. The basic question is, will we get it sooner?

Mr. NEHRING. From the comments I have read and from the conversations I have had with Canadian officials, one thing is clear about the difference between the U.S. negotiating position and the Canadian negotiating position, Canada wants to talk about oil, gas, and other energy resources jointly and the U.S. wants to talk about them one at a time. My point is that we should be more realistic about this instead of trying to get Canada to go along with the most favorable position for U.S. oil and the most favorable position for U.S. gas. Canada has a right to object to this, and I think they will object. Therefore, I cannot be certain that we can have a gas pipeline built through Canada faster if we build the Alaska pipeline, even though the latter can be built sooner. In fact, I think it is quite the opposite.

Representative BROWN. Where would the Canadian gas come from?

Mr. NEHRING. Where would it come from?

Representative BROWN. Where are their fields?

Mr. NEHRING. Some of the fields are in the Mackenzie Delta; some of the fields are in the Canadian—

Representative BROWN. How much closer to the Midwest is that than the Alaskan fields?

Mr. CICCHETTI. Rich just told me—I am not a geographer—that it is five hundred miles.

Representative BROWN. Closer?

Mr. NEHRING. Closer.

Representative BROWN. And have those fields been developed yet and is there a plan by the Canadians to transmit that gas to the Canadian east and west?

Mr. CICCHETTI. The answer to your question is no, but let me point out something about that now. At the present time Canada has more natural gas than they need domestically in Alberta, very close to the U.S. Midwest. In the past, U.S. companies have made applications and have been permitted to get additional amounts of natural gas from Canada as they have needed it. This past year for the first time the Energy Board has denied the application of U.S. companies for an additional quantity of natural gas from Alberta and in denying that the reason they pointed out "At the present time we do have excess"—we being Canada has excess—"reserves of natural gas in the Arctic; however, no transportation system exists and until it does exist we can't allow the exploration of our natural gas to go to the U.S."

Representative BROWN. You are talking about Canadian natural gas? In other words, they have refused?

Mr. CICCHETTI. That's right. I am saying the crunch has already come in the Midwest on natural gas because of the issue of Arctic pipelines.

Representative BROWN. So the Canadians are refusing to export natural gas to the Midwest where there is a receiver need right now?

Mr. CICCHETTI. That is right. Because of two reasons: First, until they see what happens. Their stated reason is to see what happens on pipelines; but it seems to me the second reason is that very recently, in the last 2 years, the Administration has changed its position on the exploration of Canadian oil which it now says is foreign oil and has to be treated as foreign oil.

Representative BROWN. It seems to me it would be better for us to find out what the Canadian government really thinks about this whole proposition because they apparently in terms of exporting gas are operating very independently.

That is all I have, Mr. Chairman.

Chairman PROXMIER. I want to thank both of you gentlemen. Do either one of you have anything you would like to say that you have not had a chance to say? Yes, sir?

Mr. NEHRING. I would just like to make one additional remark about the fiscal condition of the State of Alaska, having done a fairly extensive study of this when I was in the Department of the Interior.

Currently, from what I have seen of figures quoted by Eric Wohlforth, who is Commissioner of Revenue in the State of Alaska, the State of Alaska still has a surplus of \$800 million in their general fund remaining from the Prudhoe Bay lease sale. This is a fairly

substantial cushion when their current state expenditures are currently running around \$300 million a year, and they are getting, of course, substantial revenues from income and other taxes.

I would also like to point out that they basically doubled state expenditures in the three year period from 1968 to 1971 after the lease sale. Thus, if we are talking about any impact of the delay, we are essentially talking about the difference between a situation which is very, very good for the state of Alaska's fiscal position and one which is maybe only very good. I fail to see where they have any strong substantive case there in terms of a crying need for state revenue.

Chairman PROXMIRE. Well, that is helpful.

As I said—we have already heard from Senator Gravel who takes a contrary position—we will hear from Senator Stevens and Governor Egan a week from Monday; and I am sure they will be interested in trying to answer the points that were made and it is helpful.

Mr. Cicchetti.

Mr. CICHETTI. I would like to respond to a question Mr. Brown gave to Mr. Nehring earlier and that was the issue of the balance of payments of the Canadian route.

It seems to me two factors have to be kept in mind: One, I have explicitly considered in my analysis and that was in reaching my conclusions, I essentially did a sensitivity analysis using a computer programing; I adjusted for possibility of 20 percent higher costs through Canada to take into account any taxes or any other kind of costs that would affect balance of payment of transporting U.S. oil through a foreign country, so that in reaching my conclusion I have sort of built into it this kind of cost appreciation.

The second thing, and I think it is very important to point this out, is that the ownership of the companies that are exploring in the Canadian Arctic and therefore whose oil and gas would go into any pipeline through Canada, are U.S.-owned companies. That means that any profits from these operations will be coming back to the U.S. in the form of income to the owners of these companies and therefore the balance of payments if it is a question at all will be a short one rather than a long one; and I would also say if balance of payments was sort of an overriding issue, it would be important to consider the effect of having British Petroleum be a major owner of oil in Alaska and therefore the profits that that company receives from the exploration and exploitation of oil form Alaska either to the U.S. or another country would also adversely affect the balance of payments to the U.S.

Chairman PROXMIRE. On the basis of the testimony we have received today, it appears the decision to approve the Alaskan Pipeline, in my judgment, can not be justified on environmental, economic or national security grounds.

The testimony also raises some serious questions about the decision of the Interior Department in this respect, serious as to the procedures they followed, and I think so serious that we should certainly inquire in greater detail of Secretary Morton when he appears before us, and if those are not resolved I think we should have a congressional

investigation to determine the action taken by the Interior Department in connection with, apparently changing, at least—the allegations have been made they changed a very significant part of the recommendations of the Interior staff with respect to this vital decision involving billions of dollars.

Gentlemen, I want to thank you very, very much for appearing. You have been most responsive and most helpful.

The committee will stand in recess until June 22, to hear from Secretary Morton, Governor Egan, and other congressional witnesses.

(Whereupon, at 12:05 p.m., the committee recessed, to reconvene at 10 a.m., Thursday, June 22, 1972.)

# NATURAL GAS REGULATION AND THE TRANS-ALASKA PIPELINE

THURSDAY, JUNE 22, 1972

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

The committee met, pursuant to recess, at 10:07 a.m., in room 1202, New Senate Office Building, Hon. William Proxmire (chairman of the committee) presiding.

Present: Senators Proxmire, Bentsen, and Javits; and Representatives Widnall, Conable, and Brown.

Also present: Loughlin F. McHugh, senior economist; Lucy A. Falcone and Jerry J. Jasinowski, research economists; George D. Krumbhaar, Jr., and Walter B. Laessig, minority counsels; and Leslie J. Bander, minority economist.

## OPENING STATEMENT OF CHAIRMAN PROXMIRE

Chairman PROXMIRE. The committee will come to order.

Today we continue our examination into the merits of the Department of the Interior's decision to approve the Trans-Alaska pipeline right-of-way.

Serious accusations have been made that the decision lacks the broad and objective analysis that should be required for an accurate evaluation of an Alaskan route versus a Canadian route, that in certain respects the Interior Department's impact statement was inadequate, that in other respects the analysis was disregarded in favor of political considerations. The criteria to be used in making this decision should be how we get the greatest benefit for the Nation; not what will give the oil companies additional profit.

The general areas which appear to be inadequately analyzed on the basis of testimony to date are these:

First, national security. It is far more important to get the vitally needed Alaskan oil to the right place in the United States than to just pump it out of the ground as soon as possible. This means it must be shipped to the areas of the country that need it the most because they face the greatest shortages of oil and gas, and lack adequate alternative sources of supply, and therefore would be most dependent on relatively insecure foreign imports.

Every independent analysis we've been able to obtain concludes that the mid-West and the East have and will continue to face the most severe oil and gas shortages in the country.

Previous testimony indicated that by 1980 the mid-West and the East will be forced to import about 10 million barrels per day, roughly six to seven times the amount of imports that the West Coast will be required to make in the same time.

There is no credible evidence to support the Interior Department claim that the most critical oil and gas shortage is on the west coast.

And there is the economic consideration. The economic analysis made by the Department of the Interior argued that an Alaskan and Canadian development were of equal economic efficiency. The testimony to date suggests that the Alaskan route is economically inferior for the following reasons:

First, the Department did not calculate the full cost of operating in the Alaskan route.

Second, the Department did not properly calculate the net economic benefits to the Nation as a whole, because oil has greater economic value in the mid-west than on the west coast.

Third, the Department made virtually no analysis of the economic impact of alternative routes on consumers. Senator Mondale in written testimony submitted to the hearing today provides an analysis showing that a Minnesota family, for example, of four, paying over \$100 per year more for gasoline for fuel if the Alaskan route is used.

Finally and most importantly, the Interior Department analysis never seriously examined the economic savings of a joint oil and gas pipeline route through Canada.

The natural gas from the Alaskan slopes will be produced as the oil is produced, and unless there is a way to market this gas, it will have to be expensively reinjected into the ground.

Then there is the environmental consideration. The Alaska pipeline route faces serious environmental hazards as it crosses the five earthquake zones in Alaska, and because the oil tankers servicing the pipeline will have to cross hazardous waters to bring Alaskan oil to the west coast.

These environmental costs were serious enough and the Interior Department staff analysis apparently concluded on balance that the Canadian route was superior. This was concluded by the Department's leadership, but we do not know why.

All in all, the evidence that the Committee has received so far indicates that the Alaskan route is inferior to the Canadian route on national security, economics, and environmental grounds.

The assertions of the Interior Department that the opposite is the case has been marred by strange procedural actions. It has been calculated to justify a preconceived conclusion.

There has been a calculated effort to keep the public in the dark by limiting the information that is released to the public and by not holding sufficient public hearings.

There have been unexplained deletions of staff conclusions. There has been a policy of neglect with the Canadian Government and the Canadian pipeline alternative and the oil companies involved have had extraordinary access to the Interior Department's leadership.

Secretary Morton has come here today to help clear up the suspicions and conclusions that have arisen. I am sure that he and his staff will be helpful.

Mr. Secretary, I have had an opportunity to read your statement. I think it is an excellent statement. It's intelligently organized and I think it provides a far better case than I have read before in favor of the decision that you have made and you do meet some of the objections that I have put into this opening statement.

This opening statement was developed yesterday and your statement I had a chance to study more carefully this morning.

Would you introduce the distinguished gentlemen who are with you? I understand Mr. Irwin of the State Department will submit his prepared statement for the record. We appreciate that very much because we have a tight morning with other witnesses appearing, as you know.

And we do have, unfortunately, a committee rule which we must apply to the distinguished Cabinet member, our 10-minute rule, but that has been the rule of the committee and we will insert into the record whatever is not included in your statement.

At the end, after all the questioning is over, if there's anything that you feel has not been adequately covered because you didn't have time in your statement or because the questioning didn't cover it, feel free at that time to give us what you do think we should have in addition to what we've been able to cover.

Senator BENTSEN. Mr. Chairman, if I may interrupt at this moment, you have the advantage of having read the statement, I have not. From what you told me, we want a full airing of this, and you have a Cabinet officer here who has a primary responsibility in this decision. I would hope we could make an exception and let him read his statement, and I would ask unanimous consent to do so.

Representative CONABLE. Mr. Chairman, may I ask if the 10-minute rule has been imposed by the committee vote or is it any part of the rules of the committee?

Chairman PROXMIRE. It is not a part of the rules of the committee; it has been accepted by the committee and it has been put into effect and maintained against the top leadership of the Senate and with respect to other witnesses who have appeared.

Representative CONABLE. I don't think we need to be straitjacketed by any rule, and if Senator Bentsen wishes to have more time spent by the Secretary of the Interior, who is obviously the best man qualified to deal with decisions his Department has taken, why I certainly have no objection to waiving the rule on this case.

Chairman PROXMIRE. Well, this puts the Chairman in a very difficult position. I think these rules are only good if we apply them to everybody.

Once we make an exception—Governor Egan was very anxious to have an opportunity to take more time; he's flown all the way from Alaska. He also has a fine statement. It supports the position of the Secretary in detail.

I don't know how we can make an exception for the Secretary of the Interior without making an exception for the distinguished Governor who has a statement, and there are members of Congress who are appearing who may press—I don't know. Perhaps they will go along.

They also take the position the Secretary of the Interior takes, so we have nothing this morning but witnesses who support the position of the Alaska pipeline.

Representative CONABLE. Mr. Chairman, you've taken a fairly strong position in your opening statement here. I'm sure it was intended only to set the stage for the testimony that we received today, but it was couched in conclusary and argumentative fashion and I think the Secretary should have an opportunity to clear up some of the objections you made. I am perfectly willing to proceed and see how it develops, but I would hate to find that the Secretary had a good deal more to say on these issues than we permitted him to say.

Chairman PROXMIRE. Well, here's what I will do. Of course, I always have to husband our time.

What I will do is as soon as the Secretary finishes his ten minutes, I am going to ask the Secretary the following question: Mr. Secretary, is there anything that you would like to add, and then you can proceed with your statement if you wish to do so, and you can use my ten minutes, at which time we will turn to Mr. Conable and we will turn to Senator Bentsen and at which time they will have ten minutes to ask questions.

Senator BENTSEN. The Chairman is most considerate.

**STATEMENT OF HON. ROGERS C. B. MORTON, SECRETARY OF THE INTERIOR, ACCOMPANIED BY JOHN N. IRWIN II, UNDER SECRETARY OF STATE; JAMES AKINS, DIRECTOR, OFFICE OF FUELS AND ENERGY, DEPARTMENT OF STATE; JACK O. HORTON, FORMER DEPUTY UNDER SECRETARY OF THE INTERIOR; WILLIAM A. VOGELY, DIRECTOR, OFFICE OF ECONOMIC ANALYSIS, DEPARTMENT OF THE INTERIOR**

Secretary MORTON. Mr. Chairman and members of the Committee, I have with me this morning Under Secretary of State Irwin, and with him, Mr. Akins, of the State Department.

On my left, far left, is Mr. Vogely, who is our Director of the Office of Economic Analysis, and next to me is Jack Horton, who, during the period that we're involved with in this work, served as Deputy Under Secretary.

It is with extreme regret that I do not have with me this morning, the Under Secretary Mr. Pecora, who has done so much work on this problem. Mr. Pecora has undergone a series of very serious surgical operations and is in intensive care. He has had really a very difficult time with an acute and very serious illness. We wish him well.

Thank you for the opportunity to appear before this committee, Mr. Chairman. The United States urgently needs the oil from Alaska's North Slope in American markets to satisfy a growing gap between domestic demand and supply.

We need that oil as quickly as an environmentally safe delivery system can be developed.

My decision is based on an exhaustive and unprecedented 3-year study of the ways to safely transport these valuable petroleum resources from the Alaska Arctic.

In this period, the Federal Task Force on Alaskan Oil Development, established by the President in May of 1969, has completed the following tasks:

(a) It has prepared a six-volume Environmental Impact Statement, which is thought to be the most comprehensive and detailed study ever conducted under the National Environmental Policy Act. Preparation of this statement required 18 months, and involved consultation with and contributions from over 20 Federal and State agencies.

(b) It has closely examined other alternatives, including possible Canadian routes, other transport systems and other sources for the needed energy.

(c) It has prepared, in three detailed volumes, an analysis of the economic and security aspects of the system.

(d) It conducted a sweeping geological and engineering analysis of the proposed pipeline system across Alaska.

(e) It has developed the strictest environmental and engineering stipulations ever drafted to safeguard a project of this nature.

(f) It has organized a professional Federal surveillance team to enforce the stipulations, to impose strict quality control of the system, and to insure maximum environmental protection.

Three significant and separate groups of public hearings have been held on the proposed pipeline.

The first was held on August 29 and August 30, 1969, by former Under Secretary Russell E. Train, in Fairbanks, Alaska.

A second series of hearings, nine in number, was held by the House and Senate Interior and Insular Affairs Committees, and by the Fish and Wildlife Subcommittee of the House Merchant Marine and Fisheries Committee between August and December of 1969.

The third series of hearings, 7 days in length, in February of 1971, was held on the preliminary environmental statement in Washington, D.C., and Anchorage, Alaska. They have resulted in over 12,500 pages of transcripts. I have brought the transcript.

Mr. Chairman, the Department's examination of this project has been penetrating and thorough. After months of searching consideration, I am totally convinced that the decision to grant the trans-Alaska pipeline is in the highest public interest. I am convinced that my decision fully reflects the letter and spirit of the National Environmental Policy Act of 1969, to which we are deeply committed.

Let me turn to the substantive points of our long examination.

#### THE CANADIAN ALTERNATIVE

Perhaps the most frequent question is why didn't I pursue the Canadian alternative.

Many people asking this question are genuinely motivated by environmental concern. Others are motivated by regional, economic, and other interests. I have carefully weighed the environmental, economic, social and security considerations from a National, rather than a parochial perspective.

Let me explain briefly the status and the disadvantages of the Canadian alternative.

## INFORMATION ABOUT THE CANADIAN ROUTES

Most immediately, no right-of-way through Canada has been established and thus there is no "Canadian Route." Our environmental impact statement examined six possible routes through Canada, but clearly there has been no single route determined and quite obviously we have no set of detailed route studies comparable to our comprehensive TAPS analyses.

Contrary to the testimony of Mr. David Anderson, a Member of the Canadian Parliament, before your Committee, the United States did formally request information of the Canadian authorities to assist us in the preparation of the TAPS environmental statement. This information was requested in a United States Aide-Memoire of July 9, 1971.

We have that document for your consideration.

Chairman PROXMIRE. Without objection, it will be put in the record. (The document follows:)

DEPARTMENT OF STATE, WASHINGTON, JULY 9, 1971

### AIDE-MEMOIRE

In its aide-memoire of June 29, 1971, the Canadian Embassy conveyed a proposal of the Government of Canada to hold further consultations between officials of the United States and Canada on the environmental risks of proposed oil tanker traffic from Alaska into the Strait of Juan de Fuca and inward coastal waters.

As background to its response, the Department of State wishes to summarize the current status of environmental studies undertaken by the United States Government pursuant to Section 102 of the Environmental Policy Act of 1969 in relation to an application before the Department of the Interior for a permit to construct and operate a pipeline across Alaska for the transport of oil. This is the information mentioned by the Secretary of State of the United States to the Secretary of State for External Affairs of Canada in their conversation of June 10, 1971.

Study and analysis of the environmental aspects of the above-mentioned application are proceeding under a three-stage process, in which (1) the Department of the Interior, which has central responsibility for the project, prepares a draft environmental impact statement; (2) the draft is reviewed by appropriate Federal and State agencies and by the public; and (3) a final draft statement is prepared incorporating data and considerations developed in the course of this review. At present, this final draft is in preparation. When completed, it will be submitted to the Council on Environmental Quality and made available to all interested parties. Thereafter, the Secretary of the Interior may act after thirty days on the requested permit for the construction and operation of the pipeline system.

The scope of the Department of the Interior's final draft statement will be very comprehensive. Among other aspects, it will reflect full attention to the environmental problems which might result from the marine transport of the proposed production of Alaskan oil to ports of destination. An important phase of the current version of the environmental impact statement has been the acquisition and analysis of data from all interested sources.

In view of the concern expressed by the Government of Canada about the marine transport aspect of the proposal, special care has been taken to ensure that not only the nature of this concern but also all relevant information, in detail, be considered by the United States officials engaged in this study. In particular, this information has included material developed during hearings conducted by the Department of the Interior early in 1971 and during the United States-Canadian consultative meeting on this matter held in Washington on May 3, 1971; the records of hearings conducted by the Special Committee on Environmental Pollution of the Canadian House of Commons, as provided by the Canadian Embassy; the above-mentioned discussion of June 10, 1971 during

the visit to Washington by the Secretary of State for External Affairs and the Minister of the Environment; and, most recently, the information and considerations provided by Canadian officials in connection with the Embassy's aide-memoire of June 29, 1971.

The Department of State desires to facilitate continued United States-Canadian exchanges on this problem. At the present juncture, it believes that the immediate problem is to determine those procedures which will prove most useful.

The subjects raised in the Embassy's aide-memoire of June 29 have been discussed at some length in the consultative meeting of May 3. On most of these matters the information provided by the United States at that time remains current. On others, generally those concerning legal problems, the United States Government is continuing to study the issues, and further study will be necessary before additional responses can be developed.

Therefore, as an effective alternative to another meeting at this time, the Department of State proposes to provide to the Canadian Embassy, as soon as it is developed and on a continuing basis, any new information which would be of interest to the Canadian Government.

Meanwhile, if the Canadian authorities have any pertinent additional information which has not already been conveyed to the United States Government, the Canadian Embassy is invited to furnish such information as expeditiously as possible.

The advantage of the procedure outlined above is that effective transmission of such information in written form can be achieved with a minimum of delay. If received promptly any new information can be considered before the revised draft environmental impact statement is completed and the United States authorities move into the next phase of consideration of the pipeline application.

In addition, the Department of State would be disposed to enter into preliminary discussions looking toward establishment of joint contingency plans to deal with potential oil spills in waters affecting the two nations on the West and East Coasts, drawing as appropriate on the work undertaken with regard to the Great Lakes. Regardless of whether additional tankers should be authorized for the transportation of Alaskan oil, tanker traffic already exists in both these coastal areas, and a broadening of United States-Canadian cooperation on contingency planning should serve to minimize the risks involved, to the mutual interest of both countries.

Secretary MORTON. The 30 environmental and social studies of northern pipelines being pursued by Canada were not announced in Canada by Minister Macdonald until April 18, 1972, three weeks after the publication of the TAPS environmental statement and nine months after our request. Not one of the studies, as far as we know, has been completed and we have not received any substantive information from the Canadian Government on any pipeline route through their country.

#### RELATIVE ENVIRONMENTAL CONSIDERATIONS

While specific information on the Canadian route is not available, we have had enough general knowledge to reach some important conclusions.

There are two types of environmental impacts that must be considered in comparing the Alaskan and Canadian routes: unavoidable impacts and potential impacts. A major conclusion with respect to terrestrial impact is that because the Canadian route is longer, crosses more permafrost and more major rivers and necessitates much more gravel extraction, it involves a greater degree of unavoidable environmental damage than does the Alaskan route.

On the other hand, the Alaskan route involves a maritime leg to the West Coast which is likely to involve small chronic discharges from the ballast treatment plant at Port Valdez. We were unable to deter-

mine the extent of environmental impact, if any, that might result from these discharges.

An Alaskan pipeline would have potential seismic risks along three zones in the southern half of the route. These zones have been identified and the system designed to accommodate the largest earthquake on record. The system is being engineered to withstand ground movements of from 5 to 20 feet, and all seismic zones will be continuously monitored to determine crustal movements.

In addition to these unprecedented seismic safeguards, containment dikes and remotely controlled block valves will further insure against environmental damage from the remote possibility of earthquake damage.

The marine leg of the Alaska route also involves potential pollution from oil tanker collisions and groundings, and from accidental spills during loading and unloading.

It is pertinent to observe that the pipeline will have a throughput of only 600,000 b.p.d. for the first 1 to 2 years of operation, then an increase to 1,200,000 b.p.d. in the 3d year with 1,500,000 b.p.d. planned by the 6th or 7th year. While the system is being designed for a maximum throughput of 2 million b.p.d. it is uncertain when that capacity will be attained. Consequently, the number of ships entering Valdez and other west coast ports, and the accompanying risks of polluting accidents, will be proportionately reduced during the first 6 to 7 years of operation.

#### NEW AMERICAN INITIATIVE

Nonetheless, I am convinced that we must seize this opportunity to set new and exacting standards to govern the marine transport of American oil. This goal is worth accomplishing by itself; but if our standards can set an example for solving the broader problems of international oil movements, we will have accomplished a task of long range significance for mankind. I have discussed this matter with Secretary Volpe, and we are now studying the implementation of the following steps:

All tankers, foreign and domestic, operating in the TAPS trade will be prohibited from discharging oil into the ocean, including oil contaminated ballast, tank cleaning waste, or bilge effluent. The facilities at Port Valdez will not be allowed to deliver oil to tankers that have violated this prohibition. Newly constructed American flag vessels carrying oil from Port Valdez to United States ports will be required to have segregated ballast systems, incorporating a double bottom which will avoid the necessity for discharging oily ballast to the on-shore treatment facility. All other tankers will be required to discharge oily wastes into the treatment facility at Port Valdez. That facility will be required to eliminate as much oil from these wastes as technologically practicable. In no instance will the discharge exceed 10 p.p.m. of oil, and the standard will be upgraded as improved technology becomes available.

Vessel Traffic Systems will be required for Port Valdez and the West Coast ports. These systems will incorporate traffic separation schemes and will be geographically situated so as to avoid the fishing grounds and ecologically sensitive areas off Canada, Alaska and our West Coast. The Coast Guard will increase its staff and equipment as

necessary to implement these schemes. Aids to navigation will also be modified as required to implement these systems.

New United States flag vessel designs will be evaluated, looking toward improving their maneuverability with regard to stopping distance and turning characteristics.

All accidental discharges during loading and unloading will be eliminated to the fullest extent possible and if they occur, will be subject to substantial penalties. Coast Guard regulations scheduled to become effective late this summer are being reviewed to assure their adequacy for Alaskan operations. Construction specifications and required manning and equipment standards are also being reviewed to provide further insurance against accidental discharges during loading and unloading operations.

Contingency plans for cleaning up oil spills must be continually reviewed and proven to minimize the damage in the event any accidents occur. These will be kept current in the light of new technology to assure their maximum effectiveness. The Coast Guard will augment its personnel and equipment to insure a maximum capability in this regard.

A continuing environmental monitoring system will be required during the lifetime of oil movement in American coastal waters.

Discussion of the marine leg should not blind us to the grave environmental problems that would be involved along a Canadian route.

First, it is important to stress that the large number of river crossings constitute significant potential risks along a Mackenzie route. The wider the river crossing, the greater the risk to the environment of a pipeline system. The only crossing of as much as one-half mile width on the Alaskan route is at the Yukon River. At least twelve major river crossings of this width or greater are involved between Prudhoe Bay and Edmonton on a route up the Mackenzie River.

Second, guidelines adopted by Canada in 1970 require that oil and gas pipelines be located within a common corridor.

Chairman PROXMIER. Is there anything that you haven't covered so far in your statement, and if so, go right ahead.

Secretary MORRIS. Thank you, Mr. Chairman.

However a recent study by Canada's Federal Environmental Agency recommends that gas pipelines should be built in the west side of the Mackenzie River and oil pipelines on the east.

This study by the project leader of Canada's Northern Pipeline Project indicates that for engineering and environmental reasons the two quite different types of lines should be constructed a considerable distance apart. If the recommendations of this Canadian study are observed, then the environmental and economic savings from a common corridor are materially diminished. With your permission, Mr. Chairman. I would like to offer for the record an account of the study prepared by Mr. C. T. Hatfield, Fisheries Service, Department of the Environment, Winnipeg.<sup>1</sup>

Third, a Canadian oil pipeline alone, 3,200 miles in length could require as much as 320 million cubic yards of gravel, involving over 1,000 excavation pits. The uncertain availability of this material and the impact of its extraction on the environment of the Mackenzie Valley constitute most serious questions.

<sup>1</sup> The study by Mr. C. T. Hatfield may be found on p. 340.

I have not made these points in an effort to convince you or the American people that the Alaskan route is environmentally superior to a Canadian route. Rather, I have attempted to show that the environmental question is not as simple as some believe, and that we cannot avoid the tough environmental problems involved in this massive project by sweeping them under the rug of our Canadian neighbors.

In fact, it is by no means clear which route will produce more environmental damage over the long run, because no one can predict with certainty which potential risks will actually be realized. My authority does not run to Canada, so I can give no assurance with respect to a Canadian route similar to the exacting environmental stipulations and strict environmental surveillance that we have developed for Alaska.

#### DETERMINING THE NATIONAL INTEREST

While environmental concerns have been among our highest priorities, a project of this magnitude compels the consideration of the broadest framework of issues in determining the national interest. One of the most critical issues is the time frame in which oil can move to market.

#### CAUSES OF DELAY ON CANADIAN ROUTE

Selection of a Canadian alternative would involve substantial and unacceptable time delays. In my May 11 announcement, I estimated the delay to be 3 to 5 years; it might be even greater—possibly as much as seven years. There is no objective justification for the view that the delay could be as short as 1 to 2 years.

##### 1. LONGER LINE

The first, and most obvious, point is that the Canadian route to Chicago would involve a 3,200-mile pipeline, four times as long as the Alaskan route of less than 800 miles. As a matter of logic, a longer line takes longer to build because of increased requirements for material, logistics, and manpower.

##### 2. DRILLING IN PERMAFROST TERRAIN

The second point is not so obvious, but it is equally important. During the past three years, the Department has required the drilling of 3,300 core holes in permafrost terrain, to ascertain optimum pipe location and construction modes. This drilling is essential both to the safe construction of any oil pipeline system in the Arctic and sub-Arctic and to the preparation of adequate impact analyses. Since very little of this engineering feasibility work has been done for a Canadian oil pipeline route, the companies and the Canadian Government would be starting nearly from scratch. It is reasonable to assume that if two years were required to core-hole 700 miles of permafrost along the defined Alaska route, then at least two years and probably three would be required to drill the 1,200 miles of permafrost along the Canada route, which has not yet been chosen.

## 3. ENVIRONMENTAL STATEMENT

While the Canadians have no National Environmental Policy Act, it is important to realize that any Canadian route would require the preparation of a comprehensive environmental statement because of the 300 miles in Alaska and the 900 plus miles south of the international border under United States jurisdiction. To comply with American law, this statement must provide a detailed examination of the entire 3,200 miles of the route. It would entail the careful drafting of a preliminary statement; the preparation of comments by Federal, State and in this instance, Canadian authorities; the conduct of public hearings in both countries, and the careful assessment of all alternatives, before the final document could be completed.

A reasonable length of time to allow for this preparation is from 18 to 24 months, realizing that an adequate study could not be finished until a route is selected, and the core-drilling and other scientific environmental studies completed.

## 4. CANADIAN GOVERNMENTAL ACTION

The fourth point, the issuance of a Canadian permit, is somewhat delicate because it involves very good neighbors; but nevertheless it is important to understand this issue.

According to our best information, the Canadian Government has not been, and is not now, even prepared to accept an application for a permit. Minister Macdonald has explained to us that an application can be accepted by the end of the year. We received Alyeska's application on June 10, 1969, three years ago. There is little reason to believe that the Canadian Government will be able to resolve their environmental and Native Claims issues in any less time.

*Canadian native claim delays*

Our Congress solved the Alaska Natives claims problem by adopting the Alaska Native Claims Settlement Act of 1971. It provided 40 million acres, an area larger than the State of Wisconsin, and nearly one billion dollars. Canada is just beginning her consideration of this problem and indeed it is pertinent to note that none of the 30 Canadian studies addresses this problem specifically.

I bring to your attention, and offer for insertion in the record, Mr. Chairman, a press account of recent activities of Canada Natives with the headlines "Stopping the Pipeline Is Northern Native Cause." It indicates that Native groups "use every weapon at their disposal and are building an arsenal that will include everything from environmental protest to exercising a form of 'squatters rights'"—to achieve their aboriginal land rights.

Chairman PROXMIRE. Without objection, it will be done.  
(The article referred to follows:)

[From Oilweek, Mar. 20, 1972]

## STOPPING THE PIPELINE IS NORTHERN NATIVE CAUSE

(By Barry Kay, Editor)

Indians, Eskimos and Metis of the Northwest Territories are organizing pressure groups to seek settlement of treaty and aboriginal rights. Their main club in the fight with the federal government

will be the pipelines planned to move Arctic gas and oil south to hungry markets. Because native intervention is so potentially serious from the standpoint of delay and is beyond the control of the petroleum industry, Oilweek has delved extensively into the situation and in a four-part series of articles starting this week, brings the industry up-to-date on what could well become an explosive—and expensive—situation.

Armed with details of the massive Alaskan land and royalty settlement, a couple of old treaties the Canadian government has never honored and a new militancy among the young, the natives of the north have decided that no pipeline will be built across the land they claim as their own until Canada has settled honorably with them.

The settlement they want is of their treaty and aboriginal rights, and their efforts to obtain a major land plus cash settlement could well cause expensive and lengthy delays in construction of a Mackenzie Valley oil or gas line.

Where unity never before existed, new organizations have sprung up, their leaders set on winning satisfaction on a set of demands that are in many ways nebulous. The treaty Indians have formed a Brotherhood, the Eskimos, who historically have been loners, have their Inuit Tapirisat and Metis, non-treaty Indians and a sprinkling of Eskimo hold membership in an all-embracing organization called Committee for Original Peoples Entitlement (COPE).

At the moment, the associations are suffering birth pangs and so far have been relatively ineffective, albeit vociferous. Which may well be the reason they haven't managed to attract a great deal of attention across the country. But as they grow stronger and more sure of themselves, the associations are learning what they must do—and the answer each is coming up with is to stop the pipelines.

It's not that the natives are against progress. In fact, most look upon the coming of the oil industry to the north as a positive force in their favor. But they also know that the largest club they have to force the government to settle is the pipeline—far and away the biggest development project ever contemplated in the North.

They are convinced that if they can block construction of the line, for whatever reason, they can bring the government to bay and come up with a settlement that will look after their people for all time.

And they might not be too far from wrong.

So far they are proceeding on two main fronts—public opinion and the law. But it is the latter—legal recourse—that will probably be the battleground upon which their claims will be fought.

They intend to use every weapon at their disposal and are building an arsenal that will include everything from environmental protest to exercising a form of 'squatters rights'—otherwise known as 'aboriginal rights' or 'we-were-here-first'. The battles they are in the process of staging will carry all the way to the Supreme Court of Canada if necessary.

And, if they succeed in getting that high up the judicial ladder, then regardless of the court's decision, the pipelines are bound to be delayed.

It's likely that the first interventions will be filed shortly after the initial application is made before federal authorities. This might be a bit late if the pipeline companies are so quick at filing their proposals that the natives aren't ready to do battle, but at any rate, their objections will be lodged long before the first ditch is ready for digging.

And here's a grabber—the battles will probably be fought at taxpayer's expense. The Brotherhood and Inuit are supported by government grant and, at least in the case of the Indians, is government money that will be used to prepare their case and take it to court.

As we said the organizations through which the natives hope to obtain settlement of what they term native or aboriginal rights are still feeling their way along. Of the three, the Brotherhood is probably furthest advanced, and yet even it claims to have a great deal of extensive—and expensive—research before it can formulate a structure of its demands.

It was the Brotherhood that fired the first shot in the battle against pipelines—a relatively innocuous, but nevertheless important, intervention against Westcoast's Pointed Mountain pipeline (Oilweek, Dec. 13/71, p. 5).

The intervention went for naught—as the Brotherhood expected it would—when the National Energy Board decided the matter of Indian rights wasn't really within its jurisdiction.

"We wanted to see what would happen, and we weren't totally surprised when nothing did," said Gerald Sutton, the young lawyer who left a budding practise in Edmonton to become fulltime legal consultant for the Brotherhood in Yellowknife. "It revealed to us to some extent the mentality of the people in government and the terms in which they regard the native people.

"And it makes us realize that we'll have to get a lot tougher than just intervening in pipeline applications."

What course the "tougher" action takes will depend on the Brotherhood's state of preparedness and on the merits of their case at the time. Any other relatively small pipeline projects (along the line of the 32-mile Pointed Mountain one) probably won't get too much static from the Brotherhood.

But there's no way that Sutton and his group won't fire every available broadside at the "big one"—the first pipeline down the Mackenzie Valley from the gas or oil fields of the Arctic.

The Brotherhood's determination is echoed by another major, although controversial, group—COPE.

Centered in Inuvik, COPE purports to represent all non-treaty Indians, Eskimos and Metis (part native, part white), in the Northwest Territories and the Yukon. Although often challenged on this point, the group claims to have sold 800 \$1 memberships to natives throughout the north.

Its chief spokesman has been Nellie Cournoyer, a young, good-looking divorcee whose mother was Eskimo and father white and who manages the Canadian Broadcasting Corp.'s Inuvik station.

Very outspoken and radical in approach, Miss Cournoyer spends a great deal of her time searching for an identity for her group. But while membership and aims might be somewhat murky, she is in to doubt about what action to take when a pipeline proposal goes to government:

"We'll stop it, by whatever means we can."

Again, the means will probably be litigation. But Miss Cournoyer doesn't want COPE, the Brotherhood and other groups going their own individual ways—instead she'd like to see them launch a unified, concerted effort, that sees Indian, Eskimo, and Metis speaking with one voice.

Perhaps because of her involvement with communications, Miss Cournoyer places fairly high importance on public opinion, particularly where the oil industry is concerned.

If the industry was on the side of the natives, it could help them make yards with the government by exerting some of its influence in areas of pressure lobbying, she feels. In fact, all of the entitlement groups figure the road will be a hard one to negotiate on their own and look for support from the south, both from industry and the public.

Support for the natives is a logical way for the oil industry to go, the natives feel, because, judgments of right and wrong aside, it would make sense for them to take whatever track means fewer problems in building the pipelines.

Which raises a question that the industry is probably going to have to answer eventually—should it become politically active as a matter of self interest in the case of native rights, or should it stay very much on the sidelines and take the lumps that are almost certainly to accrue in the battle between government and native?

Secretary MORTON. My point here, Mr. Chairman, is that the Canadian Native Claim issue is now at an incipient stage and time for its resolution must be properly considered. The American Congress took several years to determine and act upon this critical issue.

In view of the United States record, it would be unwise, and indeed ill serve the cause of social justice, to ignore the possibility of delay from Canadian Native Claims in the interest of expediting pipeline construction.

#### *Canadian environmental delays*

Likewise, there are on grounds to assume that environmental groups in Canada will not demand of their government an important voice and a most cautious and deliberate approach to a project of this magnitude.

As an example, the Canadian Arctic Resources Committee, an environmental group of scientific and northern experts, has recently recommended that exploitation of the Arctic should be delayed for approximately a decade to allow for the completion of basic research and environmental management procedures. It is certain that this Canadian group, among others, will seek a close participation in discussions for any proposed pipeline through Canada.

*Canadian application requirements*

Finally, it is important to clearly assess the demanding requirements for filing a pipeline application in Canada. The Canadian National Energy Board requires in effect that a full Project Description accompany the application together with a detailed map of the route and specific information regarding markets, reserves, growth trends, capital costs, accrued depreciation, throughput contracts, projected revenues and expense, construction schedules, and disclosure of financial matters.

I insert in the record, with your permission, excerpts from the Rules of Practice and Procedure of the National Energy Board pertinent to the filing of applications for oil pipelines.

Chairman PROXMIRE. Without objection, it will be done.

(The excerpts follow :)

[Excerpts from the National Energy Board, Rules of Practice and Procedure, Government of Canada]

\* \* \* \* \*

INFORMATION REQUIRED TO BE FURNISHED BY APPLICANTS

5. (1) Every application for a certificate shall be accompanied by :

(a) the map required under section 28 of the Act, having a scale of not less than one inch, equals one mile ; and

(b) except as otherwise authorized by the Board, the information specified in the Schedule to these Rules.

(2) Every application for a license, or order authorizing the exportation of power under Part VI of the Act shall be accompanied by the information required to be furnished to the Board under any regulations made under that Part.

(3) At any time after the filing of an application and before the disposition thereof by the Board, the Board may require the applicant to furnish such further information, particulars or documents as the Board deems necessary to enable it to obtain a full and satisfactory understanding of the subject of the application.

NOTICE OF APPLICATION

6. (1) Except in any case where the Board direct that an application may be heard and determine *ex parte*, the Board shall, as soon as possible after the filing of an application, set the application down for hearing.

(2) Where an application has been set down for hearing, the Secretary shall forthwith notify the applicant of the time and place fixed for the hearing thereof and shall, by such notification, indicate :

(a) the persons to whom and the time within which notice of the application shall be given by the applicant :

(b) the manner, whether by public advertisement, personal service or otherwise, in which notice of the application shall be given by the applicant ; and

(c) the form and contents of the notice to be given by the applicant and the information to be included therein, including the time and place fixed for the hearing of the application and the time within which any reply or submission shall be filed with the Secretary.

(3) Upon receipt of the notification referred to in subsection (2) the applicant shall give notice of the application in accordance with such notification.

\* \* \* \* \*

## PART II

## INFORMATION REQUIRED TO BE FILED BY APPLICANT FOR CERTIFICATE IN RESPECT OF OIL PIPE LINE

- (1) Details of markets to be served by the applicant's pipe line system ;
- (2) The marketing areas to be served and their present and future needs ;
- (3) The reserves of crude oil to support the estimated throughput of the pipe line and the trends in growth of these reserves ;
- (4) Details concerning the route, design and capacity of the proposed pipe line including :
  - (i) pumping stations ; and
  - (ii) storage facilities ;
- (5) Details as to the suitability of the proposed pipe line design with particular regard to :
  - (i) adequacy for foreseeable throughput ;
  - (ii) operational flexibility for increasing throughput ;
  - (iii) economics of installed pump horsepower related to diameter of line ; and
  - (iv) flow formula and hydraulic profile used in design ;
- (6) A brief description of ;
  - (i) gathering facilities to supply oil to the proposed pipe line ; and
  - (ii) any connecting pipe line facilities beyond the international boundary ;
- (7) With respect to the applicant's pipe line system, a statement of :
  - (i) the capital cost and accrued depreciation of existing facilities ; and
  - (ii) the estimated cost of new or additional facilities to be constructed ;
- (8) Details of all throughput contracts entered into by the applicant ;
- (9) Details of deficiency agreements entered into by the applicant ;
- (10) Pro forma statement of estimated revenues and expenses for the applicant's pipe line system for the first, third and fifth years following the issuance of the proposed certificate indicating :
  - (i) estimated revenue in detail ;
  - (ii) annual operating costs of facilities referred to in clause (7) ;
  - (iii) the estimated profit or loss ;
  - (iv) the estimated rate of return ; and
  - (v) proposed pipe line tolls and the derivation thereof ;
- (11) Estimated construction schedule ;
- (12) Evidence to the effect that the proposed pipe line is and will be required by the present and future public convenience and necessity of having regard to :
  - (i) the present and future needs of the marketing areas to be served, and
  - (ii) the economic feasibility of the pipe line ; and
- (13) The financial responsibility and financial structure of the applicant, the methods of financing the line and the extent to which Canadians will have an opportunity of participating in the financing, engineering and construction of the line.

\* \* \* \* \*

Secretary MORTON. For comparison, it took Alyeska 18 months to comply with our mapping requirements and three years to file a satisfactory Project Description.

Once an application might be filed and approved, further time must be allowed for the conduct of hearings, the review of comments and for Parliamentary debate. These debates, certainly, would involve discussion and possible enactment of pending Canadian environmental legislation which in turn could have significant effects on the timing of a pipeline permit.

## 5. FINANCING

Let me turn now to problems whose solutions would be as difficult as any of the engineering or administrative issues—the problem of financing.

The TAPS route is estimated to cost \$2.8 billion for the pipeline and \$1.7 billion for tankers—a total of \$4.5 billion. Its costs have the advantage of being shared between the petroleum and maritime industries.

The cost of a Canadian oil pipeline is unknown, but we estimate it to be over \$6 billion. Canadian authorities have indicated that they must control 51 percent of any system through their country. We enter here, Mr. Chairman, a most uncertain and difficult area. Let me bring to your attention some questions of critical importance about the feasibility of a Canadian route:

1. Could the Canadian industry raise from their own money markets the \$3.1 billion necessary for 51% of equity financing for an oil pipeline?

2. Could they raise an additional \$2.2 billion necessary for 51% of a gas pipeline through Canada—making a total of over \$5 billion of Canadian financial resources?

3. How long would these financial arrangements take, and can an application be filed before agreements are completed?

4. Would not agreements on financing and an elaborate corporate structure be necessary before route feasibility studies and a Project Description could start on a specific Canadian route?

5. How much of the throughput capacity would the Canadians demand and what effect would this have on raising American capital, and on the financial structure of American companies?

6. Would a pipeline system of shared capacity and ownership require treaty arrangements, and if so, how long would these take?

7. If the Canadians are given any percent of throughput, how long would trade negotiations over oil import quotas require?

The answers to these administrative and financial questions bear most directly on the time frame of a Canadian system. The great uncertainty of their resolution in time as well as substance makes it clear that our 3 to 5 year delay may well underestimate the actual time required. Under the most optimistic assumptions, I do not personally see how oil could flow through a Canadian system earlier than 1981.

## IMPACT ON THE UNITED STATES

In concluding my statement, let me outline the more significant impacts that a Canadian route would have on the United States:

1. While the Canadians have offered to increase oil exports to us during the period of delay, it is most uncertain whether they can guarantee the equivalent of the TAPS capacity above the Canadian import increases which we have already assumed in our calculations.

2. If 50% of the capacity of the line were reserved for Canadian oil, royalty revenues to the State of Alaska and to Alaska Natives would be cut by 50%.

3. A Canadian route would deny to the United States the substantial employment benefits resulting from construction and operation of a pipeline in Alaska.

4. The denial of an Alaskan route, with the accompanying reduction of State and Native royalties, would most seriously affect the economy of the State of Alaska.

5. A Canadian route would deny the United States and the State of Alaska the construction of a vital transportation artery to its own Arctic.

6. To the extent that a Canadian route involved shared capacity, the resource cost savings and balance of payments of the United States would be adversely affected.

7. A Canadian route would deny to this country the substantial benefits that otherwise will occur to our maritime industry.

#### TRANSPORTATION OF ARCTIC GAS

The Department's examination has indicated the growing need for gas in the United States and the economic efficiencies which would be realized by transporting Prudhoe Bay gas by a pipeline through Canada. Throughout our analysis, we have recognized the clear benefits that a Mackenzie Valley route would have for this gas and we welcome a close working relationship with the Canadian Government on this matter.

We also recognize the severe burdens that will be imposed on the Canadian economy should the funding of a \$6 billion oil pipeline and a \$4.3 billion gas pipeline, at 51% Canadian equity, be sought from their domestic markets.

Because of the staggering, perhaps insuperable difficulties involved with financing both systems with Canadian capital, we propose that the trans-Alaska pipeline proceed now under American financing, and that we join together with Canada in pursuing a Mackenzie route for the gas.

It is pertinent to add here, Mr. Chairman, that United States gas pipeline companies advised the Department on May 4, 1972, that the adoption of a Canadian route for North Slope oil would be "disasterous" inasmuch as the construction of a gas line would be delayed until the mid-1980's. This delay, they indicate, would cast doubts on its economic feasibility. With your permission, I enclose for the record their comments on the Department's final environmental statement.

Chairman PROXMIRE. Without objection, it will be done.

(The comments follow :)

#### COMMENTS OF UNITED STATES GAS PIPELINE COMPANIES INTERESTED IN TRANSPORTATION OF NATURAL GAS FROM ALASKA AND NORTHERN CANADA

##### I. PRELIMINARY STATEMENT

These comments on the Final Environmental Impact Statement on the Proposed Trans-Alaska Pipeline are submitted by a group of United States natural gas companies who are actively engaged in proposals to acquire and transport natural gas from the North Slope of Alaska and northern Canada to markets in the lower 48 states. These companies are :

The Columbia Gas System, Inc., 20 Montchanin Road, Wilmington, Delaware.  
Michigan Wisconsin Pipe Line Company, One Woodward Avenue, Detroit, Michigan.

Natural Gas Pipeline Company of America, 122 South Michigan Avenue, Chicago, Illinois.

The listed companies supply natural gas to major consuming areas of the United States and are responsible for providing the additional supplies of gas required to meet the needs of millions of consumers. In order to attempt to

meet the rapidly increasing demand for gas and to replace current production, the listed companies are formulating plans to construct a natural gas pipeline from the North Slope of Alaska through Canada to the lower 48 states. Michigan Wisconsin Pipeline Company and Natural Gas Pipeline Company of America are members of the Northwest Project Study Group. The Columbia Gas System, Inc. is a member of the Gas Arctic Systems Study Group. Both groups are engaged in extensive technical, financial and economic studies and research preparatory to filing applications with the United States and Canadian Government agencies for authority to construct and operate the proposed pipeline facilities.

The position of the listed companies is unequivocally in support of issuance of a permit for the Trans-Alaska oil pipeline. These comments are submitted to register our concern and opposition with respect to a proposed alternative, namely, construction of the oil line through Canada to the lower 48 states.

## II. CONSTRUCTION OF AN OIL LINE FROM ALASKA THROUGH CANADA WOULD SERIOUSLY DELAY AND IMPERIL CONSTRUCTION OF THE URGENTLY NEEDED GAS PIPELINE

The Final Environmental Impact Statement lists as one of the alternatives to construction of the Trans-Alaska Pipeline, the transportation of the Prudhoe Bay oil through a pipeline constructed from the North Slope of Alaska through the MacKenzie River Valley of northern Canada to the vicinity of Edmonton, Alberta, and thence to the lower 48 states by existing pipeline routes. While the Impact Statement considers various favorable and unfavorable aspects of this alternative, it does not refer to the most serious drawback of all its disastrous effect upon construction of a gas pipeline from the same area.

The groups planning construction of an Arctic gas pipeline have based their plans on the assumption that the Trans-Alaska oil pipeline would be approved and constructed by the mid-1970's. Obviously no gas can be produced from the Prudhoe Bay field until oil production has commenced. The gas pipeline was therefore contemplated to be constructed as soon after completion of the Trans-Alaska oil line as possible, and it was contemplated that gas from Alaska and northern Canada would begin to flow to the lower 48 states by or before 1978.

If, however, the oil line were to be constructed through Canada, it is clear that the gas line would be delayed until the mid-1980's or beyond and that the cost of gas transported through the line would be increased so significantly as to cast doubt on its economic feasibility.<sup>1</sup> The effect of the Canadian oil pipeline alternative, therefore, would be to make the present and projected gas shortage even more critical and to seriously jeopardize the gas industry's efforts to maintain adequate service to consumers.

In considering the alternative of constructing the oil pipeline through Canada, the following facts must be borne in mind:

*First.*—An oil pipeline through Canada could not be completed prior to the late 1970's or early 1980's. Such a line would be approximately 3,500 miles in length as compared with the 900-mile Trans-Alaska route.<sup>2</sup> It would be necessary to completely redesign and re-engineer the oil line, undertake the massive environmental studies that would be required, and apply for the requisite Canadian and U.S. Government permits. Obviously a major project of this kind would require the most intensive and painstaking review by the responsible Government agencies of both countries before permits were issued, and environmental considerations would necessarily revive the same searching analysis in Canada as in the United States.

Even assuming all necessary Canadian and U.S. Government authorizations had been issued by the mid-1970's and all litigation had been concluded, the mobilization of men, construction equipment, pipeline materials and supplies, and the actual construction of an oil pipeline 3,500 miles long would obviously require four or five years as a minimum. Thus, completion of the oil pipeline could not realistically be expected prior to 1980, and it might well be several years later.

*Second.*—If an oil pipeline through Canada were not completed until 1980 or thereafter, construction of a gas pipeline from the Arctic would be delayed

<sup>1</sup> The delay in authorization of the Trans-Alaska oil pipeline has already delayed the gas pipeline timetable by several years, with the result that total project costs estimated by the Northwest Project Study Group have increased from \$2.7 billion to \$5.2 billion.

<sup>2</sup> A complete new pipeline system would have to be constructed from Edmonton to the Chicago area, as well as from the North Slope of Alaska to Edmonton, since existing oil pipeline facilities south of Edmonton are not capable of transporting the large volumes to be produced from the Prudhoe Bay Field.

until at least the mid-1980's. Thus, urgently needed supplies of Arctic natural gas would be unavailable to meet the critical shortage facing the nation during this decade. Construction of a gas pipeline would necessarily have to be deferred for three basic reasons:

(a) As noted above, no gas can be produced from the Prudhoe Bay field until oil production commences. The gas reserves in the Prudhoe Bay field provide the "anchor" for the proposed Arctic gas pipeline. Until large volumes of gas from Prudhoe Bay are assured, it would be impossible from an economic standpoint to construct a gas pipeline from the Arctic. Thus, construction of the oil line must precede construction of the gas pipeline.

(b) Even if sufficient non-associated gas were to be discovered on the North Slope of Alaska and northern Canada to justify construction of a gas pipeline prior to commencement of oil production, it would be impossible to do so. Construction of an oil line of the size required to transport the Prudhoe Bay and northern Canadian reserves would require all available construction equipment, construction personnel, transport, supply and communications facilities. There is simply *no* way by which a gas pipeline could be constructed while construction of the oil line was in progress.

The logistical problems involved in constructing even one pipeline in the Arctic far from roads, railroads and habitation and under weather conditions unknown in the lower 48 states, are so monumental as to require the most careful advance planning and coordination. Likewise, the problems of assembling the required construction crews, equipment, materials and supplies to construct even *one* pipeline will tax the available resources of the pipeline industry. There is absolutely no way two such pipelines could be constructed through the same area within the same time frame.

(c) Even apart from the two preceding factors, a gas pipeline could not be constructed through Canada at the same time as the oil line because of the impact of the two projects on the Canadian economy. Concern has already been expressed over the effect of the massive infusion of U.S. dollars into Canada upon the value of the Canadian dollar as a consequence of constructing a gas pipeline costing between \$3 billion and \$5 billion. If an oil pipeline costing well in excess of \$5 billion were superimposed on the gas pipeline, it is obvious that the Canadian dollar would rise dramatically in value, thereby causing a massive dislocation of the entire Canadian economy. Thus, simultaneous construction of an oil and gas pipeline from the Arctic through Canada is not a practical possibility.

It should also be recognized that the problem of financing the gas pipeline alone, utilizing all available sources of capital, is an exceedingly difficult one which has not yet been satisfactorily resolved. If an oil pipeline through Canada requiring an even greater capital investment were to be constructed, it would simply be impossible to obtain sufficient capital to construct the gas pipeline at or about the same time.

In summary, construction of an oil pipeline through Canada would necessarily delay construction of the proposed Arctic gas pipeline for a number of years—certainly until the mid-1980's or beyond. Such a delay is simply unthinkable in view of the critical gas shortage now facing the United States.

The energy crisis in general, and the gas shortage in particular, are now so well recognized and documented as to need little further elaboration. Simply by way of illustration, the Federal Power Commission Staff Report No. 2, National Gas Supply and Demand 1971-1990, issued in February, 1972, projects an increase in demand for gas in the lower 48 states from 22.6 trillion cubic feet annually in 1970 to 34.5 trillion cubic feet in 1980 and 46.4 trillion cubic feet in 1990. Domestic production of gas, however, is projected to decrease from 21.8 trillion cubic feet in 1970 to 20.4 trillion cubic feet in 1980 and to 17.8 trillion cubic feet in 1990. Unsatisfied demands are estimated to increase dramatically throughout this period, and the reserve-production ratio will continue to decline.

An alternative routing of the oil pipeline through Canada, whose necessary effect would be to delay construction of the Arctic gas pipeline by five to ten years, is thus wholly incompatible with the nation's need for additional natural gas. Not only is Arctic gas essential to meeting the total energy requirements of the United States, it is essential for homes and industries alike if air pollution control standards are to be met. Any alternative routing of the oil line which

excludes a new source of natural gas from the nation's markets for a significant length of time, as the proposed Canadian route alternative does, is incompatible with both the environmental goals and the energy needs of the United States.

Submitted on behalf of the listed companies by:

ARTHUR R. SEDER, JR.,  
General Counsel,  
Michigan Wisconsin Pipe Line Co.

Dated: May 4, 1972.

### THE TAPS DECISION

Secretary MORTON. Mr. Chairman, the nucleus of my decision to grant the Alaska route is based on the urgent need to bring North Slope oil and gas into the American marketplace as rapidly as possible. Our studies have clearly articulated the need for these petroleum resources, and the costs of delay. The trans-Alaska route presents the only feasible means of transporting Arctic oil within an acceptable time frame. This route avoids the delays and uncertainties inherent under Canadian control and Canadian law. District V provides an important American market where the full capacity of the pipeline is needed and can be readily absorbed.

Every year of delay will increase the gap between our demand for crude oil and production from secure sources.

Every year of delay increases our vulnerability to arbitrary price changes and supply interruptions.

Every year of delay will materially weaken our bargaining positions in the continuing negotiations with oil producing and exporting countries, and add complications to our foreign relations.

By the far-reaching steps that Secretary Volpe and I announced today to combat marine pollution, and by the unique stipulations and enforcement that we have developed for the Alaska pipeline, its cautious construction and operation will proceed under the most rigorous environmental protection.

Mr. Chairman, the Alaska route is right for the interests of the State of Alaska and the Alaskan Natives.

It is right for our shipbuilding maritime, banking, and petroleum industries.

It is right for the interest of American labor.

And it is right for the economic security and the national interest of this country.

This completes my statement and I am happy to answer questions from the committee at this time.

Chairman PROXMIRE. My time is up.

Congressman CONABLE.

Representative CONABLE. I yield back to the Chairman. We appreciate your cooperation.

Senator BENTSEN. Mr. Chairman, he is referring to you.

Chairman PROXMIRE. Congressman Widnall.

Representative WIDNALL. I have no questions.

Chairman PROXMIRE. Congressman Brown.

Representative BROWN. Am I to assume we're not asking the Secretary any questions?

Chairman PROXMIRE. No, you go ahead and ask questions.

Representative CONABLE. He gave his time to the Secretary rather than vary the ten-minute limitation.

I think he should go ahead.

Representative BROWN. Certainly, I think he should.

Chairman PROXMIRE. I don't want this to be a precedent. The trouble is, I think it's been very helpful to the committee, and I had the impression that the members of the committee liked the idea of confining the witnesses to 10 minutes, as we've sat here so often with witnesses and had no chance to ask questions or very little chance, because they talk at such length, so I do hope this won't be a precedent. And I hope you're the only witness, among your other distinctions, Mr. Secretary, who breaches this provision.

Without objection, the prepared statement of the distinguished Assistant Secretary of State, Mr. Irwin, will be printed at this point in full in the record.

(The prepared statement of Mr. Irwin follows:)

PREPARED STATEMENT OF HON. JOHN N. IRWIN II

Mr. Chairman, it is a pleasure to appear today before the Joint Economic Committee to present the Department of State's views with respect to the Alaska Pipeline. My statement will concentrate on the national security and foreign policy considerations. There were, of course, other considerations—particularly environmental considerations—which were weighed by the Administration in reaching its decision on the Alaska Pipeline, but other agencies have the primary responsibility for evaluating these issues.

Over the course of the last several years, the Department of State has been paying a great deal of attention to the energy issue. Our review of projected future patterns of consumption and production has led to some disturbing conclusions. By the end of this decade, unless steps are taken to increase domestic sources of energy, the United States may be dependent on imports for as much as 50 percent of its total petroleum requirements. As much as two-thirds of these imports may have to come from sources in the Eastern Hemisphere, largely from the Middle East, which contains nearly three-fourths of the world's oil reserves.

In the recent past, the United States has followed a policy of attempting to obtain as much as possible of its petroleum requirements from domestic sources and from countries in the Western Hemisphere.

There is certainly no reason to depart from this policy today. Within the last two years some major producing countries have used the threat of supply interruptions in bargaining with the oil companies for better economic terms. There have also been calls in some of the producing countries to use oil to achieve political goals. Less than a month ago producing countries in the Middle East were asked by the Iraqi Government to impose limitations on production to prevent the oil companies from increasing production outside Iraq to make up for any shortages that might result from Iraq's nationalization of the Iraqi Petroleum Company.

Until recently the United States had been able to isolate itself to a large extent from developments abroad which affected petroleum supplies. The United States was self-sufficient in petroleum, and there was enough spare capacity available to help other consuming countries in the event of supply interruptions. As most of you know, this is no longer the case. The United States today is importing more than 25 percent of its total petroleum requirements, mostly from the Western Hemisphere, but a significant amount also from the Eastern Hemisphere.

We have on the whole enjoyed good relations with the petroleum exporting countries of North and South America and of the Eastern Hemisphere. We appreciate these good relations and hope that they will continue to the mutual benefit of the countries involved. We are concerned, however, that a substantial increase of our dependence on overseas oil could put us in a difficult situation, particularly when coupled with the worldwide growth in demand for energy which we foresee.

Demand for energy, particularly oil, will experience dramatic increases in coming years. Demand for oil in Western Europe is projected to double over this decade, from a level of about 12 million barrels per day in 1970 to 24 million barrels per day in 1980. For Japan, the increase will be even greater, from a level of about 3.8 million barrels per day in 1970 to over 10.0 million barrels in

1980. The situation in Western Europe and Japan is therefore similar to that which we foresee in the United States—with one important difference. Lacking their own energy resources, Europe and Japan must continue to be dependent on the Middle East for nearly all of their petroleum requirements.

Our energy policy, therefore, is of great importance to the world's other consuming countries. Should we fail to take steps to develop expeditiously our own resources, more of our demand would have to be met from foreign sources—largely from the Middle East—where we will be competing with other consuming countries. At the same time, the major producing countries have begun to adopt policies placing limitations on production levels. Venezuela, Libya, and Kuwait have already imposed such limitations, and other countries are known to be considering similar measures. These limitations, coupled with naturally declining production in some countries as reserves peak out, could mean that the amount of oil which will be available will not be sufficient to meet the total requirements of the consuming countries. Under such circumstances, the competition for available supplies could become increasingly severe. Our relations with other consuming countries could be seriously affected, and the ability of the producing countries to use oil to obtain not only economic but also political goals will be greatly increased. The national security implications of such a situation are obvious.

Given this situation, the Department of State believes it is important to bring oil from the North Slope of Alaska to market as soon as possible. We favor, therefore, early construction of the Alaska Pipeline. Construction of the Alaskan Pipeline will enable North Slope oil to get to market several years sooner than would be possible with a trans-Canadian route, for several reasons. First, the Canadian route is much longer than the Alaskan route. It would therefore presumably take longer to construct. Second, more preparatory work has been done for the Alaskan route than for a Canadian route. Third, and most important, the Government of Canada has only recently stated that it will be in a position to accept for consideration an application to construct a Northern pipeline. The latest word we have is that Canada will not be able to accept such an application before the end of this year. We have no indications, moreover, of how long deliberations on the applications might take, or even if such an application would be approved.

Given our own experience, it would be imprudent to assume that a pipeline application in Canada would not encounter substantial difficulties, similar to those which have arisen in the United States. A pipeline through Canada would also involve detailed, and probably lengthy, negotiations on financing and throughput arrangements.

The Department of State, therefore, believes that it is in the best interests of the United States to bring North Slope oil to market as soon as possible and that this can best be accomplished through construction of the trans-Alaskan pipeline. We hope, however, that in the future trans-Canadian pipelines can also be built, and that the resources of both the United States and Canada can be developed expeditiously to meet growing energy needs in both countries. In this connection, we have been interested for some time in pursuing discussions with the Canadians on our energy and petroleum relations. We hope these discussions can move forward to serve the mutual interests of both our countries.

I do not mean to suggest that Alaskan oil will solve all of our energy problems. It will not. But two million barrels per day from Alaska will mean two million barrels per day we will not have to import from the Eastern Hemisphere. In addition to the security implications of such additional imports, the drain on our balance of payments could be considerable. With world oil prices continuing to rise, further delay in bringing oil from Alaska could, by the end of this decade, mean an additional dollar outflow of from \$2 to \$3 billion per year.

At the same time, we should move on a number of other fronts to increase domestic supplies. As Senator Proxmire has suggested, there may be significant oil reserves in the Gulf of Alaska. This area, along with other off-shore areas, should be opened up for development. There should also be further efforts to promote domestic production of conventional oil and gas, nuclear stimulation of gas, research into exotic energy forms, and measures to conserve and use our available energy more rationally and more efficiently.

Mr. Chairman, I hope the State Department's views will be helpful to the committee in its deliberations on this matter.

Secretary MORTON. Mr. Chairman, I overlooked the answers to the questions that were submitted to me in writing in a letter from you.

I have the answers.

Chairman PROXMIRE. Without objection, that will be put in the record also.

(The information referred to follows:)

RESPONSE OF HON. ROGERS C. B. MORTON TO WRITTEN QUESTIONS POSED BY  
CHAIRMAN PROXMIRE

*Question 1 (a). Since your impact statement notes the existence of 26 trillion cubic feet of natural gas under the Prudhoe Bay oil field and concludes that it is economically unfeasible to liquefy this gas at Valdez and ship it to markets in LNG tankers, did you consider the economic and environmental merits of a single oil/gas pipeline corridor running from Prudhoe Bay to Fort McPherson, Canada, and then south along the Mackenzie River Valley to Edmonton versus two separate corridors, one for oil through Alaska, and another for gas through Canada?*

Answer. Yes, these factors were considered. A separate analysis, entitled "Future Developments of Arctic Oil and Gas: An Analysis of the Economic Implications of the Possibilities and Alternatives," addressed itself to the economic issues. The present value of savings from constructing a gas pipeline in the same corridor would be \$55-\$105 million, a 1 to 2 percent saving in the total cost, depending on when construction begins. That analysis also concludes that savings from the placement of oil and gas lines in a common corridor would be less than the costs to the economy incurred in one year's delay in delivery of oil from the North Slope of Alaska.

With respect to environmental savings of a common corridor, the argument is based upon two faulty assumptions—that a cold gas line involves equally serious environmental problems as compared to a hot oil line, and that the two lines can be built very close together. Neither assumption is true, so that the reduction in environmental impacts is not nearly as great as claimed by some.

Transportation of oil and gas from the North Slope of Alaska will be an enormous financial undertaking. If both the oil and gas line were to be built through Canada, the requirements for financing in the smaller Canadian money market would more than double. Because of the great difficulties in financing both systems with Canadian capital, United States gas companies advised the Department that adoption of a Canadian route for North Slope oil would delay marketing North Slope gas until well into the 1980's. Such a delay would have economic and gas supply disadvantages in addition to those already cited.

*Question 1 (b). If so, why are the results of this comparison not included in the Interior Department's analysis?*

Answer. This comparison was completed subsequent to publication of the bulk of the economic and security analysis. The results were, however, available prior to decision.

*Question 1 (c). ". . . and why did it not alter your decision?"*

Answer. The savings from use of a common corridor are less than the costs to the economy incurred in one year's delay in delivery of North Slope oil. The most likely delay caused by a pipeline through Canada would be three to five years or more; thus the economics of a common corridor do not outweigh the costs of delay and a trans-Alaska route is still preferable. The reduced environmental impacts of the common corridor are not overriding.

*Question 2 (a). Did you estimate the full potential of the North Slope and adjoining Arctic regions in order to determine the probable need for a second oil pipeline route to this country between 1980 and 1985?*

Answer. Such potential is evaluated in "Future Developments . . ." However, the reserves to justify a second line can only be found by exploratory drilling. Such drilling will not occur until the owners of the leases are assured of transportation for their oil. It is uncertain that a second oil line will be needed at all, since additional reserves must be discovered by future drilling. Such a line, in any case, is many years away.

*Question 2 (b). If so, what would be the route of that pipeline?*

Answer. Without prior specific knowledge of where reserves adequate to support a second pipeline are located, no one can state the route of such a line.

*Question 3 (a). What is the basis for your 3 to 5 year estimate of the delay associated with constructing the Alaska-Canada route, given that there is no discussion of this matter in the impact statement, and that Canadian officials have estimated a 1 to 2 year delay?*

Answer. General Lincoln, Director of the Office of Emergency Preparedness, estimated a delay of at least three years in his analysis of the security aspects of the trans-Alaska pipeline question. That conclusion is adopted as a finding of the economic and security analysis and is supported by a discussion of the factors influencing the delay in Appendix C of that analysis. Industry sources, both in commenting on the draft statement and in public utterances, have used the figure of five years. My conversation with Minister MacDonald and information coming from conversations of members of my staff with Canadian officials indicated that three years was a minimum figure.

The delay arises from these factors: The Canadian line is much longer—3,200 miles as compared to 800 miles; two years of test drilling, including 3,300 core holes in permafrost terrain, has been done for the much shorter trans-Alaska line—the drilling necessary in the 1,200 miles of permafrost terrain for the Canadian line is much greater, and has hardly begun. Of the Canadian route, at least 150 miles would be in Alaska, and 850 miles in the midwestern United States. The National Environmental Policy Act would require a detailed statement covering the entire 3,200 miles. After receipt of an application, completion of core drilling and other scientific and environmental studies, it would take the United States another 18–24 months to fully conform with NEPA requirements.

The Canadian government must also confront environmental and Native Claims issues, similar to those which confronted the United States when we received our pipeline application. The American Congress took several years to determine the appropriate solution to the Native Claims issue; the potential for delay of a Canadian route for this reason is considerable. The Rules of Procedure and Practice of the Canadian National Energy Board requires a full project description, detailed route maps, and specific information regarding markets, reserves, financial condition, and so forth.

*Question 3 (b). Regarding the alleged 3 to 5 years delay allude to, did you consider legal delays involved in the trans-Alaska route while the matter is litigated in the courts?*

Answer. Of course. The litigation on the trans-Alaska route is very near its end. I am advised that the matter should be finally settled at the trial court level in September and by next spring at the Court of Appeals level. There is, of course, the very high probability of substantial legal delays facing any proposed trans-Canada line. The delays for trans-Alaska were of two kinds. Those arising from the Native Claims required Congressional action for solution, and it has taken two years to arrive at the current point of the litigation on environmental and procedural issues. The Canadians have a similar Native Claims problem, which is not yet settled, and litigation is highly probable in both the U.S. and Canada if a Canadian route is proposed.

*Question 4. On what basis did you determine a Pacific Coast deficit in 1980 of 2 million barrels a day?*

Answer. The estimates of crude oil supply and demand were prepared by the U.S. Bureau of Mines. This Bureau is the most authoritative agency in the United States on mineral supply and demand analysis. Their estimate, contained in Appendix L of the economic and security analysis, shows, in the most likely case, that without North Slope oil, the deficit between domestic production and demand in PAD District V in 1970 was .7 MBD; in 1975 is estimated to be 1.0 MBD; 1980 2.0 MBD; and 1985 3.1 MBD. (MBD=million barrels per day).

*Question 4 (a). What were your estimates for oil supply, offshore and onshore, from sources in southern Alaska, California, the Canadian Trans-Mountain pipeline, and possible flows from Oil Districts III and IV?*

Answer. The most likely estimate of supply for District V is as follows:

(In thousands of barrels per day)

	1980	1985
District V production:		
South Alaska-California.....	1,070	950
North Slope.....	1,500	2,000
Total.....	2,570	2,950
Receipts from other districts.....	118	50
Imports:		
Canada <sup>2</sup> .....	300-400	300-400
Overseas.....	237-137	652-552
Total.....	537	952
Processing gain.....	90	100
Total supply.....	3,315	4,052

<sup>1</sup> Of which south Alaska is 150 and 100 respectively.

<sup>2</sup> The figures reflect the capacity and throughput of the Trans-Mountain line. The industry might well decide, on the basis of economics, to reverse this line and divert all or some of the Canadian oil to district II, making up the difference with overseas imports.

*Question 4 (b). What were your estimates for oil demand on the Pacific Coast?*

Answer. The Bureau of Mines medium estimate of oil demand in District V, in thousands of barrels per day, is 2,695 in 1975, 3,315 in 1980, and 4,052 in 1985.

*Question 4 (c). Is it not true that the Canadians have indicated a willingness to compensate for any shortage of crude oil brought about by a delay in pipeline construction and, if so, why have we rejected this offer?*

Answer. The Canadian government has made no formal offer for us to accept or reject. There are not sufficient reserves in Canada, over and above those we have taken account of in our supply analysis, to make up the oil lost by delay without severe economic dislocation to the Canadian oil and gas industry.

The adverse impacts of delay would not be mitigated by Canadian oil in any case, since that oil would also involve additional resource costs to our economy, balance of payments impacts, loss of revenue to the Alaska natives and the State of Alaska, and weakness in our negotiation position with the Middle Eastern oil producers during the critical period of 1975-1985.

*Question 5 (a). Given the Pacific Coast oil oversupply that is likely to occur if the trans-Alaska pipeline is built, as noted in your own economic and security analysis, did you evaluate how this oversupply would disrupt existing oil markets, forcing other oil sources out of the Pacific Coast market, and thereby imposing additional economic and national security costs on the Nation?*

Answer. There will be no oversupply of oil on the West Coast. The domestic deficit in 1980 in the absence of the North Slope will most likely be 2 million barrels per day—substantially higher than the probable throughput of the trans-Alaska line by that date. The 2 million barrel capacity of the line will not be reached for several more years after 1980, if then, as there is a real probability that stress factors will limit the eventual capacity to 1.5-1.8 MBD.

*Question 5 (b). Since your May 11th statement nevertheless implies that the total North Slope production will be absorbed on the Pacific Coast, would you—in order to further enhance the military and economic benefits of Alaskan production—be willing to write into your stipulations with the oil industry provisions forbidding the sale of North Slope oil to foreign nations, including Japan?*

Answer. There is no government policy to prohibit the exportation of oil. The tentative opinion of counsel is that the Department does not have the authority to write such stipulations. As noted, there will be a market for the oil in District V, and economics point to that market as being preferred to Japan.

*Question 6. In arguing that the trans-Alaska pipeline is an essential oil source for the Pacific Coast, because that region "does not have the diversity and flexibility of supply available to the midwest," you have not made clear what are to be the future oil sources for the midwest.*

Answer. The Bureau of Mines' estimates of District II supplies are contained in the following table:

[In thousands of barrels per day]

	1980	1985
District II production.....	1,250	1,100
Receipts from other districts (primarily district III).....	3,710	4,474
Imports:		
Canada <sup>1</sup> .....	700-800	1,000-1,100
Overseas (via gulf coast).....	590-490	688-588
Total.....	1,290	1,688
Processing gain.....	90	90
Total Supply.....	6,340	7,352

<sup>1</sup> The imports from Canada might be a larger proportion, depending upon company decisions concerning economics of transportation via the Trans-Mountain pipeline. (See note<sup>2</sup> to question 4(a).)

*Question 6 (a). Does this statement reflect the physical impossibilities of delivering oil from the southwest to the Pacific Coast, or the desire of certain oil companies to maximize their profits and enhance their positions in certain areas of the country at the expense of citizens in other areas?*

Answer. Very little oil is expected to move from the southwest to District V, because of comparative cost factors. The analysis of the benefits and costs of the trans-Alaska pipeline did not concern itself with the profit picture of individual oil companies. It is, rather, an examination of national economic and security considerations. Where regional impacts have differed, they are explicitly treated.

*Question 6 (b). Is it not true that the crude oil deficit in the midwest is several times that of the Pacific Coast and is projected to continue?*

Answer. Yes. The data are in the answers to questions 4, 5, and 6 above.

*Question 6 (c). What are the diverse and flexible sources available to the midwest that you allude to?*

Answer. Potential sources of crude oil to District II (the midwest) include: production within the district, shipments of production from District III (Gulf Coast) excess to the needs of that district, lesser amounts of production which may, under certain assumptions, be excess to the needs of District IV (Rocky Mountains), imports from Canada, and imports from other countries through tankers and pipelines from the Gulf Coast or the St. Lawrence waterway. Because of the system of pipelines connecting Districts I, II, III, and IV, it is easier to shift crude petroleum around east of the Rockies than it is to provide additional supplies to District V, which is not served by large-capacity pipelines from other parts of the country and which has therefore a certain degree of physical isolation.

*Question 6 (d). Certainly of equal importance, to what extent did your analysis take into account East Coast needs for diverse and flexible oil sources?*

Answer. We took full account of the East Coast supply situation. The needs of the East Coast for diverse, flexible, and secure sources are clearly articulated in the economic and security analysis.

*Question 7 (a). What were the national security criteria that allowed you to come to the conclusion that the trans-Alaska route would make this country's oil supply more secure?*

Answer. The national security considerations are presented in the analysis prepared by the Director of the Office of Emergency Preparedness and incorporating the views of the Secretaries of State and Defense. The Director of the Office of Emergency Preparedness and the Secretary of State find the early delivery of North Slope oil to be an important national security objective, since it would reduce dependence on insecure foreign sources in the intervening years. A trans-Alaska pipeline could deliver oil sooner than any other alternative mode of transportation. They therefore find that construction of the trans-Alaska pipeline is an important national security objective.

*Question 7 (b). In particular, since your own economic and security analysis finds greater oil shortages in the Midwest and eastern regions, how did you balance the short- and long-run security needs of these regions with the security needs of the West Coast?*

Answer. The security argument is based on the larger interests of the nation as a whole. It is on this basis that the trans-Alaska route is preferred; it would deliver North Slope oil sooner, and thus reduce dependence on Eastern Hemi-

sphere oil during the critical 1975-1985 period. Beyond that time, alternative energy sources—whose development requires long lead times—may come into play.

*Question 8. The economic analysis section of your March 20 impact statement concluded that construction of a pipeline through Alaska would not lower the rate of unemployment in Alaska, would not significantly reduce existing barriers to native employment, would have a major adverse impact on the native subsistence economy in a great portion of the State, would aggravate conditions of inflation and over-crowded housing, would severely damage commercial and recreational fishing in the Valdez Arm and Prince William Sound, and would lead to a "significant downward (economic) adjustment" when construction is complete. What then is the basis for your May 11 statement that construction of the pipeline through Alaska "will be beneficial to the economic development of the State?"*

Answer. The question misstates and misinterprets the staff documents. There will be no "major" adverse impact on the native subsistence economy "in a great portion of the State." There will not be severe damage to commercial and recreational fishing. The downward economic adjustment after construction follows a very substantial upturn during construction. There is absolutely no question that the construction of the pipeline will be of great benefit to the State of Alaska, the Alaska natives, and, as must be emphasized, to the entire United States.

*Question 9. Did your May 11th statement that, "The Trans-Alaska right-of-way to Valdez would commit an additional area of 30 to 50 square miles to development," include the 361 mile service road accompanying the project, the 61.3 miles of avian habitat your impact statement estimates would be destroyed during construction, the area to be occupied by three to five air strips, 12 construction camps and six pumping stations (each of 50 acres), the 900 acre "tank farm" at Valdez, and activity associated with the gathering of the 89 million cubic yards of construction material, mostly gravel, to be gathered along the route?*

Answer. Yes, it did. The total permanent land commitment for the pipeline and associated activities is 27,560 acres; the temporary use area is 11,649 acres, for a total of 39,215 acres or approximately 61 square miles. To place this land area in perspective, this is but 2% of the area of one park—the McKinley National Park in Alaska.

*Question 10. In evaluating the trans-Alaska alternative, did you take into account the cost of the subsidy and tax deferral of building tankers, developing environmentally safe harbors, and Department of Defense requests for patrol frigates and sealane control ships to protect U.S. oil tankers?*

Answer. There is no direct subsidy involved in building tankers for the coastwise trade. Indirect subsidies, involving mortgage guarantees and tax advantages, are available under the Merchant Marine Act of 1970. The impact of the indirect subsidies on tanker rates is very small. The costs of the facilities for control of oil pollution in Valdez are included. Since the oil will flow into the West Coast by tanker in any case, no costs at their terminus are included. The Department of Defense has not indicated that this issue will alter requirements for protection of tankers.

*Question 11 (a). Regarding the difficulties of obtaining financing for a Canadian pipeline, is it not true that the same oil companies involved in the development of Alaska's resources are also involved in exploring the Canadian Arctic?*

Answer. Dozens of oil companies, including most of the majors and a number of independents, hold oil and gas leases on the North Slope of Alaska. By far the largest holders, in terms both of acreage and probable reserves, are BP, Atlantic Richfield (ARCO), and Humble (operating subsidiary of Standard Oil of New Jersey). ARCO and Humble, together with Amerada Hess, Mobil, Phillips, Sohio, and Union, form the Alyeska Pipeline consortium.

Two distinct areas of the Canadian Arctic are being explored. By far the largest operator in the Mackenzie Delta area is Imperial Oil Co. Ltd. Imperial, Canada's largest oil company, is 70% owned by Standard Oil of New Jersey, with the balance being held by individual Canadian investors. Exploration is underway in arctic islands farther north and east; however, development of arctic island resources is more distant in time, and transportation of its resources to market would not necessarily include use of a Mackenzie Valley corridor; pipelines skirting eastern or western shores of Hudson's Bay have been mentioned. Dominant in arctic island exploration is Panarctic Oils, Ltd., a consortium of the Canadian government (which has a 45% interest) and 19

Canadian oil and mining companies—none of which has significant North Slope ties. Lesser investigations in the arctic islands are being carried out by Canadian affiliates of BP and Gulf, and by Magnorth, another Canadian consortium.

*Question 11 (b). What are the unique financing difficulties associated with the Canadian alternative?*

Answer. The Canadian alternative is more costly than the trans-Alaska pipeline system including the tanker segment. The most recent estimates of the total cost of the systems are as follows: TAPS: \$2.8 billion for pipeline construction beginning in 1973 plus \$1.7 billion for tankers and associated facilities, or a total of \$4.5 billion; Mackenzie Valley Pipeline: \$6 billion for construction beginning in 1977. More significant than the difference in absolute cost is the nature of the financing and of the money markets in which it must be sought.

Canadian authorities have indicated that they must control 51% of any system through their country. The difficulty of raising the \$3.1 billion for 51% equity financing of an oil pipeline plus \$2.2 billion for 51% of a gas pipeline in the Canadian money markets would be considerable, as would the complexity of financing and corporate arrangements and the time required for their execution. Were the Canadians to require—as is likely—reservation of some fraction of the throughput of a Canadian line for Canadian oil, the financial arrangements would be further complicated, and additional negotiations relevant to oil import quotas would be required.

*Question 11 (b). What are the unique financing difficulties associated with the economic benefits accruing to each oil company that is a member of Alyeska as a result of approving this particular pipeline route?*

Answer. No. The economic arguments are arguments of national economic efficiency, and not of the benefits to any particular oil company or companies.

*Question 12 (b). Have you evaluated the effect of this particular pipeline arrangement on competition in the oil industry?*

Answer. No. That is the function of the Justice Department, not Interior. I am informed that the Justice Department has under consideration the trans-Alaska pipeline proposal.

Chairman PROXMIER. Mr. Secretary, you said the Alaskan route decision fully reflects the letter and the spirit of our National Environmental Policy Act of 1969.

First, in previous testimony it was charged that you and other high leadership in the Department, it was charged, I don't make that charge—it was charged by other witnesses, were never really interested in looking at alternatives, that your mind was made up from the beginning to approve the Alaskan route.

A former economic analyst in the Department of the Interior who testified before this Committee, relayed to us certain comments you and Under Secretary Pecora allegedly made in a meeting on October 26 of last year.

When asked about considering alternatives, Mr. Pecora allegedly said, "Well, we have imposed alternatives already, we required more valves, we required the construction of the pipeline above ground, but we are prepared to go beyond this in order to meet the Court's demand."

You are reported to have said at the same meeting that "this is a private project, that the investor does not want to put his money in it, then it is no a real alternative."

Mr. Secretary, I can't believe this is the way you would view your responsibility under the National Environmental Policy Act. Would it be more correct to say that you viewed alternatives as broadly as possible, and certainly beyond just additional valves in the Alaska pipelines.

Secretary MORTON. It certainly would. There is far more in this decision than individual economic analysis by various individual staff members.

In trying to keep the work of the individual staff members on track, and not have them try and overlap each other and do the work of the executive, we had to impose certain disciplines. When the matter came to review of the whole Department, when it came to my office, every consideration, based on all of the criteria that was available from every source, were taken into account.

Chairman PROXMIRE. Now, does this mean you regard the Canadian route as a feasible alternative and that you carefully studied the implications of the gas pipeline that must be built through Canada, the financing that would be involved in any pipeline through Canada, the environmental effects of such a pipeline, as well as understanding the attitudes of the Canadian government toward those pipelines?

Secretary MORTON. Not only that, Mr. Chairman, we took into consideration all the comments by other agencies, or governments, or private sources, wherever we could get them, as to the feasibility of the Canadian pipeline.

Chairman PROXMIRE. Well, now here is what gives me a problem on this.

I cannot reconcile what you said about this study of the financing problem, and what former Deputy Under Secretary Horton and Mr. Vogely, Director of Economic Studies for your Department have said in sworn depositions. They have both said that your Department made no study of the problem of financing the Canadian Line.

Did you not study that problem?

Secretary MORTON. We certainly did study that problem; in fact, I asked that the principals, the Alyeska principals, to go to Canada and discuss financing with the Canadian government, which they did do; and other agencies of government were involved in the study of the whole economic and financial aspects of this line.

There is a lot of information that we do not have, because we don't know how much any Canadian line would cost, because of the problems of hot oil lines. It is pretty easy to determine the cost of a gas line, because a gas line is a cold line, it is compatible with the frozen tundra in the environment.

An oil line is an adversary to it, and we have no idea what the Canadian line will cost. It has taken us 3 years to determine how much the line from Prudhoe Bay to Valdez will cost approximately.

So, the cost being unknown, it is pretty difficult to determine exactly what the financing problems are. But this was discussed with Minister Macdonald and myself; and Minister Macdonald said what about a 51% share for Canadian interests? Well, we have no way of determining whether they can raise 51% of that kind of money.

The fact is that most advisers, people that I have talked to, cast a great shadow of doubt as to their ability to do that.

Chairman PROXMIRE. Well now, Mr. Horton, I have the transcript of the question that was asked you, and of your answer.

The question was, "Is it fair to assume from that expression of concern that the analysis was undertaken with the financing difficulties that must surround the initiation of the proposal?"

You replied: "Mr. Horton. No: I would say it would be unfair to assume that." What is the explanation for that, Mr. Horton?

Mr. HORTON. Mr. Chairman, the Secretary was responding to your question in the larger financial sense of the overall policy of constructing a pipeline along the Canadian route. The Secretary did not intend to imply that we had looked into the private financial relationships of companies that might build the system through the McKinsey route.

For one reason, the companies are not incorporated into a system that would actually go seek authority for construction of a route of that nature.

So that, I think we are using the word "financial" in two senses.

Chairman PROXMIRE. So the analysis that was done was a generalized analysis. It was not specific. You didn't study the particular difficulty that a particular corporation would have raising this money, in the particular time frame in which they would have to do it.

Secretary MORTON. First you have to determine what corporation would be involved.

Chairman PROXMIRE. Well, could we have copies of the Interior Department studies on financing, if that was done? Are they available?

Secretary MORTON. We have the economic analysis copies which we published, which are certainly available.

Chairman PROXMIRE. Can you send us those copies?

Secretary MORTON. Yes, certainly.

Chairman PROXMIRE. Does that include financing?

Secretary MORTON. I am not going to let you trick me, Senator Proxmire, into precisely what is covered in those analyses; but we will give you all of the information that we have as to analysis, financial analysis, and other economic analysis, as long as we know precisely what you are driving at, and what you want to know.

Chairman PROXMIRE. Well, apparently there was some kind of a general judgment made, and some kind of an analysis made with respect to whether or not financing would be feasible in the time frame in which it would be feasible.

There seems to be a difference of opinion as to just how detailed that was. We would like to see it, to see the basis on which you made that judgment.

Let me proceed by asking this. I cannot reconcile what you have said with what former Deputy Under Secretary Horton who is here today, and Mr. Bloom of your Department have said that you never did an economic and environmental study of a joint oil and gas route through Canada.

Did you or did you not study the Canadian alternative in that respect?

Secretary MORTON. There is no way—we have no way of core drilling in Canada; we have no way of moving our teams into Canada and selecting a route from Edmonton to some point on the Alaskan-Canadian border.

We only could use the information that we had, and our general knowledge of the environment, and our general geographic and geological knowledge of the area.

Chairman PROXMIRE. Of course, the thrust of my question, Mr. Secretary, is why you could not have worked with the Canadian government in that respect.

They have a great economic interest in this.

Secretary MORTON. Mr. Chairman, we solicited information from the Canadian government. On July 9, 1971, in the Aide-Memoire, I asked the State Department, Assistant Secretary Trezise at that time, to furnish us with all of the information that they could get from the Canadian government; and if the Canadian authorities had had any pertinent additional information which has not already been conveyed to the United States—we weren't able to obtain it.

So we got all of the information that was available in Canada, I think, concerning this route.

Chairman PROXMIRE. Well, I just have time to ask one more question. Let me ask you this.

I can't reconcile your statement about cooperation that you have just made with the Canadian government, with the sworn statements of Deputy Under Secretaries Horton and Clarke, with the one exception, that was July 9, 1971—there was virtually no consultation with the Canadians about the Canadian alternative.

If we do not extensively consult with the Canadian government, how could we evaluate the Canadian alternatives?

Secretary MORTON. Well, let me quote from a memorandum, which was to me, of September 22, 1971, from Mr. Shooshan, who is the Director of International Affairs, of the Department of Interior :

The subject is the trans-Canada pipeline. Following our discussions of last Friday, September the 17th, I have made inquiries regarding the status of the trans-Canada pipeline alternative to the trans-Alaska pipeline proposal. In order to get back to you quickly, I have approached this through separate discussions with certain officials in the Department of State, and the Canadian Embassy.

The line of my query has been three-fold. What is the Canadian government policy toward a trans-Canada pipeline? What is the status of the technical and scientific studies being performed with the Canadian government? What is the best forecast of completion of the necessary technical and scientific studies?

After completion of those studies, what is the forecast when actual construction could be completed and oil flowing?

The Canadian government has no declared policy for or against a Canadian pipeline. Officially, their position is that there is no request before them for such a pipeline; hence, there has been no need to take a position. Individual ministers and members of Parliament have stated views, but no government policy has been announced.

However, there have been statements made by responsible Canadian officials that indicate a favorable attitude of the Canadian government, if environmental hazards can be overcome.

This is not to say that there are not problems, other than environmental, associated with the construction of a pipeline across Canada, which would also have to be resolved. However, the new Minister of Environmental Affairs in Canada, Jack Davis, has said that it is 90% certain that the Canadian government would approve a trans-Canada pipeline, if the environmental hazards can be overcome.

You will also recall that the meeting which the oil companies had with Canadian officials earlier this year brought forth no real interest on their part, to consider a trans-Canada pipeline at that time, and they stayed with their trans-Alaska plans, and hence no real Canadian government position was indicated.

In brief, the existing studies have been characterized by the Canadians as a low-key effort rather than a crash effort, primarily for the reason that there is no request before the Canadian government for the construction of a pipeline.

It is a multi-disciplined activity which has been progressing at a pace commensurate with the nature of the problem to date. On this basis, their efforts would require an indefinite number of years before adequate scientific knowledge is available, and so forth.

Chairman PROXMIRE. My time is up, Mr. Secretary; and let me just say that I will put in the record the excerpts from the deposition

of Mr. Horton, and I will just read two very brief questions and answers.

Question. Are you unaware of any discussion with respect to the possibility of a trans-Canadian alternative pipeline?

Mr. HORTON. Between officials of the two governments? Yes, I am unaware.

Question. Who would know if there were any?

Mr. HORTON. I would know, and I don't believe the discussions took place.

The excerpts from Mr. Horton's deposition will be printed in the record at this point.<sup>1</sup>

Mr. HORRON. Mr. Chairman, may I respond to that?

The memorandum the Secretary was reading was dated September 21, 1971; it involved a discussion between American authorities and Canadian authorities, at least in the Canadian Embassy.

I was not aware of those discussions, and I was not aware, indeed, until this morning, that this memorandum had been drafted.

Chairman PROXMIRE. Thank you, that is very helpful.

Congressman CONABLE.

Representative CONABLE. Thank you, Mr. Chairman.

Mr. Secretary, this Committee has quite lively interests that range widely; but our primary responsibility is economic. I thank you for a very complete statement. The one area I would like to investigate at this point was suggested by the opening remarks of the Chairman, and relate primarily to economic matters.

He suggested that the trans-Alaska pipeline would put oil in a place where it was not needed, and that a trans-Canada pipeline would have the effect of lower prices for consumers in the Middle West, where it is needed.

Now, first of all, would you tell us a little something about the West Coast oil market, and the need for this oil there? And, what kind of readjustments it would make possible in our oil supplies throughout the country?

Secretary MORRON. Well, let me preface my answer with this—that oil brought to the lower forty-eight states market place, in total, has a basic effect on oil availability across the whole country, whether it is brought to the West Coast, whether it is brought to the Gulf Coast, whether it is brought to the East Coast.

If oil is brought to the west coast, and there is a market for it, and a demand for it there, this will relieve some pressure, so that oil imported to the United States from other areas, such as other Western Hemisphere countries and Middle Eastern countries, can flow to the east coast, and flow to the gulf coast if necessary, thereby minimizing the total dependency that we have on imported oil. This gives us an entirely stronger position to negotiate from and buy oil from foreign sources, than we would have without the North Slope oil going to the west coast.

Oil east of the mountains can be transferred and moved around very well. There is really a grid of pipelines which satisfy the movement of oils in the Eastern States, or States east of the Rocky Mountains.

The west coast in this regard is somewhat isolated.

Now, let me say this also, that the pipeline that exists now, from Edmonton to the Midwest, bifurcates part of the system going into

<sup>1</sup> The excerpts from Mr. Horton's deposition may be found in the committee room files.

Toronto. Part of it, going into the Midwest and Chicago, provides an artery for Canadian oil imports to the United States and the Midwest.

In addition to this, the Midwest receives its oil from movements from the gulf coast region 3, into region 2. The east coast, no matter how you cut it, is going to be heavily dependent on imported oil.

When you come right down to the price, the analysis of the price shows that, except for a few freight differentials, the general price of petroleum products across the country is roughly the same.

There are local considerations and local differences, and some price variance due to transportation, but basically, if we are able to satisfy the west coast demand, it will be easier for us to satisfy the other areas, realizing full well that much of this will have to be imported.

Representative CONABLE. Where does the west coast get its oil now?

Secretary MORTON. I can give you a breakdown on the west coast supply.

Representative CONABLE. Well, I don't need a detailed breakdown; you can summarize it, or generalize about where it comes from.

Secretary MORTON. 1.2 million barrels a day comes from district 5 production.

Representative CONABLE. Southern California?

Secretary MORTON. That's California, the California Continental Shelf, and Cook Inlet.

Receipts from other districts are inconsequential, only 200,000 barrels a day.

The total domestic production for district 5, which is the west coast, is 1.5 million barrels a day, and there are some products being exported, such as petrochemicals and the like, which bring you down to 1.4.

The demand today is 2 million barrels a day, and you have a 600,000-barrel-a-day domestic product deficit, and that is met by imports from Canada, at 200,000 barrels a day, primarily through the transmountain pipeline, and from, largely, Indonesia, at 400,000 barrels a day.

Representative CONABLE. Well, is there an opportunity, if this Alaska oil comes to the west coast, to divert the Indonesian and other Canada production, into other areas of the country, relieving the pressure on prices there?

Secretary MORTON. Yes, there would be that opportunity, but unfortunately the demand in region five is growing at a rate where additional demand is going to have to be met, either by substantially more foreign imports, or from Alaska; and you have got to put this pipeline in its perspective.

This pipeline is only going to deliver 600,000 barrels a day at the outset, and it is going to take 7 years for it to get up beyond a million and a half barrels a day, and this is way more than absorbed by the increase in west coast demand that is anticipated by all evaluators, during the period of time between now and when that pipeline comes on stream.

So you would not actually be diverting any oil. It is simply that you are going to need this additional oil by the mid-1980's to supply the west coast demand.

Representative CONABLE. Are there alternative plans for developing sources of foreign oil for the west coast, in the event this pipeline is not brought to fruition?

Secretary MORRIS. Well, you would be in the foreign marketplace, which would be of course in the countries of the Pacific rim, and the Middle East, and South America.

You would be in tight competition of course with all the other importers of oil. It doesn't take a great deal of planning.

It takes a checkbook to buy this oil.

Representative CONABLE. Now, what about—is there a substantial differential in consumer prices for petroleum products in the Midwest at this point?

You mentioned there are comparatively modest differentials because of the grid of pipelines and so forth that is available east of the mountains.

Secretary MORRIS. I am going to ask Mr. Vogely to answer that. He can probably do it in fewer words than I can.

The fact is, of course, that a gallon of gasoline, or a hundred gallons of heating oil for your furnace is cheaper here in the United States than it is anywhere else in the world, at least in the developed countries that have to import fuels.

But Mr. Vogely can very quickly, I think, give you a rundown on price differentials of petroleum products throughout the lower 48.

Mr. VOGELY. The prices of petroleum products in the various areas reflect crude oil prices, essentially, and the crude oil prices in the area east of the Rockies are based upon gulf coast. So in Chicago for example you will have product prices which are higher than the gulf coast by approximately the transportation differential, which is 20¢ to 30¢ a barrel.

On the east coast, it is 45 or so cents per barrel higher.

On the west coast, it would be equivalent to the gulf coast.

Representative CONABLE. Thank you.

My time is up, Mr. Chairman.

Chairman PROXMIRE. Senator Bentsen.

Senator BENTSEN. Thank you, Mr. Chairman.

Congressman Conable was absolutely right in saying that the primary responsibility of this committee is economic, but I would like to exercise a little Senatorial privilege here.

I have taken my children many times. Mr. Secretary, on pack trips, on fishing trips, into that country, and I think that is some of the most magnificent, most beautiful unspoiled country in the world.

I am concerned that to the extent feasible it remains so. So I would like to talk to you some more about the environmental and protection requirements that you put on this company, Alyeska.

You have stressed a number of times that you are requiring strict environmental standards. I recall that this pipeline passes some three hundred and fifty streams. What surveys have you done on the migration of fish, and the spawning of fish, for example?

Have you done that type survey?

Secretary MORRIS. Senator Bentsen, we have had teams, Bureau of Sport Fisheries and Wildlife, and Alaskan game people, in this whole pipeline corridor, on this very thing, and intensive studies have been made of the effect on fish and wildlife of this project, ever since I came into office, and a good deal of this work was going on before.

I can say with all the fervor that I can muster that the fish and wildlife consideration, and the other environmental considerations

that have been taken into account in the development of these stipulations, have been equal to and higher than the economic considerations that have been used.

Senator BENTSEN. Now, you built a simulated pipeline in 1971.

Have you seen any adverse effect upon the migration of wildlife as a result of it?

Secretary MORTON. No, we have not, but I don't think we could rest our case on that test alone.

I think the tides of Nature have to be given an opportunity; some wildlife will go over it, some will go under it; and we have provided that opportunity, so frequently, along the migratory routes, that it is just virtually impossible to conceive that these migrations would be inhibited.

Let me point out a very cogent thing. The total permanent land commitment for the pipeline, and associated activities, that is the pumping stations—that is the terminal, that is the whole ball of wax—actually occupies 27,560 acres, and there will be a temporary use of only 11,000 acres during construction, for a total of 39,000 acres; that is, 61 square miles. To place this in its perspective, this is only 2% of the space occupied by the McKinley National Park.

We have developed containments in case of ruptures, so that the oil would be contained, it would not get into the streams. We have provided safety factors as far as the flexibility and movement and strength and pressures are concerned, to make breaks and ruptures as hard to come by as we possibly can.

Senator BENTSEN. Thank you, Mr. Secretary.

Let me ask you another question, concerning previous statements before this committee.

David Anderson, who is a member of the Canadian Parliament, has testified that it would be rather unneighborly for the United States to move oil by tankers from Valdez to the West Coast, due to the possibility of spillage on Canadian shores. I would like to get this in perspective.

Are you familiar with how much oil Canada imports off the coast of Maine, and ships, the number of ships related and the number of ships that we would bring down the West Coast from Alaska?

Secretary MORTON. Senator, approximately 550,000 barrels a day are being imported by Canada, unloaded at Maine and transported from Maine to Canadian points, by a Maine-Canada international pipeline.

In 1970, 188 million barrels were delivered to Portland, in 886 tankers, and we only forecast 80 tankers a year from Alaska into Puget Sound.

Senator BENTSEN. Are you saying that the Canadians are now bringing down more than ten times as many tankers as we would anticipate bringing down the West Coast?

Secretary MORTON. This is correct.

Senator BENTSEN. Mr. Secretary, one of the economists who testified earlier indicated that Alaskan producers wanted to begin oil production prior to removing the gas cap, because that was the most profitable.

Isn't that also the safest way to develop the field, and assure the recovery of all of the reserves?

Secretary MORTON. I am told that by experts in the field.

Senator BENTSEN. One of the criticisms that we have heard is that the Alaskan pipeline does not deal with the shortage of natural gas in the Midwest, and that a trans-Canadian route would do so.

Yet, you referred to a May 4 statement from gas companies that indicates just the opposite. Will you tell us a little more about the gas companies' position on that?

I might say that I have a telegram from the Michigan Wisconsin Gas Pipeline Co., which concludes that the effect of the Canadian oil pipeline alternative would be to make the present and projected gas shortage even more critical, and to seriously jeopardize the gas industry's efforts to maintain adequate service to consumers.

Mr. Chairman, I would like permission to insert that in the record.

Chairman PROXMIRE. Without objection.

That is a very interesting inquiry.

(The telegram referred to follows:)

[Telegram]

MICHIGAN WISCONSIN PIPE LINE Co.,  
Washington, D.C., June 7, 1972.

HON. LLOYD M. BENTSEN, Jr.,  
Joint Economic Committee,  
Washington, D.C.

Joint Economic Committee hearings regarding the proposed trans Alaska Pipeline System and natural gas matters are of great interest to the U.S. Gas Pipeline Companies interested in transportation of natural gas from Alaska and Northern Canada. Recent statements by those who object to the Trans Alaskan Pipeline have been directed toward an alternative to the Alaska line, namely construction of a pipeline through the Mackenzie River Valley of Northern Canada to Edmonton Alberta and thence to the lower 48 states by existing pipeline routes. As various aspects of this alternative are discussed, we should not lose sight of one of its most serious drawbacks, the disastrous effect upon construction of a gas pipeline from the same area.

Groups planning construction of an Arctic Gas Pipeline have based their plans on the assumption that the trans Alaska Oil Pipeline would be approved and constructed by the mid 1970s. Obviously no gas can be produced from the Prudhoe Bay Field until oil production has commenced. The gas pipeline was therefore contemplated to be constructed as soon after completion of the trans Alaska Oil Line as possible, and it was contemplated that gas from Alaska and Northern Canada would begin to flow to the lower 48 states by or before 1978.

If however, the oil line were to be constructed through Canada, it is clear that the gas line would be delayed until the mid-1980's or beyond and that the cost of gas transported through the line would be increased so significantly as to cast doubt on its economic feasibility. The effect of the Canadian oil pipeline alternative, therefore, would be to make the present and projected gas shortage even more critical and to seriously jeopardize the gas industry's efforts to maintain adequate service to consumers.

Under separate cover, by messenger, we are delivering to you today a copy of the comments of the Columbia Gas System, Inc., Michigan Wisconsin Pipe Line Company, and Natural Gas Pipeline Company of America.

ARTHUR R. SEDER, Jr., *General Counsel.*

Senator BENTSEN. Would you tell us, Mr. Secretary?

Secretary MORTON. Well, I think that if the oil pipeline were to be constructed in Canada, a hot oil line, the gas line would be delayed until the mid-1980's, or beyond, and the cost of the gas transported through the line would be increased so significantly as to cast doubt on its economic feasibility.

The effect of the Canadian oil pipeline alternative, therefore, would be to make the present projected gas shortage even more critical, and to seriously jeopardize the gas industry's efforts to maintain adequate

service to consumers. The point being that there are many factors that make the joint pipeline, the gas pipeline, and the hot oil pipeline, going along the same corridor, not as desirable and not as feasible as it was first thought.

It sounds like a good idea, but actually, the best way to serve the American market and guarantee the consumers energy is to put the Alaskan system in for oil, and put the Canadian system in for gas.

Senator BENTSEN. Mr. Secretary, my time is about to expire, and it seems to me the question boils down to, do we stop an 800-mile pipeline project across U.S. soil in which we have invested 3 years of work and \$300 million, so that we can begin from scratch on a 3,200-mile pipeline across a foreign country, who is going to require a 51 percent controlling interest, but probably doesn't have the money and when we get through with it, we will only be able to move half as much oil.

Mr. Secretary, I don't have much trouble with that question.

Secretary MORTON. Well, may I say this, Senator Bentsen? If I thought going through Canada, and then from Edmonton all the way to the Midwest, and developing that system, were more in the national interest than the present system, I would be willing to scrap \$300 million and all of the work that has been done.

But I am convinced—I think all of the criteria and other evidence supports that conviction—that the best thing for the United States now, in this period of our history, is to develop the oil pipeline, through Alaska with the maritime system, and concentrate on working with the Canadians for a cold gas pipeline.

I think that is in the best interests. But again, I think I would be willing to write off what has been done if I thought it was in the national interest.

Senator BENTSEN. Thank you, Mr. Secretary.

Thank you, Mr. Chairman.

Chairman PROXMIRE. Mr. Widnall.

Representative WIDNALL. Thank you, Mr. Chairman. Mr. Secretary, I'd like to welcome you to these hearings.

I think you made a very forceful statement, one that is going to prove very helpful to us.

I would like to follow up on something that Senator Bentsen spoke about, the comparison figures between Valdez, and Portland, Maine. It seems to me that the answer given involved about a 10-to-1 ratio in number of ships between Maine and the Valdez port.

Didn't you say something like 850 vessels? Would you repeat that again?

Secretary MORTON. I will give you those figures, Congressman, yes, sir.

In 1970, 188 million barrels were delivered to Portland, in 886 tankers. This is more than twice the amount of oil projected for delivery in Puget Sound.

I think it is not quite realistic to use any 10-to-1 ratio, just because the deliveries in Maine have been through relatively small ships, because we are rapidly evolving toward fewer tankers to carry more oil.

I think however it is perfectly proper and right and true to say that the traffic in Portland, Maine, handling Canadian oil, will be con-

siderably greater than the traffic in Puget Sound, for example, using Valdez oil.

This of course is by reason of the fact that the destinations are not all concentrated at one port. So, the actual addition of tanker traffic to the west coast is, by comparison to the situation, de minimus.

Representative WIDNALL. Well, the point of my question was going to be the fact that you would be using super super tankers in the Alaskan operation.

Secretary MORTON. No; this is not true, sir.

Representative WIDNALL. As compared to the other—

Secretary MORTON. These tankers are of the size that the West Coast ports now require, so in terms of the largest tankers on the high seas, and we can give you some tonnage figures on that here, these tankers are not the super super tankers.

However, they are going to be super in one respect, they are going to be super in the environmental aspect of their operation. This is a contribution, and this is a commitment and an important commitment, that this company is making to oil transportation in the world.

We discussed this in Stockholm, in the environmental conference. I know I take a strong position. Secretary Volpe does. Now the Maritime Administration does. And we hope the Congress will.

We are not going to be content with tankers that are going around polluting the ocean, because it is not necessary.

Representative WIDNALL. It is heartening to hear that, Mr. Secretary.

I was interested in the section in volume five of the Environmental Impact Statement, dealing with the probable dependence on Eastern Hemisphere oil in the event that North Slope oil is not brought to the American market before 1980. I quote :

Failure to bring North Slope oil to market would raise dependence on Eastern Hemisphere oil from a range of 22 percent to 34 percent to a range of 31 percent to 39 percent of domestic demand, in 1980.

These figures can be contrasted with the recommendation of the Capital task force on oil import control, which said that no more than 10 percent of U.S. requirements should be met by imports from the Eastern Hemisphere.

Could you put these figures in the context of the TAPS controversy?

Secretary MORTON. Let me see if I can do this in a simple way, without taking too much of your time, here.

The probable demand in 1980, and we are using median demand analysis—probable demand in the middle range, is 22 million barrels a day. In 1985, the probable demand is 27 million barrels per day.

U.S. production, exclusive of the North Slope, in 1980, is estimated to be about 10.4 million barrels per day. We would have then a crude oil deficit without North Slope, of about 11.6 million barrels per day, and with North Slope we would have a crude oil deficit in the United States, in 1980, of 10.1 million barrels per day.

The imports from the Western Hemisphere would range from 3 to 5 million barrels per day. Therefore, without North Slope oil, the potential oil requirements from the Eastern Hemisphere would be about 8 million barrels per day in 1980, and 12 million in 1985.

This would be 35 percent without North Slope oil, and North Slope oil would reduce it in 1980 to 28 percent. In 1985, with North Slope oil, it would be reduced from 45 percent to 37 percent.

So you can see, by 1980 and 1985, no matter how you cut it, we are going to be heavily dependent on Middle Eastern oil, unless we are able in that time frame—and I don't think we are, and I don't think any expert has testified that we are to bring things like oil shale and other energy sources on the line.

We are just not going to make the technological and economic investments, based on technology, in that time frame. We are going to go through a period here, in the 1980's, where we are going to be heavily dependent on energy from external sources, and to a large degree, on Middle Eastern oil.

Representative WIDNALL. In your statement you mentioned a study by Canada's Federal Environmental Agency which recommended the gas pipeline be built on the west side of the Mackenzie River, and the oil pipelines on the east. Doesn't this pretty well refute any arguments to the effect that there could be a common corridor for gas and oil pipelines running through Canada?

Secretary MORTON. I don't think it refutes the common corridor. It would be a wider corridor; it would be a less efficient corridor.

The real problem is that you don't have the materials in many of these areas, and the gravel that it takes to build this hot oil pipeline is tremendous. If these pipelines do have to be put on each side of the river, then the service roads will have to be put on both sides of the river, and the total land and environmental impact would be very great.

So much of the efficiency of the theoretical common corridor case is eroded away.

Representative WIDNALL. It seems odd to me that the environmental groups have not zeroed in on other places where the potential of oil spills for the maritime transport of oil constitutes a hazard to sea and land alike.

In this regard, how would you compare the projected traffic of Puget Sound with the oil tanker traffic presently coming in and out of Portland, Maine?

In your opinion, is the main harbor in Portland fouled up beyond all recognition because of the oil tank operations there?

Secretary MORRIS. Well, let's take a look at the Canadian situation just a little bit, here.

One of the things that amused me a little bit is how Mr. Anderson spoke, I'm sure his heart is in the right place and he is concerned about the environmental aspects of the Canadian West Coast, though he did not address himself to the environmental aspects of the United States East Coast in bringing in oil for use in Canada. But, let's just go through some of the things that the Canadians are doing in this area that will have a substantial impact on the environment.

The maritime Provinces in Eastern Canada are now experiencing the most dramatic increase in refining capacity in Canadian history.

Between December 31, 1969, and June 1971, the total refining capacity in New Brunswick, Nova Scotia, Newfoundland and Quebec increased by more than 100%. The existing plans indicate that this rapid expansion of petroleum-related activities is likely to continue.

All of the crude oil used by these refineries is imported, either directly by tanker, or by tanker-pipeline through Portland, Maine.

The following major Canadian oil activities off British Columbia and the Maritime provinces are indicated: a refinery at Vancouver, British Columbia, supplied by tanker pipelines, supplies refined products to the islands and coastal cities by water; oil explorations and permits have just been issued off the coastal waters of British Columbia for drilling on 2,700,000 acres; substantially exploration and drilling has been underway for some time off the coast of Nova Scotia on Sable Island with no published results. So it is very difficult for me to seize on the Canadian problem and relate it to our environmental problems, when they are expanding their Maritime oil facilities, transportation, production and all of the rest.

They will have far greater traffic on their own West Coast from their own oil operations than the traffic would be from Valdez to the West Coast of the United States.

Representative WIDNALL. Thank you, Mr. Secretary. My time is up. Chairman PROXMIRE. Congressman Brown?

Representative BROWN. Mr. Secretary, I have been trying to jot down things here during your testimony and the questions that have been asked you about the Trans-Canada pipeline for oil; now do I understand correctly that there is no set route for a Trans-Canada pipeline?

Secretary MORTON. This is correct.

Representative BROWN. But a member of proposed alternatives; is that right?

Secretary MORTON. There are six alternatives that have been discussed. I think, from our own general geological and geographic knowledge of the area, that the Mackenzie Valley, with slight variations from it at some points, either north of or south of the Arctic Wildlife Range at the Alaskan border, would be a preferable route. But the route has not been surveyed out and staked out and core drilled and all of the rest.

Representative BROWN. Well, that speaks to some other questions that I wanted to ask about this rather flexible Trans-Canada pipeline for oil.

Is there any ownership interest among oil companies or pipeline companies in the Trans-Canada pipeline?

That is, has anybody got a specific plan or made a specific request for such a pipeline?

Secretary MORTON. To my knowledge, there's no application before the Canadian Government for an oil pipeline through Canada from the Arctic down through Edmonton.

Representative BROWN. What about financing?

Is there developed financing interest in the Trans-Canada or any Trans-Canada pipeline?

Secretary MORTON. Not to my knowledge. The only thing I think we can say is that Minister Macdonald, when he came down in our talks with him, suggested that if such a pipeline were developed that the Canadian interest should be 51 percent.

Representative BROWN. And what about the environmental studies in-depth in the Trans-Canada pipeline? Has that been done?

Secretary MORTON. The only environmental studies that we can find that are being done are more of a general nature rather than a specific nature of a survey of a specific oil pipeline route.

Representative BROWN. All right.

Now, with reference to the Alaskan route, there is interest among oil companies, there is financing feasibility and the environmental studies have been completed.

Am I right in that?

Secretary MORTON. This is correct.

Representative BROWN. All right.

Now, with reference again to the presumed Trans-Canada route, I gather the disadvantages you have outlined are as follows, that it will be controlled 51 percent by foreign interests meaning Canadian interests?

Secretary MORTON. The primary disadvantage is a matter of time, Mr. Brown.

A delay of 3 to 5 years at a minimum, perhaps even longer, I think is a real disadvantage. It is a real disadvantage to the Canadian route.

The other disadvantage is the fact that if it is built it probably would delay several years the completion of a cold gas pipeline which is needed to bring Prudhoe Bay gas to the American marketplace.

Representative BROWN. Well, I have those two down on my list.

What about the prospect of foreign use of an oil pipeline?

Secretary MORTON. Well, any throughput guarantee that had to be given to the Canadians of such a pipeline, of course, would reduce our deliveries of Prudhoe Bay oil by that much, and this would have an economic effect. It would have an effect on our balance of payments, it would have an effect on our basic resource policy.

Representative BROWN. You mentioned the question of financing difficulties in Canada and the economic loss to Alaska and the United States with a trans-Canada pipeline. But I wanted to make very clear your feeling, or your estimate of the environmental impact.

Is it your estimate, from what you know at least, that the environmental impact of the trans-Canada pipeline would be greater than the environmental impact of a trans-Alaska pipeline?

Secretary MORTON. The impact will be greater, though we have to face up to the problem, that the potential environmental problems of the Alaska pipeline, because of seismic difficulties, have got to be solved, and would require special attention.

For that reason, there is a degree of environmental impact balance. But the length of the pipeline, the difficulty of finding the necessary building materials, and the total land impact of the Canadian pipeline obviously, because it is so much longer, would be greater. It goes through more permafrost areas that are subject to permafrost degradation, and are very sensitive; and the amount of gravel that would have to be mined and extracted from the area is just enormous.

For that reason, there is just no conclusion that you can come to, other than that the actual impact on the environment of the Canadian pipeline is greater than the actual land impact of the Alaska pipe.

Representative BROWN. Now, I wonder if you or one of your experts could explain to me the difference between the environmental damage done by an oil pipeline and the environmental hazards or damages in a gas pipeline, as it relates to either Alaska or Canada?

Secretary MORTON. Well, let me take a shot at it.

A gas pipeline transmitting gas from one place to another refrigerates itself because of the physics of the problem. Therefore, a gas pipeline can be laid underground in permafrost conditions and it will not

tend to thaw the permafrost, because the structure itself is below freezing.

Therefore, a gas pipeline doesn't have anywhere near the environmental stipulations required as to its structure as does a hot oil pipeline, which is an adversary to the environment.

Chairman PROXMIRE. Mr. Secretary, if you'll excuse me for just a moment, that's a rollecall and I'm going to go and vote and I'll be right back.

Senator Javits is next to question. He can use his own judgment on this, and meanwhile, if we both have to absent ourselves, Congressman Widnall will chair the committee.

Secretary MORRON. A final sentence.

The cold gas pipeline is compatible with the environment and is not adversary to it; therefore, when you put the cold gas pipeline in, it can be covered over. Its effect on fish and wildlife is very minimal.

The other thing is, if it does have a rupture, you don't have the problem of cleaning up or containing it. It goes off in the air.

You fix the rupture and you're back in business.

Representative BROWN. So really, the problem is with the oil pipeline, and if we're talking about the oil and gas pipelines together, the only advantage would be in reduced land use if they were side by side; and we've got Canadian information to the effect that the Mackenzie River part, that they would not be side by side.

Secretary MORRON. Right.

Representative BROWN. What is the reason they would not be side by side in the Mackenzie area?

Secretary MORRON. Well, I would have to ask—maybe Mr. Horton has analyzed the Canadian reports to an extent. I think it is because of the availability of materials, and maybe other considerations as far as the permafrost is concerned, but I will ask Mr. Horton to answer that.

Mr. HORTON. Thank you, Mr. Secretary.

Congressman, very briefly, we're still studying the results of the Canadian report. The principle is this: First we have recognized very definitely the efficiencies, the theoretical efficiencies, economic efficiencies, of putting the two systems together.

The Canadian report, however, says that for engineering and environmental reasons, we must be very cautious.

The concept is this: That the west side of the Mackenzie has the most degraded and silt-laden streams and would be the best place to put both systems, but because of the difficulties of the characteristics of the permafrost, and the difficulties with the stream beds, it is too dangerous to put a hot system on the west side, so you would have to put it in what is called a more pristeen environment on the east side. Consequently you minimize the environmental problems and you maximize the engineering safety if you put the gas on the east and the oil on the west.

Representative BROWN. We had testimony the last time we met on this subject from Mr. Nehring, a Ph. D. economist and Mr. Cicchetti, also a Ph. D. economist, two men whom I presumed were experts on the fields, because they were here before this committee about—Mr. Nehring testified about the length of time to get an environmental OK and to get the job underway for an oil pipeline through Canada. He

said, in effect, that there would be no delay beyond the construction delays because the Canadian environmental studies were as far along as ours were on that problem, on the environmental problem, and he did not anticipate—I tried to find out whether he anticipated legal delays and he said he saw no reason for legal delays relative to the land claim or environment beyond those which would also obtain in the United States for an Alaskan pipeline at this point in time.

Now, I gather, Mr. Secretary, that you disagree with that.

Secretary MORTON. I certainly disagree with it. He got completely out of his field in this area. It is almost impossible to come to that conclusion when you look at the problems that we have had getting to this point with the Alaskan pipeline.

I think that his qualifications as an economist are certainly good, but he got into a completely disassociated field when he started exercising judgment on delays and political aspects and the considerations that have to be taken in building this pipeline.

Everyone I have talked to that really has studied the actual occurrences agrees that a delay of 3 to 5 years is minimum. And this is not just because of economic considerations, this is because of political considerations, because of the development of environmental considerations, because of all of the engineering work that has to be done. I think these are judgments we are more qualified to make than he is.

Representative BROWN. Well, let me ask you specifically about two areas which you are qualified in, I suppose, because of your position, and that is the land claims.

Does Canada have as many land claim problems in connection, or would they have as many in connection with the Trans-Canada pipeline as we do with the Trans-Alaska?

Secretary MORTON. Well, let me read you what Mr. Chretien, their Minister for these areas actually said only a few days ago in connection with Canadian land claims, and I think it is very cogent and bears on the point. This is Mr. Chretien :

Recently, there have been suggestions that the Government should no longer delay in the settlement of outstanding Indian treaties. These are treaties 8 and 11 of the Indian People of the Mackenzie Valley. This is a more complex problem than it would appear on the surface.

I have met with representatives of the Northwest Territories Indian Brotherhood on several occasions. However, they have indicated to me that they need time to examine their treaty rights and to determine the approach to claims and treaty rights,

The press releases and the press stories all indicate that the same sort of problem is going to be faced by Canada that we faced up to in solving our own native claims issue.

Representative BROWN. What about the activities of the environmentalists in Canada with reference to this problem?

Is that as extensive as it has been in this country?

Secretary MORTON. Well, we certainly would expect the environmentalists in Canada to examine this with the same sort of fairness as the groups in our country have examined the Alaskan route.

I think they are wrong if somebody's got the idea that we can avoid environmental problems by pushing all of this up into Canada, into the Canadian pristine environment. They seem to think we can build the roads and tear up the land and cross these rivers that virtually turn to glaciers in the spring, that is all right, but we mustn't do anything to the Alaskan environment.

Well, I think if we aren't broader gauged than that something is wrong with our environmental movement, because the environment of the continent is just as valuable to Americans as it is to Canadians.

Representative BROWN. Mr. Cicchetti in his comments said in effect that the consumers would be better off and the oil companies would be worse off with a Trans-Canada pipeline.

In other words, the Trans-Alaska pipeline system was really going to benefit the oil companies, because they would bring oil into California and the West Coast, and then export it abroad and make money on that and still have the price jacked up on the East Coast.

Now, he was also, I think, banking on the Trans-Canada pipeline only having a construction delay, no additional delays than perhaps only being delayed eighteen months or two years over the Trans-Alaska pipeline system.

But what about the time and availability of oil and gas, the price impact on the consumer, and the impact on East Coast versus West Coast prices?

Secretary MORTON. I think Mr. Vogely, our economic analyst, can give you a quicker run-down on that than I can.

Mr. VOGELY. Mr. Congressman, in my professional opinion, Mr. Cicchetti completely misunderstands the pricing of crude oil in his analysis.

Crude oil is priced in markets at the—

Representative BROWN. Well, I'm not sure I'm competent to judge this one way or the other, but if you can make it simple and explain it to me, maybe I can catch up.

Mr. VOGELY. Well, I will try to, sir.

Crude oil is priced in markets at the cost of the most expensive barrel, which is required to supply that market. The Alaskan oil coming into the West Coast will replace insecure Eastern Hemisphere oil, which is cheap oil—not as cheap as the Alaskan oil, but you will still have the domestic production in California and in Cook Inlet which will be establishing the price on the West Coast. Therefore, our analysis is that the bringing of crude oil from Valdez into the West Coast will not change the price of crude oil over what it would have been otherwise in the West Coast.

Representative BROWN. It will just make the supply more secure?

Mr. VOGELY. That is correct, and it would also make the resource cost of gaining the oil cheaper, but the price would not change. The same is true in the Midwest, and therefore our analysis is—

Representative BROWN. Now, "the same is true?"

Now, explain that about the Midwest and the East. If you brought a pipeline across Canada and brought oil into the Midwest, you would not bring it in—

Well, what would be the price relationship?

Mr. VOGELY. Well, that oil would replace, or would back out, as the statement goes, some of the Gulf Coast oil, or perhaps imports, by 1980 or 1985, that would have been coming to the Midwest. The price, however, would still be set by the necessary shipments of domestic petroleum to the Midwest and therefore, there would be no price impact on the Midwest prices with or without the North Slope oil.

Representative BROWN. Mr. Chairman, my time is up, but I'd like to ask one more question, and that is, if you can get the gas in sooner to

the Midwest would there be any relaxation of oil prices if you could get a greater supply of gas for competitive switch between oil and gas?

Mr. VOGELY. No.

The deficit for gas by the 1980's is going to be so great and gas will be in such relatively short supply that it will have no impact on the price of crude oil.

Representative BROWN. Thank you, Mr. Chairman.

Chairman PROXMIRE. Senator Javits.

Senator JAVITS. Thank you, Mr. Chairman.

Mr. Secretary, I hope to ask my questions primarily of Under Secretary Irwin, because of my interest in the foreign policy questions which are affected by this decision, but I do have a serious question of you.

First, I think that the balance which has been drawn in your decision between the environmental considerations and the supply of energy supply considerations represents the major classic decision on that subject to date and may very well be a critically important precedent.

You cannot guarantee 100 percent against the occurrence of some environmental damage, however, you can minimize it to such an extent as to weigh the balance in favor of the project and that is exactly what your decision says when coupled with the environmental impact statement; is that correct?

Secretary MORTON. That is correct.

Senator JAVITS. I thoroughly agree with the approach your Department has taken and hope very much that this view will prevail because this approach is not only valid in this case but will be valid for future construction of atomic energy plants it is going to be valid for the development of novel kinds of energy sources: solar and otherwise, the effort to deal with oil shale, and so forth. These great and ironic difficulties will have to be solved, and your decision in this case has made a good start.

For example, there's nothing environmental that prohibits the plants making energy under conventional conditions from belching smoke all day, but you can very easily get an order enjoining an atomic energy plant which emits no smoke. That's one of the ironies.

I understand it, and you understand it, but I think the people also ought to understand it as well. I think you've done a splendid job, and I congratulate you.

Now, one question.

In the course of pipeline construction, lots of things can happen. To what extent is the Department going to monitor construction so that what you have anticipated in your report will actually be carried out in practice, both as to the protection of the environment and as to the other considerations which induced you to act?

Secretary MORTON. In the first place, we have retained the authority, as part of the stipulations, to shut the job down at any time, if we feel that the stipulations are not being fully carried out.

We are putting together a team and developing the expertise to do this very job that you are talking about: monitoring the construction of this pipeline. It will be an interagency effort; the Corps of Engineers will be involved, our own Bureau will be involved, the Pipeline Safety Division of the Department of Transportation will be involved,

and so forth. And, providing we can get the appropriations—and I feel sure that we can—we already have included this in the President's budget. We will have an ongoing quality control effort that heretofore is unmatched, even by the military in the case of military construction where surveillance is exercised by the services.

Senator JAVITS. And the project will be directly accountable not only to construction schedules, and so forth, but to the environmental impact statement and assurances which have been given?

Secretary MORTON. Absolutely; and more than that. The permit that would first be issued and is now in litigation is not a construction permit, it is a right-of-way permit. Construction permits are something again, and they will be issued on a segment by segment basis; and we won't let the construction proceed any faster than this environmental monitoring can be done, and can be done well.

We have got complete control over that. That is part of the agreement that we have, and the terms of the permit to be issued.

Senator JAVITS. And that is your commitment to the people of the United States, including the people of Alaska?

Secretary MORTON. Without any question at all.

Senator JAVITS. And that of the Administration as well?

Secretary MORTON. That is correct.

Senator JAVITS. Mr. Secretary this now leads to a question to the Under Secretary of State. In your recent and excellent report on the Minings and Minerals Act of 1970. The Department says "The United States' primary demand for minerals in the year 2000 is projected to rise to \$117 billion at 1970 prices."

The report then goes on to say that we will have a deficit of \$64 billion since United States production of primary minerals in the year 2000 will be only \$53 billion: and that compares with a deficit measured in 1970 dollars of only \$4 billion of 1971.

Now, Mr. Secretary, could you tell us how much of that deficit is represented by energy resources, with specific emphasis on oil?

Secretary MORTON. Not off the back of my head, Senator. We can break it down, but let me address that question to the Under Secretary of State. He may have the figures right with him.

Mr. IRWIN. I do not have the figures either, Senator Javits. Mr. Akins, who dealt with this in detail and is one of the experts in the field, may.

Senator JAVITS. Well, give us an order of magnitude, Mr. Akins?

Mr. AKINS. We have not looked at the year 2000, but the figure we're using for 1980, assuming we are importing 12 million barrels a day, will be on the order of \$17 billion.

Senator JAVITS. Of added deficit.

Now, what is our deficit on the balance of payments of today, the aggregate?

Mr. AKINS. It is running somewhere in the area of \$2½ or \$3 billion.

Senator JAVITS. A year?

Mr. AKINS. That's right.

Senator JAVITS. So the cost of oil imports would be a highly adverse factor on our trade account.

Mr. AKINS. That's right.

Senator JAVITS. And this trade account is causing us plenty of trouble right now, since we are presently running a deficit at \$2 or \$3 billion; is that correct?

Mr. AKINS. Indeed it is.

Senator JAVITS. We can therefore well imagine how much trouble \$17 billion would cause us.

Now, Mr. Secretary, would this deficit be materially reduced by the Alaska pipeline?

Secretary MORTON. It would be reduced by the amount that the Alaska pipeline delivers to Valdez and is subsequently delivered to the United States market. We estimate that in six or seven years after the pipeline begins to flow oil that this would be in the neighborhood of a million and a half barrels a day.

Senator JAVITS. What does that mean in terms of dollars in balance of payments?

Secretary MORTON. Well, in today's dollars it would be—

Mr. IRWIN. Well, Mr. Secretary, may I?

If I could speak to 1980, our general view is that by 1980 we might be receiving 2 million barrels per day from the Alaska pipeline. If we were not to receive these 2 million barrels per day and we had to buy them elsewhere from overseas, the price then might be \$4 a barrel, which would mean \$800 million a day, or probably \$2 to \$3 billion, closer to \$3 billion a year.

Senator JAVITS. Now, in the \$17 billion figure, is the \$2 to \$3 billion to be deducted or included?

Mr. AKINS. That is including the \$3 billion from Alaska.

Senator JAVITS. If we couldn't count on Alaskan oil then the deficit credit would really go up to \$20 billion, wouldn't it?

Mr. AKINS. Yes.

Secretary MORTON. To answer your question, we've computed it out here, and it does come to about \$2 billion on the basis of \$3 oil, but that, of course, is highly speculative.

So it could be as high as twice that.

Senator JAVITS. Twice that.

Now, the other point is, I notice with great interest in your prepared statement, Mr. Under Secretary, where you say: "Our relations with other consuming countries could be seriously affected and the ability of the producing countries to produce oil to obtain not only economic but also political goals would be greatly increased."

You attribute that both to our dependence on that supply, and to the acute competition for the Middle East supply which will come from Europe and Japan.

Now, Mr. Secretary, what would be the consequences to America's foreign policy if we could be held up by Middle East countries like Iraq and other countries in this situation?

Mr. IRWIN. It could be serious, Senator.

If we were dependent for 50 percent of our oil in 1980 on overseas imports, some two-thirds of that oil coming from the Middle East, the possibility of disruption, by holding up production or withholding the oil, would have a serious effect on our total energy supply and therefore on our security.

Senator JAVITS. So that whatever disposition we might wish to make in the world respecting peace or justice could be materially and adversely effected by our growing dependence, as you described it.

Mr. IRWIN. That's correct, Senator.

Senator JAVITS. And that could be, oil blackmail instead of nuclear blackmail, couldn't it?

Mr. IRWIN. That is one way to express it.

Senator JAVITS. One way to express it.

So to some extent, you at least get a little insurance from the North Slope; you get that, don't you?

Mr. IRWIN. Yes, sir. You get the start of protection.

Two million barrels would mean, perhaps, a quarter to a third of the amount by which we will need to increase our present use in this decade. We are now dependent roughly 25 percent on imports; in 1980, it will be roughly 50 percent on imports, going from 16 million barrels per day up to 24 million barrels per day.

Two million barrels from Alaska would mean, in that case, roughly 25 percent of that future increase. Now, this would not answer all of our problems, obviously, but it would be a start, and it would be a significant start. At the same time we should explore other methods of meeting this increased need.

Senator Proxmire suggests that there may be significant oil reserves in the Gulf of Alaska. There also may be oil reserves in other Continental shelves.

These should be explored.

The more esoteric ways of developing our own production of energy should be discussed, such as coal, oil shale, and nuclear energy.

Senator JAVITS. Mr. Secretary, thank you very much.

If we did have this addition from the North Slope, at least if we are going to run into trouble, we've got a little bit more help, at least to deal with emergency requirements.

Mr. IRWIN. Yes, sir; we do.

Senator JAVITS. Thank you, Mr. Chairman.

Chairman PROXMIRE. Mr. Secretary, I have a lot of questions along the lines of those asked by Senator Javits, but I want to ask others first, but you know, the effect that this has had on New York and Wisconsin, on Illinois and Ohio is dramatic, clear, emphatic and we have the most remarkable demonstration on the part of the minority today, of being very concerned, I am sure, but putting other considerations ahead of it, and I would like to pay tribute to that view. I don't think it is very realistic and I think actually where we need oil is not in California, but in the Middle West and New York and the East Coast and in New England. That is where we need it. That is where the shortage is. That is where the price is so high, and I have a series of questions I'd like to develop.

Now, first, before I get to that, let me ask you this.

The committee was told in previous testimony that the staff analysis concluded that the Canadian route, on balance, had fewer adverse environmental effects than the Trans-Alaskan route, but that the leadership of the Interior Department deleted this conclusion from the analysis, took it out.

Now, what was the exact language that was deleted from the staff analysis?

Secretary MORTON. I don't know what the exact language was, but the reason was because those analyses didn't take into consideration river crossings.

Chairman PROXMIRE. So the staff was wrong?

They ignored the river crossings?

Secretary MORTON. In my judgment, they hadn't fully considered the difficulty of making the twelve river crossings that are involved in the Canadian route with the ice problems and the environmental and difficult engineering problems involved versus the one river crossing of over a half a mile.

Chairman PROXMIRE. Well, did you have another analysis that gave you information that those river crossings were ignored and that they would add to the environmental—

Secretary MORTON. We do have that analysis; yes, we can furnish it.<sup>1</sup>

Chairman PROXMIRE. Was it put in the impact statement?

Mr. HORTON. Mr. Chairman, I'm not sure whether that specific study was contained in toto. We have it, however, in toto and we will certainly—

Chairman PROXMIRE. Was any of it put in the impact statement?

Mr. HORTON. Certainly some of it was put in the impact statement. We will provide the entire statement to you for the record.<sup>1</sup>

Chairman PROXMIRE. How much of that was put into the impact statement, do you know?

Mr. HORTON. Quantitatively, Mr. Chairman, I do not know.

Chairman PROXMIRE. Was the decision to delete the staff conclusion in any way based on influences or studies outside the Interior Department?

Well, let me get to some specific names here.

Did you meet jointly with Mr. Peter Flanigan and members of the Alyeska Pipeline Company to discuss the need to rapidly approve a pipeline route?

Secretary MORTON. I never met with the principals of the Alyeska group in the entire time we were studying this, with one exception; and that was when they came back from Canada, I met with representatives of the Alyeska group to hear their report on that.

I have discussed the alternatives—I have discussed this whole thing—with the President and with members of his staff.

Chairman PROXMIRE. Does that include Mr. Peter Flanigan?

Secretary MORTON. Yes. It does.

Chairman PROXMIRE. What advice did you receive on that meeting?

Secretary MORTON. It was a matter of giving advice more than it was receiving advice. I was trying to inform them as to where we stood as far as the work was concerned and give them a scenario that would give them some idea as to when we were going to reach a decision and take the various steps.

Chairman PROXMIRE. Did Mr. Flanigan give you any recommendations?

Secretary MORTON. No. He did not.

Chairman PROXMIRE. Did the Alyeska people make any recommendations?

Secretary MORTON. Well, the Alyeska people have been quite concerned and have inquired of the Department at almost every turn as

<sup>1</sup> See Secretary Morton's letter, dated Aug. 4, 1972, p. 335.

to when we were going to do this or when we were going to do that, and primarily as to when we were going to issue the Environmental Impact Statement.

We were never properly able to give them a very good answer because we said we were going to do it as soon as we felt we had done the work.

Chairman PROXMIRE. Did they simply want to know when you were going to release it? They didn't make any recommendations to you specifically on this?

Secretary MORTON. They wanted to know when they were going to be able to do one thing or another.

Chairman PROXMIRE. Did you meet with the Council on Environmental Quality?

Secretary MORTON. Yes. On several occasions.

Chairman PROXMIRE. What advice did they give you on the Alaska pipeline?

Secretary MORTON. This again was more an exchange of information. They were concerned, of course, that the stipulations were being well handled, and the advice was to maintain all of the authority that we could in the question of monitoring the pipeline construction and to make it as environmentally sound as technology would permit.

Chairman PROXMIRE. Do you deny that they told you that the Alaska route was environmentally more damaging than the Canadian route?

Secretary MORTON. I think they were concerned about the seismic aspects of the Alaskan route, and they expressed—

Chairman PROXMIRE. I didn't ask if they're concerned. Did they express a judgment as to which was more environmentally damaging? Did they not say that they felt the Alaskan route would be—

Secretary MORTON. No. They did not have the information to make that judgment. They did not express that.

They were concerned, as we all are, as to the environmental impact of either route.

Chairman PROXMIRE. Did you meet with the Environmental Protection Agency?

Secretary MORTON. I met with it's director.

Chairman PROXMIRE. What advice did he give you, if any, on the Alaskan pipeline?

Secretary MORTON. He wanted to make sure again that the stipulations were there. We discussed the question of standards, and we discussed the question of thoroughness as far as our environmental analysis is concerned, and he also offered his sympathy as to the size and scope and difficulty of the decision.

Chairman PROXMIRE. Are you saying that the head of the Environmental Protection Agency made no judgment on environmental impact?

Secretary MORTON. Of course he made a judgment.

Chairman PROXMIRE. What was it?

Secretary MORTON. His judgment never has been against. He has shown no opposition or expressed no opposition to the decision that we grant the permit for Alaska.

Chairman PROXMIRE. Did your conclusion on the environment also take into account the Interior memorandum prepared by Mr. Horton entitled "An Alternative to the Trans-Alaskan Pipeline," that was done, I understand, in April 1971?

Secretary MORTON. Yes. I asked Mr. Horton to prepare it. So I have constantly tried, Senator Proxmire, to weigh in the balance all of the aspects of the various alternatives—not only the Alaskan pipeline versus the Canadian pipeline, but the proposition of extending the railroad north.

Chairman PROXMIRE. Now, it is interesting that Mr. Horton's analysis on balance extolls the environmental virtues of a Canadian route. In Horton's statement of environmental considerations he lists nine in favor of the Canadian route, including avoiding oil pollution in Prince William Sound, avoiding oil loss in tanker collisions, avoiding major seismic regions, avoiding two transportation corridors, thus minimizing overall terrestrial disturbances and minimizing adverse socio-economic impacts.

Secretary MORTON. That is exactly what my statement says.

Chairman PROXMIRE. Since this evaluation included the effect of a common corridor and did not state any impacts in which the Alaskan route was superior, obviously it doesn't justify your exclusion of the staff recommendation. You did it entirely on the basis of the river crossings, is that it?

Secretary MORTON. Not entirely on the basis of the river crossings. The problem of gravel, the problem of soil, the difficulties of putting joint gas and oil pipeline over that area—there are many aspects of it.

Finally you've got to make a judgment. Finally you've got to come down and make a decision. I think I made the right decision, and it is a matter of judgment.

Chairman PROXMIRE. Would you supply the Committee—I would be very grateful if you would do this—Mr. Secretary, with a detailed justification in view of the major and perhaps prime significance of these river crossings?<sup>1</sup>

If you would give that to us so we could have some basis for evaluating your judgment. It is entirely new to me and to the staff, I understand.

We were not aware of this, and it's a very interesting development, and we would like to have that.

Secretary MORTON. The river has been there a long time.

Chairman PROXMIRE. Yes. I know it has, but the analysis hasn't, and it's very new. And you have never reviewed it before publicly, to the best of our information.

Now, the major national security objective was, I think, clearly stated by President Nixon or rather by President Nixon's Cabinet Committee report on the oil import question. And he said that no region of the United States should be dangerously dependent on any single, insecure foreign source for its petroleum supply—no region of the United States.

The conclusion of the best independent estimates the Committee could obtain was that over the next 15 years the Midwest and the East will be at least 20% more dependent on insecure foreign sources than will be the West Coast. Moreover, the actual deficit in the East Coast and the midwestern states will be about a billion barrels a day—far more than the West Coast.

And this is the reason why I question your decision to send the oil

<sup>1</sup> See Secretary Morton's letter, dated Aug. 4, 1972, p. 335.

to the West Coast. Moreover, it appears that the Interior Department deliberately biased their estimates in order to project a 2 million barrel per day deficit on the West Coast in 1980.

First, the estimates are based on ridiculous West Coast demand growth of 8% per year, and the actual average of real growth has been about 4% for the last 10 years.

Second, the estimates completely disregard alternative sources of supply to the West Coast—California off-shore, the Gulf of Alaska, and Canada.

Even accepting what may be biased estimates, how did you conclude that a 2 million barrel deficit on the West Coast was as great a threat to our national security as a 10 million barrel deficit in the Midwest and the East?

Secretary MORTON. Well, in the first place, if all the TAPS oil went to the East Coast, you would only reduce the dependency on foreign oil on the East Coast from 93% to 78%. That is because of the quantities involved.

Chairman PROXMIRE. But nevertheless, it is a lot more comfortable to have a 23 percent assured than 7 percent. That's three times as much. And of course, there are priorities within the use of oil.

Secretary MORTON. Versus a five-year delay in getting any oil at all?

Chairman PROXMIRE. Well, that's in dispute—two years or five years—and of course, the time that we have the real shortage—well, we have a shortage now. It's very serious.

We'll have an even more serious shortage, as you say, in the next two or three years, but five years from now, ten years from now, we'll be in trouble. And this is, it seems to me, where we ought to make our decision.

Secretary MORTON. That is why we'd better go ahead and develop the North Slope and develop the Alaskan pipeline system so that we have the flexibility. One of the advantages of this system is that this oil from Valdez can go anywhere in the United States by tanker where we have ports. It can go to the Gulf Coast; it can go to New York; it can go to Portland; it can go to the Chesapeake Bay.

Chairman PROXMIRE. Well, the question is do we have to get this out right away and quickly, and it's very helpful if we do. But you see what troubles me is whether or not the Interior Department has a long range policy—a 10- to 15-year policy—and that in the future when, as you say, we're going to be in a very difficult position—highly dependent, much more dependent than we are now, on foreign oil.

Secretary MORTON. Well, I think we do have a 15-year policy. And the solution as governed by that policy would be to develop the Alaskan oil now—the Alaskan system now. Get the cold gas pipeline in as soon as you can; get it financed, and then by that time you would have a better idea of what the Canadian oil discoveries and reserves are in the Arctic Islands—in the Canadian Arctic—and develop another pipeline system that would serve that area.

That is the best long-range solution as far as bringing Arctic oil into the United States market.

Chairman PROXMIRE. What is the long-range solution for the Middle West and the East and the New England area?

Secretary MORTON. That oil could very well go into it. You've got all the Canadian oil imported now through the Edmonton-Chicago pipeline. It is existent; it is there.

And the other thing we are trying to do, and we are having some resistance as you know, is to develop the fields in the Gulf—to develop the Gulf Coast reserves. Because oil moves by pipeline north from the Gulf Coast into the Midwest, and this is our big casino as far as domestic production, that pipeline system is already geared up to handle it.

We've had some environmental problems as far as the lease sales in the Gulf Coast are concerned, and we have had to recycle that operation. We got it recycled. This is a big potential production that is hooked up to the Midwest.

Chairman PROXMIRE. The hour is after 12 noon now.

Oh well, Senator Javits has another question, I understand.

Senator JAVITS. I have just one question.

Mr. Secretary, I wanted to ask you what was the situation with respect to national security considerations in respect to this pipeline, and have you been in touch with the Office of Emergency Preparedness on that score? And if so, what was said?

Secretary MORTON. We have a letter here from General Lincoln who is the Director of the Office of Emergency Preparedness, and I think it fairly well delineates the considerations as far as security is concerned that he felt were appropriate, and I would ask that this short letter be incorporated in the record. It's self-explanatory.

Senator JAVITS. I ask unanimous consent.

Chairman PROXMIRE. Without objection.

(The information referred to follows:)

EXECUTIVE OFFICE OF THE PRESIDENT,  
OFFICE OF EMERGENCY PREPAREDNESS,  
*Washington, D.C., June 20, 1972.*

Hon. ROGERS C. B. MORTON,  
*Secretary of the Interior,*  
*Washington, D.C.*

DEAR SECRETARY MORTON: Our objective during the next two decades—when our economy will be heavily dependent on crude oil in conventional forms—must be to keep our dependence on insecure foreign sources, primarily in the Eastern Hemisphere, to sufficiently low levels so that we are not subject to inordinate economic pressure or vulnerable to capricious supply interruption.

In 1990 and beyond, synthetic fuels, alternative energy sources, and altered consumption patterns may well reduce the importance of such protections. In the nearer term, however, such dependence is critical. Current agreements with the Organization of Petroleum Exporting Countries (OPEC) expire in 1975. If history is any guide, those countries will use our dependence as an additional lever to the overwhelming existing dependence of our allies so as to extract substantial additional price concessions—which directly increase supply risks and costs to our economy without corresponding benefits.

Thus, our dependence on insecure sources will be of critical importance to our bargaining position in 1975 and the years immediately following. Significant quantities of oil from the North Slope of Alaska could begin to flow through a trans-Alaska pipeline in 1975; any delay in such delivery would be detrimental to our interests. No further significant exploration and development in Alaska can be expected until marketing of Alaskan oil is assured. These considerations lead me to believe that timing is the critical issue in the trans-Alaska pipeline case.

It has been suggested that water movement from Alaska to the West Coast is more vulnerable than overland movement through Canada. This view focuses on the wrong element in the national security equation. The West Coast has been an oil-deficient area from the commencement of the oil import program, and its relative dependence on insecure sources is growing at an alarming rate. Water movement from Alaska will be short-haul transportation in United States flag vessels. The alternative supply for crude-deficient District V is long-haul, foreign flag transportation of oil from Eastern Hemisphere sources by routes that are fraught with unpredictable contingencies.

Recent developments in Canada, including the situation with respect to claims of Canadian natives (akin to our own long controversy finally resolved in 1970 by the Alaska Native Claims Settlement Act), indicate that my initial estimate of a delay of three years in delivery of the first oil from the North Slope through a trans-Canada pipeline may have been optimistic. A trans-Alaska pipeline could deliver oil to the West Coast by 1975, and full capacity by 1982; the West Coast markets will be able to absorb that oil. It is in the national interest to reduce our total dependence on insecure imports as much as possible in the critical years after 1975; this interest outweighs any considerations of distribution of that oil among regions.

The considerations outlined above including the critical importance of timing lead me to reaffirm my strong conclusion that the early completion of the trans-Alaska pipeline is an important national security objective.

Sincerely,

G. A. LINCOLN, *Director.*

Secretary MORRON. One point I want to raise here is what do we mean by security. Are we talking about military defense, or are we talking about a secure supply of energy?

I think those two things have to be balanced. Basically, the Defense Department in their statements felt that the Alaska system could be defended with our system of defense, and about this they are on record.

Another aspect about the national security is the aspect that we have already discussed here at great length. It's the question of dependence upon foreign sources as opposed to the development of domestic resources.

I think the big argument that exists is the time argument. I am very confident that a Canadian pipeline would not be accomplished in time to consider it in the best interests of national security.

Senator JAVITS. Thank you, Mr. Secretary.

Secretary IRWIN, is there any negotiation, actual or pending, with Canada to develop a continental energy policy in view of these interconnections between the two?

Mr. IRWIN. There have been discussions for some time, but not very detailed or effective ones as yet. But we are trying to get together with the Canadians to work closely on this type of policy.

Back as early as September 1970, then Assistant Secretary Trezise met in informal energy talks with the Canadians. Mr. Akins was with him at that time. This relates to one of the earlier questions that I think Congressman Widnall asked.

At that informal session the United States suggested guidelines for a joint United States-Canadian pipeline. The reaction, we understand, at that time was that the Canadians were not ready to discuss the question. There has not been any serious discussion of it since. But there are plans and efforts for both sides to get together now and work closely on the energy question.

I would like to ask Mr. Akins if he would wish to add anything, because he has participated in the past in some of the talks with the Canadians.

Mr. AKINS. We did initially talk with the Canadians about a broad energy agreement incorporating all forms of energy. They were not willing to do that, however, and we subsequently said that we would talk about any forms of energy that they wish—about atomic energy, about oil, or gas.

We would have preferred to talk about oil and gas together, but we have been meeting with the Canadians more or less regularly in

the last 3 years, and we hope to continue our discussions with them. But as yet, there is not great Canadian desire to have an agreement with us.

We would like to have concluded an agreement a long time ago.

Senator JAVITS. Mr. Secretary, I would urge the Department to make some agreements interdependent with the Canadians. There are a lot of things that they need from us.

They don't hesitate to ask for them when they need them, and I, with the greatest friendship of the Canadians, think we should, too. And I hope very much the Department will have that in mind, that a reciprocity is required and that this reciprocity is critically important to the United States.

Mr. IRWIN. We would like to do that, Senator Javits. I might add that we are now importing something like 900,000 barrels a day from Canada. Of that amount, all that is west of the Rockies flows in without restrictions. There are certain limitations on the amount that will flow in east of the Rockies.

The reason for that limitation is that the Canadians have not yet been willing to reach an overall agreement with us that provides stability for both Canada and the United States in case of an oil crisis, in case of a cut in production.

If the imports to Canada were suddenly cut off, we would like to have an understanding with them as to what effect that would have on the oil they were supplying to us and how we were sharing that oil to meet both of our shortages at that time.

This has not yet been able to be achieved with the Canadians; we continue to be very anxious to achieve such an understanding.

Senator JAVITS. Well, I am suggesting that the question of a continental energy policy be laid on the table together with a lot of other things the Canadians may want from us, because they are not bashful about asking for things, and I hope we won't be, either.

Thank you, Mr. Chairman.

Chairman PROXMIRE. Thank you.

Thank you very much, Mr. Secretary and gentlemen. It's an excellent statement and most responsive replies. We deeply appreciate it. We're very, very much impressed.

You've given a fine case. I can't say that I'm a convert. I still disagree very deeply, but I think you have done an excellent job. We deeply appreciate it.

Secretary MORTON. Thank you very much.

Chairman PROXMIRE. Would you please respond to the various submissions requested for the record?

Secretary MORTON. I'd be very delighted to.

(The following information was subsequently supplied in the record by Secretary Morton:)

U.S. DEPARTMENT OF THE INTERIOR,  
OFFICE OF THE SECRETARY,  
Washington, D.C., August 4, 1972.

Hon. WILLIAM PROXMIRE,  
Chairman, Joint Economic Committee,  
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: During my testimony before the Joint Economic Committee, I indicated I would submit several items for inclusion in the hearing record. The material I am now enclosing is in addition to my letter to you of June 24, 1972.

Enclosed is a copy of the three volume "Analysis of the Economic and Security Aspects of the Trans-Alaska Pipeline"<sup>1</sup> which was prepared by the Department and to which I referred during my testimony.

In my testimony, I referred to an analysis of the many large river crossings that would be involved in a trans-Alaska-Canada route. This analysis was performed by a Department engineer from existing source material and was given orally to the late Dr. Pecora and me. The Yukon River is the only crossing of ½ mile or wider along the trans-Alaska route. On the other hand, 12 rivers ½ mile or more wide would be crossed by the trans-Alaska-Canada route, the first 4 of which are in Alaska. These 12 rivers are as follows: Sagavanirktok River, Chandalar River, Sheenjek River, Coleen River, Old Crow River, Peel River, Arctic Red River, Ramparts River, Mountain River, Mackenzie River, Peace River, Athabasca River.

Hazards with long river crossings are associated with both construction and operation. The pipe may cross over the water or, more likely, under the water in a trench dredged in the river bottom. In underwater crossing of a wide river, there are major problems in maintaining an open ditch in which to lay the pipe. Although the pipe is specially protected, nonetheless the risk of damage from rocks in the ditch bottom is serious. Unknown damage, which may show up later as corrosion pitting, is easily caused. The main hazard during operation comes from floods which scour out the river bed and bank, and if large enough, may expose the pipe to buffeting from boulders and swift currents and thence probable rupture. Thus, river crossings are particularly hazardous because of uncertainties regarding pipe support and the danger of scouring during floods. It is generally the rule that the wider the river, the greater the risks.

I am also enclosing a copy of the Interim Report 1, "Fish Resources of the Mackenzie River Valley,"<sup>2</sup> prepared by the Fisheries Service of the Canadian Department of the Environment under the direction of Mr. C. T. Hatfield and his associates. This is the study to which I referred during my testimony and which shed some doubt on the desirability of a common gas-oil pipeline corridor along the Mackenzie River.

I also provided the Committee with a copy of a letter dated June 20, 1972 from the Director of the Office of Emergency Preparedness, in which he reaffirmed his "strong conclusion that the early completion of the trans-Alaska pipeline is an important national security objective." In this connection, Mr. Kenneth Rush, Deputy Secretary of Defense, has written me that he is "in complete accord with [General Lincoln's] position that it is in the national interest to minimize our dependence on insecure imports as quickly as possible and that our ability to obtain this Alaska oil at an early date is essential." A copy of Mr. Rush's letter is enclosed.

Sincerely yours,

ROGERS C. B. MORTON,  
*Secretary of the Interior.*

Enclosures.

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#### AN ANALYSIS OF THE ECONOMIC AND SECURITY ASPECTS OF THE TRANS-ALASKA PIPELINE: STATEMENT OF FINDINGS

(By Dr. William A. Vogely, Director, Office of Economic Analysis, U.S. Department of the Interior)

##### *Introduction*

The study of the Economic and Security Aspects of the Trans-Alaska Pipeline System was undertaken to explore these aspects pursuant and leading up to the decision by the Secretary of the Interior with respect to the application for a right-of-way for the trans-Alaska pipeline. The papers, studies, memoranda and letters which were involved in this review are contained in a series of 13 appendices arranged in two volumes and 6 appendices separately bound. The findings contained in this document are those of the author, based upon this supporting material.

<sup>1</sup>This is a condensed version of vol. I. The complete three volume "An Analysis of the Economic and Security Aspects of the Trans-Alaska Pipeline" may be found in the committee room files.

<sup>2</sup>This is a condensed version of Interim report 1, vol. 1. The complete report may be found in the committee room files.

### Major findings

I. North Slope oil delivered to the United States will reduce imports of Eastern Hemisphere oil by an equal amount.

II. No transportation alternative is economically more efficient than the trans-Alaska pipeline system; the only equally efficient alternative is a pipeline through the Mackenzie Valley of Canada.

III. The development of North Slope oil is an important national security objective: The trans-Alaska pipeline system can deliver oil sooner than the other efficient mode.

IV. From the point of view of economic efficiency, North Slope oil should be developed and transported to the United States; delay in such development places increased costs on the Nation's economy.

V. The short-run impact of the trans-Alaska pipeline system on the State of Alaska will be mixed. The long-run impact would benefit the State, the size and pattern of benefits being determined by future State action.

### Discussion

#### I. CRUDE OIL SITUATION: FINDINGS

1. *At least to the period 1980-85 crude oil will be the preferred and necessary source of liquid fuels.*

Oil and oil products are used in all sectors of the economy—in households, in industry, and in transportation. Although substitutes for oil in many of its uses can be and will be developed over time, within the next two decades, oil will remain as a preferred fuel for most of its current uses. Synthetic sources of oil will become important in the decades following the 1980's; they are not substitutes for natural crude oil within the time frame under consideration.

2. *The demand for crude oil in the United States in 1980 may be as low as 20 million barrels per day, as high as 25 million barrels per day, and most probably will be 22 million barrels per day.*

All known professionally competent forecasts of crude oil demand were systematically examined. There is a high probability that the demand for crude oil in the United States will be within the range indicated above.

3. *The production of crude oil in the United States (without North Slope oil) in 1980 may be as low as 8.8 million barrels per day, as high as 11.9 million barrels per day, and most probably will be 10.4 million barrels per day.*

All known professionally competent analyses of future oil production in the United States were examined to arrive at the above conclusion. There is a high probability that the actual production of crude oil will lie within the range stated.

4. *The crude oil deficit for 1980 (without North Slope oil) may be as high as 16.2 million barrels per day, as low as 8.1 million barrels per day, and most probably would be 11.6 million barrels per day.*

This follows from findings 2 and 3.

5. *By 1980, the crude oil available through the proposed trans-Alaska pipeline system will be 1.5-2.0 million barrels per day.*

This finding is based upon the projected description, the proposed construction schedule and the anticipated buildup to capacity of the line. It assumes that construction of the line will be initiated in the early 1970's.

6. *The crude oil deficit with North Slope oil available in 1980 may be as high as 14.7 million barrels per day, as low as 6.1 million barrels per day, and most probably will be from 9.6-10.1 million barrels per day.*

This follows from findings 4 and 5.

7. *The Western Hemisphere will provide oil to the United States by 1980 in quantities as high as 4.85 million barrels per day or as low as 2.95 million barrels per day.*

This finding is based upon an examination of the capacity for crude oil production within the Western Hemisphere and the demand for crude oil in the countries where it is produced. There is a high probability that the availability of crude oil to the United States from these sources will be within the range indicated.

8. *Imports from the Eastern Hemisphere and North Slope crude oil are the only sources available to meet the deficit between demand and U.S. production (without North Slope oil) plus other Western Hemisphere availability.*

This finding flows from finding 1 above.

9. *Without North Slope oil, imports of Eastern Hemisphere oil will range from a lowest probable figure of 16% to a high of 53% of demand.*

This range is calculated from the above findings.

10. *With the availability of North Slope oil, in 1980 the Eastern Hemisphere imports would be reduced to a low of 6%-9% and a high of 45%-47% of demand.* This is based on the above findings.

## II. TRANSPORTATION ALTERNATIVES : FINDINGS

1. *On the basis of costs of transportation and value at destination, the trans-Alaska pipeline system and a Mackenzie Valley pipeline system are the top most efficient alternatives for bringing oil from the North Slope to the Continental United States.*

The knowledge of the costs of a trans-Alaska pipeline system is much firmer than the knowledge of the costs of any other alternative system. The above finding is based upon detailed cost estimates for the trans-Alaska system, grosser estimates for the Mackenzie Valley system, and scanty estimates for other transportation systems. Data does not exist to definitely state the relative efficiencies of TAPS and Mackenzie Valley pipeline system.

2. *The Mackenzie Valley pipeline system would, on economic considerations, supply oil to the Mid-Continent (Chicago) area of the United States.*

It would be technically feasible to deliver oil both to Chicago and to the West Coast, or to transship the oil from Chicago to the East Coast. An examination of the economics, however, indicates that the preferred market for a MacKenzie Valley system would be the Chicago market.

3. *The trans-Alaska pipeline system would deliver oil to the West Coast.*

This is the project objective. See also Finding VI-4.

4. *North Slope oil delivered to Chicago via Mackenzie Valley pipeline system as compared with North Slope oil delivered to the West Coast via trans-Alaska pipeline system is a matter of indifference with respect to the price paid for oil products by consumers and the value of crude oil at the field in the North Slope.*

Incremental supplies of crude oil from the North Slope to either district will not change the price of oil in these districts, under the existing institutional arrangements affecting crude oil prices, or even if the complex of policies affecting pricing of crude oil are changed. The availability of North Slope oil will not, in itself, change either the level of consumer prices or their geographic structure. The price of crude oil delivered in Chicago is higher than the price of crude oil delivered in the West Coast. The estimated transportation charge to Chicago through the Mackenzie Valley pipeline system is higher than that of the Trans-Alaska pipeline system by about the same amount as the price differential between the West Coast and Chicago, resulting in equivalent field netbacks with either system.

## III. NATIONAL SECURITY ASPECTS : FINDINGS

1. *From a national security point of view, it is important to get North Slope oil to the lower 48 states as soon as possible so as to lessen our dependence on potentially insecure foreign sources of petroleum.*

This is the finding of General George A. Lincoln, Director, Office of Emergency Preparedness, following review specifically requested through the National Security Council.

2. *The Alaska pipeline gives promise of bringing in a significant quantity of North Slope oil to the lower 48 states by 1975, earlier than the Mackenzie Valley pipeline system alternative.*

There is no formal application by any source for a Mackenzie Valley crude oil pipeline. No detailed engineering plans or design work has been done. The Canadian government has legislation similar to the National Environmental Policy Act, which would require comprehensive consideration of any such line. Extensive negotiations would have to be undertaken between the governments for such a line.

The pre-construction planning of the trans-Alaska pipeline and the actual construction of portions of the associated marine transportation system, place this system in a higher degree of readiness.

General Lincoln estimates that the Alaska pipeline could bring the oil to market three years earlier than any alternative.

3. *Early completion of the Alaska pipeline must be considered an important national security objective.*

This is the finding of General George A. Lincoln, Director, Office of Emergency Preparedness, following review specifically requested through the National Security Council.

4. *The Secretary of Defense finds no distinct preference from a national security standpoint for any particular mode of transportation.*

Based on Lincoln letter of November 30.

#### IV. ECONOMIC EFFICIENCY CONSIDERATIONS: FINDINGS

1. *North Slope oil can be found, produced, and delivered to the Continental United States at substantially less cost than oil imported from the Eastern Hemisphere.*

This finding is based upon the conclusion of the Chairman, Council of Economic Advisers that, "the value of labor and capital resources the Nation would have to utilize to obtain crude oil from the North Slope via the trans-Alaska pipeline would be substantially less than the claims against domestic resources the Nation would have to give up to obtain an equal amount of oil from abroad." Chairman McCracken estimated that the savings would be from \$15 to \$17 billion over the life of the Prudhoe Bay field.

2. *The resource savings to the Nation are independent of security and other oil pricing policies.*

This finding follows from the calculation of the resource savings to the economy. This calculation is based on the actual cost of producing and transporting North Slope oil as compared to the actual cost acquiring imports from the cheapest world sources. Both of these are independent of oil pricing policy decisions. The resource savings would accrue without oil import quotas or state prorationing actions.

3. *A year's delay of delivery of North Slope oil forfeits the possible resource cost saving of \$1.50 to \$1.70 per barrel, or \$1.1-\$1.25 billion in resource costs.*

The loss is based on the amount of crude oil forgone during the buildup of the pipeline system to a 2 million barrels per day capacity. Such loss of throughput would only be recovered at the extreme end of the field life, and would have near zero present value.

#### V. ECONOMIC IMPACT ON ALASKA: FINDINGS

1. *Trans-Alaska pipeline system construction will have a major impact on the level of civilian employment in Alaska, strongly concentrated in specific sectors and regions.*

This finding is based upon the project description and estimated indirect impacts. It indicates that over a three-year period from 20,000 to 30,000 workers will be employed both directly and indirectly on the production and transportation of crude oil.

2. *Constructing the trans-Alaska pipeline system probably will not lower unemployment in Alaska.*

This finding is based upon experience with the modest oil boom in the Kenai-Cook Inlet area, and is the consequence of free immigration from the south 48 to Alaska. It is expected that the influx of job seekers, with skill levels higher than those currently unemployed in Alaska, will cause the impact on unemployment to be small.

3. *Constructing the trans-Alaska pipeline will not, in a major way, reduce the existing barriers to native employment.*

This finding flows from the disadvantages that the natives currently have in competing for employment, their isolation from centers of employment, and the existence of a large job pool from immigrants.

4. *Constructing the trans-Alaska pipeline will create a significant temporary growth in state personal income.*

This finding flows from an analysis of the payrolls and new employment created by the constructing of the trans-Alaska pipeline.

5. *Constructing the trans-Alaska pipeline system will probably increase prices and cost of living in Alaska.*

This finding follows from examination of divergent positions taken by several scholars who have examined the problem. It is clearly possible that the impact could be opposite to that stated. However, the State of Alaska estimates that prices and cost of living will increase. This is found to be the more probable outcome.

6. *After the period of construction of the trans-Alaska pipeline system, the Alaskan economy may experience a significant downward readjustment.*

This finding is based upon the fact that the State of Alaska has already increased its expenditures, out of the bonus money received from the lease sales. The studies which draw the conclusion that the impact after construction would not be major, base their argument on increasing State expenditures to offset the decreasing expenditures for the construction of the pipeline. Since the State has already increased its expenditures, the above finding appears the probable outcome, unless the State undertakes deliberate stabilization action.

7. *The State of Alaska will receive very substantial revenues from the development of North Slope oil.*

The estimated royalty and tax revenue from North Slope oil to the State is about \$300 million per year at full pipeline capacity. The amount of State revenue will not differ significantly under either the trans-Alaska pipeline system or a MacKenzie Valley pipeline system, as alternative transportation modes, assuming a 2 million barrel per day throughput of Alaskan oil through either system.

8. *The long-run impacts of development of North Slope oil on the State of Alaska are dependent upon the policies and actions of the State and its spending decisions with respect to the State revenue.*

This finding simply states that the additional income to the State offers an opportunity to move in many alternative directions. The direction actually chosen will determine the final impact on the State.

#### VI. OTHER CONSIDERATIONS: FINDINGS

1. *The impact on the balance of payments of the development of North Slope oil will be positive; the size of the positive impact is uncertain.*

This finding is based upon the conclusion that North Slope oil will displace an equal amount of imported oil and therefore reduce the outflow of payments for oil imports. Such a reduction will also tend to reduce United States exports as it reduces the amount of dollar exchange available to the rest of the world. In the first instance, the impact is positive through the direct reduction of import expenditures. The final size of the impact depends upon the timing and size of the return dollar flows. This is uncertain, and no more precise finding is possible.

2. *The trans-Alaska pipeline system will use United States bottoms for its tanker segment to U.S. ports.*

This finding flows from the application of the Jones Act.

3. *Construction of the 33 new tankers required in the United States shipyards will generate substantial employment and income to those shipyards.*

This finding is based upon the announced plans of the Alyeska Company and the analysis of the Department of Commerce.

4. *Any diversion of oil shipped from the trans-Alaska pipeline to other than West Coast ports will be temporary in nature.*

This finding is based upon the growth of demand for crude petroleum on the West Coast of the United States and on the economic considerations for the destination of North Slope oil through the trans-Alaska pipeline. If the trans-Alaska pipeline is built and goes to full capacity during the first few years of its operation, there may be oil available which is surplus to West Coast needs. The plans under this eventuality are to ship the oil either to the Gulf and East Coasts of the United States by transshipment at Panama, or to an export market, presumably Japan. The growth of demand on the West Coast indicates that by the early 1980's, a crude oil deficit will exist in excess of 2 million barrels per day. Because of the relative prices of crude oil on the West Coast and in Japan, and because of the transportation cost of transshipment through Panama, the West Coast destination is clearly preferred on economic grounds. Therefore, any diversion of trans-Alaska pipeline oil from West Coast destination will be temporary in nature.

#### FISH RESOURCES OF THE MACKENZIE RIVER VALLEY

(By C. T. Hatfield, J. N. Stein, M. R. Falk, and C. S. Jessop)

#### ABSTRACT

In May 1971 the Department of the Environment, Fisheries Service began a four-year investigation into possible effects of northern pipeline construction and other northern development on the fish resources of the Mackenzie River Valley.

Fish are caught in standard size mesh gill and seine nets at sampling stations on the Mackenzie, Liard, Great Bear, Arctic Red and Peel main stems and all significant tributaries crossed by the proposed pipeline routes. Species composition, distribution, age and growth, feeding, length-weight and spawning characteristics are under study. Baseline data on contamination of fish with heavy metals and pesticides are being collected. The compilation of a stream catalogue, covering chemical and physical water quality, water flows, spawning gravel areas and major obstruction to fish migration is underway. Sport and commercial fishing potential and an assessment of domestic fishery requirements are also being investigated.

Siltation or removal of fish spawning gravel, the blocking of migrations during biologically critical periods, destruction of rearing areas or chemical contamination of the aquatic environment from spills, are possible adverse effects from the northern pipeline construction and geophysical operations. Species age composition studies determine the sensitivity of certain populations to siltation, gravel removal and any chemical pollution resulting from pipeline construction. Plots of fish migration routes and times, and knowledge of spawning and nursery areas will be used in evaluating proposed pipeline construction routes and schedules. Sampling of fish sizes, age composition and growth, aid in defining of life histories, habitats and resilience of fish populations. The assessment of present contamination of fish with heavy metals, pesticides, mercury, etc. provides baseline data for future use. Food habit studies indicate the major items fed upon by each species, providing an indication as to the possible effects to the resource, should vulnerable organisms be destroyed. Sport, commercial and domestic fishery potentials and requirements are being studied in an attempt to identify species and geographic areas of particular value for human use of the resource.

Substantial fish runs were found in the Peel, Mackenzie and Arctic Red rivers in 1971. Over thirty species of fish were regularly caught. Arctic char, lake trout, inconnu, humpback and broad whitefish, Arctic and least cisco, walleye and Arctic grayling appeared to be the species which could be most affected by construction of a northern pipeline. Fish distribution varied widely depending on the species.

Age and growth of age class composition data for some northern fish populations appear comparable to those of more southern commercially fished species. For most species, growth is slow and age class composition spread is wide.

Based on stomach analyses, it appears that some fish such as chub and trout-perch, normally considered not economically valuable, are important forage fish for the economically important inconnu, pike, walleye and lake trout. Aerial insects make up a large portion of the diet of some fish species during the summer months.

Spawning areas for the various fish species are extremely difficult to define. Tributary streams flowing north into the Mackenzie River between Great Slave Lake and the junction of the Liard River are very important for grayling spawning as are some clear running streams around the Norman Wells area. Large migrations of humpback and broad whitefish, Arctic and least cisco and inconnu, south through the delta area, indicate spawning takes place at some points upstream, particularly in the Arctic Red River. Generally, it appears that the clear east side Mackenzie streams are more important than the larger turbid west side streams for fish production. These streams would be particularly suitable for sport fishing. The delta area has the potential for a small commercial fishery. Sizeable domestic fisheries exist in the delta area and around many settlements throughout the valley.

Based on the 1971 data, tentative recommendations for protection of the fish resource of the valley are presented. These cover geographic areas biologically sensitive to northern pipeline construction, seasonal times sensitive to construction, safeguards to fish during northern pipeline construction, safeguards during pipeline operation and specific safeguards for the domestic fishery during and after pipeline construction.

Specific spawning, nursery and feeding areas will be further delineated in 1972. Migration routes and times will also be better determined and population estimates verified by a tag recovery program. More emphasis will be put on lakes along the pipeline routes in the Mackenzie Valley and delta region. Intensive study of some small representative stream systems is planned.

\* \* \* \* \*

1. *Northern pipelines*A. *Geographic areas biologically sensitive to northern pipeline construction*

On the basis of fieldwork done in 1971, some streams and river areas can be classified at this time as being biologically sensitive to disruption. Assessment in this field is preliminary, however, and the naming of some sensitive areas does *not imply* that many others are not sensitive. This appraisal applies to fish resources only. Sensitivity listings will be updated as more data is collected in 1972.

Generally, one could say that clear running streams on the east and south sides of the Mackenzie would be more sensitive to environmental disruption than the turbid west side streams. Clear streams generally contained more resident fish, especially of species considered economically or aesthetically valuable. Silting is rare and gravel clean. Siltation should be closely controlled on these streams and gravel removal not permitted. Turbid streams with their already high rate of silt load and history of extreme natural events (eg. flooding, scouring, eroding, stream bed shifting, etc.) would seem less likely to be affected by man-caused physical disruptions. Chemical contamination would be a danger to both stream types. In the case of an oil line crossing, the west side turbid streams might be less desirable because of the greater possibility of land erosion caused breaks leading to oil spillage.

The Mackenzie main stem is turbid and, therefore, less sensitive to silting than the other systems. Blockage is unlikely. Gravel removal could probably be permitted in some areas although some gravel bars are probably used for spawning. Chemical contamination by pesticides, petroleum materials, or heavy metals could be disastrous for the delta area in the north.

In 1971, only one observation of a spawning area, actually in use, was made in the Mackenzie Valley. This was immediately upstream from the moraine area on Fish Creek, a tributary of the Rat River. A large number of Arctic char (or Dolly Varden, depending on the classification system) were spawning in this creek. Presumably these fish migrate up through the system from the Mackenzie Delta in late summer. No gravel removal from, or siltation of, this bed could be permitted at any time of the year, as eggs, fry, juvenile or adult fish would be present on a continuous basis.

The Arctic Red and Peel River systems have large migrations of fish. Specific spawning areas in the rivers have not been located and are difficult to speculate on because of turbid waters in both systems. Siltation would be less of a problem than blockage and gravel removal on these systems. The Tree River, a clear west side tributary, supports a grayling run. Several important grayling streams also exist in the Norman Wells area. Two west side streams, Stewart and Slater creeks, and two east side streams, Bluefish, and Vermilion creeks, have substantial runs. The Great Bear River supports an Arctic cisco run. Siltation, blockage or gravel removal on these systems would not be ecologically acceptable.

Near Fort Simpson, the Jean-Marie, Trout, Kakisa, Rabbitskin, Spence, Trail and Martin tributaries would be extremely sensitive to siltation, gravel removal, migration blockage or chemical contamination. They serve as important spawning and nursery areas. The Mackenzie and Liard main stems in the Fort Simpson area appear less sensitive to disruption than major rivers in the more northern study areas. Fewer fish migrations and less permafrost would seem to lessen the probability of construction on the main stems affecting the fish resource.

In conclusion, preliminary results from our study indicate that the west side route down the Mackenzie is best for a gas pipeline from the point of view of protecting the fish resource. Because of the extreme consequences of an oil pipeline break, however, the east side route along the Mackenzie is recommended for this line as watersheds are more stable along this bank. It is assumed, when making these recommendations, that engineering of the lines would be such that stable non-silting river crossings would result once lines were in place two or three years. If both gas and oil lines are built, or associated services such as railways, roads, and powerlines included, a "corridor concept" along one side of the river may be preferable.

\* \* \* \* \*

## FUTURE AREAS OF STUDY

Deficiencies in the 1971 field program largely determined plans for 1972. When data were analysed it was possible to estimate species composition, distribution, migration times, age class composition, length-weight characteristics, contamination levels and food habits of some populations. However, questions of migration routes, locations of spawning grounds, and life history details of many species still remain.

To overcome this lack of data, four large additions to the 1971 investigation are contemplated. These are, an extensive tag and recovery program, an extension of the netting survey to include lakes at the head of tributaries, an extension of the investigation area into the Mackenzie delta proper with a base at Aklavik, and the establishment of small watershed study areas.

The tagging program will be largely centered in the Aklavik-Arctic Red area with extensive tagging of broad and humpback whitefish, Arctic and least cisco, inconnu, and grayling being done. Some tags will also be applied to pike, walleye, lake cisco and flathead chub. Crews at Norman Wells and Fort Simpson will tag those species most abundant in the respective areas. Tag recovery will be through the domestic fishery and Fisheries Service netting studies conducted as in 1971. Tag and recovery data will better identify spawning areas and migration routes, further define population estimates and expand life history knowledge.

Information collected from the 1971 study indicates that lakes in tributary headwaters play an important role in life histories of certain species. Overwintering, particularly of grayling, could occur in these waters. In 1972, studies will include sampling lakes for fish throughout the year.

The possibility of a pipeline route south from the Tuktoyuktuk Peninsula-Richards Island area and that certainty of petroleum feeder lines throughout the delta make this area of our study more important in 1972 than 1971. High fish numbers in the delta dictate a more extensive program. Migration routes and times, and growth rates will be better defined for fish from this area.

Intensive studies of small watersheds will provide good life history information for species where these data are lacking. It is planned that one east or south side clear stream and one west side turbid stream, both intersected by proposed Mackenzie Valley pipeline routes, be fished regularly with trap nets. Local tag and recovery programs to estimate numbers, benthos surveys to determine food availability, and water chemistry sampling, to measure seasonal change, will be performed.

In addition to the major changes in the 1971 Fisheries program, an expansion of existing studies is contemplated. The helicopter synoptic survey will be intensified in the search for spawning areas. It will be used extensively in the increased tributary and lake investigations. A better assessment of the domestic fishery is also planned. Samples and records of catches will be tabulated for the year.

Contamination data collected in 1971 showed no problem areas in the valley. Since data are now considered adequate, this aspect of the program will be dropped.

On pipeline completion, large quantities of "flushing fluid" will be used to test either an oil or gas line. The effect of these chemical mixtures on fish will be assessed in 1972 using bioassays to determine acute toxicity. Plans for final disposal of the fluids may then be better drawn up.

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DEPUTY SECRETARY OF DEFENSE,  
*Washington, D.C., June 21, 1972.*

HON. ROGERS C. B. MORTON,  
*Secretary of the Interior,*  
*Washington, D.C.*

DEAR ROGERS: Abe Lincoln has sent me a copy of his June 20, 1972, letter to you concerning the urgent need of our country for Alaskan oil. I am in complete accord with his position that it is in the national interest to minimize our dependence on insecure imports as quickly as possible and that our ability to obtain this Alaskan oil at an early date is essential.

Our country is deeply indebted to you for the vigorous leadership you are giving in pushing toward the accomplishment of this objective, and you have my strong support.

Warm regards.

Sincerely yours,

KENNETH RUSH.

## INTERNAL MEMORANDUM, DEPARTMENT OF INTERIOR

## AN ALTERNATIVE TO THE TRANS ALASKA PIPELINE

1. The Department of the Interior released a massive 9-month environmental statement on the proposed Trans Alaskan pipeline on March 20, 1972. As required by the National Environmental Policy Act, this statement clearly and objectively defines the impact to be expected from construction of the pipeline and operation of an associated tanker system to the West Coast. The most serious hazards are projected for the fishing industry and marine environment in Prince William Sound and from the threat of large earthquakes in Southern Alaska.

2. Secretary Morton has indicated that no action on the permit would be taken for 45 days or until May 4, 1972. During this period, increasing pressure against the Trans Alaska pipeline can be expected from the National Media, leading environmental groups and the Canadian Government.

3. Because of the high intensity of these potential pressures and in light of the uncertain length of litigation against the Alaska pipeline, an alternative course of action should be kept under consideration.

4. One alternative would be the establishment of an International Joint Venture between the Government of the United States, the Government of Canada and the oil industry for the purpose of constructing and operating a continental "common carrier" pipeline system for transporting oil and gas resources from the American and Canadian Arctic by way of the MacKenzie Valley to market.

In forming this International Joint Venture, the Government of the United States, the Government of Canada and the oil industry would share equally the required investment and the resultant return on capital.

This International Joint Venture could serve as the cornerstone of a North American Continental Oil Policy.

## INTERNATIONAL CONSIDERATIONS

*Favorable*

1. An international joint venture would contribute to reversing the growing tide of nationalism in the United States and Canada uniting both countries, symbolically and physically, by an "Iron Artery."

2. This alternative route would stimulate exploration and development of petroleum and other resources in both countries, and could constitute the first step in developing a North American continental oil policy.

3. An intercontinental pipeline would avoid the potential adverse impact on the coastline of British Columbia (except in Puget Sound) and the marine biota of the Northeast Pacific.

4. For these economic and environmental reasons, the alternative should be a political-plus for the Canadian Government.

## POLITICAL CONSIDERATIONS

*Favorable*

1. Strongly favorable public reaction from a) national environmental groups, b), Midwestern and Eastern electorate, and c) national media. Interior has received in excess of 52,000 letters in the last year alone, the vast majority of which are against the Alaska pipeline. Most of the national media is opposed to the Alaska route.

2. The Administration (with the Government of Canada) would regasp the political initiative from environmental groups and the courts with respect to the transportation of Arctic oil.

*Unfavorable*

1. Risk of losing three electoral votes and one Senate seat in Alaska.

## ECONOMIC AND ENERGY CONSIDERATIONS

*Favorable*

1. Under a tripartite joint venture, the oil industry would provide only one-third of the necessary capital investment.

for a continental pipeline to Puget Sound via Edmonton, the industry would invest *1.7 billion* (of a 4.2 billion total) compared with *4.15 billion* industry investment for the TAPS system.

for a common oil and gas system to Chicago, the industry would invest *3.1 billion* of a total 9.3 billion cost. This is compared with *an 8.65 billion*

industry investment for the TAPS pipeline-tanker system (4.15 billion shared with shipping companies) and a gas pipeline to the midwest United States (4.5 billion to be funded by a consortium of gas utilities).

2. The two governments and the industry would share equally the revenues generated from the investment.

3. A continental pipeline system would allow oil delivery to both West Coast and Chicago markets.\*

4. Achieve a 10-15% savings on construction costs for gas pipeline parallel to oil pipeline because of common construction roads, common pumping stations and common gravel pads.

#### *Unfavorable*

1. For the oil pipeline to Puget Sound, an additional 500-700 million would be required for tankers to move the crude not refined in Puget Sound to other West Coast ports. The oil industry would share one-third of this cost.

2. About 65% of the 800 miles of TAPS pipe would have to be moved to depots in Canada. The cost of moving would be shared by the three parties in the Joint Venture; the capitalized value of the pipe, however, would not be lost. Additional pipe of less stringent specifications would have to be ordered (1600 miles more to Puget Sound; 2450 miles more to Chicago.)

3. Possible loss of one to two years for oil delivery to market. This consideration must be weighed against the indefinite time period of TAPS litigation and against the uncertain timetable for construction approval by Canadian authorities.

4. Loss of approximately one-half of the 8,000 American jobs projected annually for construction of the Trans Alaska pipeline. This loss, however, might be partially or totally offset by jobs provided by pipeline construction into Chicago or the Puget Sound area. Pipeline employment would exist only for the period of construction, three years in the case of the Trans Alaska pipeline. The route of oil transportation would have no effect on the 2,300 jobs estimated for the drilling development of the Prudhoe Bay field.

5. Loss of some revenues (less than 2%) to the State of Alaska. Over 95% of the benefits to the State are attributable to royalties and production taxes. 3% is attributable to corporate income taxes. These three sources of revenue would be unaffected by route location.

6. Some, but not all, of the industry costs of technical and scientific investigations could be applied to a Canadian intercontinental system.

#### ENVIRONMENTAL CONSIDERATIONS

##### *Favorable*

1. Avoid chronic oil pollution in Port Valdez and Prince William Sound.

Projected annual financial loss of \$400,000 to salmon industry in Valdez arm.

Projected 12-32 barrels per day discharge in Valdez Harbor from ballast treatment plant and transfer operations.

2. Avoid increased marine transport of oil in Northeast Pacific. Prevent 384 barrels of daily oil loss from accidental tanker spills estimated by U. S. Coast Guard on a "worst case" basis.

3. Avoid three of four most sensitive areas of permafrost in Alaska (Yukon Flats Hess Creek area, and Copper River Basin).

4. Reduce number of crossings of major mountain ranges.

5. Minimize adverse socio-economic impacts (recreational and wilderness disturbance; Native subsistence and community disruption projected for TAPS line).

6. Avoid high intensity seismic areas in Southern Alaska.

7. Avoid two "transportation" corridors across the Brooks Range for separate gas and oil pipelines.

8. Minimize overall terrestrial disturbance by one corridor for oil and gas systems

9. Reduce number of river crossings by about one half.

\*A pipeline from Portland, Maine, now delivers about 500,000 barrels per day of tanker-transported Mideast and Venezuelan crude to Montreal. Other pipelines which cross the Canadian-American border include the Trans Mountain (250,000 bbl/day); the Continental (Calgary to Montana 95,000 bbl/day) and the Interprovincial (Calgary to Chicago, 1,300,000 bbl/day).

*Unfavorable*

1. If the two oil transportation systems (TAPS and MacKenzie Valley) are compared, *more terrain* (and wildlife habitat) would be physically disturbed if the Canadian proposal were adopted. If both *oil and gas* transportation systems through the two countries are compared, *less total terrain* would be disturbed by choosing a common corridor.

2. The Canadian route would involve a *greater linear extent* of permafrost (770 miles for TAPS, 1205 for MacKenzie Valley) The character of the permafrost, however, is more important in determining the extent of impact and construction techniques (and costs) required. Lack of knowledge of the MacKenzie route prevents a comparison of permafrost conditions, other than linear extent.

3. For Edmonton to Puget Sound, any pipeline would have to cross the Rocky Mountains, probably parallel to the present Trans Mountain pipeline. Interior has not studied the topographical or seismic conditions of this route.

U.S. DEPARTMENT OF THE INTERIOR,  
OFFICE OF THE SECRETARY,  
Washington, D.C., March 23, 1972.

## MEMORANDUM

To: Bob Hitt, Ken Brown (for Secretary).  
From: The Under Secretary.  
Subject: Portland-Montreal Pipeline.

The pipeline connecting Portland, Maine and Montreal, Quebec is approximately 236 miles long (70 miles in Canada). It has three main lines (12'', 18'' and 24''). The U.S. section passes through Maine, New Hampshire and Vermont.

The average daily throughput is approximately 500,000 barrels per day. An estimated 1,400 tankers unload at the Portland terminal of which approximately 600 provide crude oil for the pipeline to Montreal.

No information yet on transport costs or carrying charges.

W. T. PECORA.

U.S. DEPARTMENT OF THE INTERIOR,  
OFFICE OF THE SECRETARY,  
Washington, D.C., March 27, 1972.

## MEMORANDUM

To: The Secretary.  
From: Jack Horton.  
Subject: International Pipelines.

There are four pipeline systems that cross the Canadian-American border:

1. *Trans Mountain Pipe Line*; Edmonton to Puget Sound, capacity 250,000 bbl/day to be increased to 300,000 this year.

2. *Continental Pipe Line*; Calgary to Montana, 95,000 bbl/day.

3. *Interprovincial Pipe Line*; Edmonton to Minnesota, bifurcating to Toronto and Chicago, 1,300,000 bbl/day.

4. *Portland, Maine, to Montreal Pipe Line* carrying Venezuela and Mideastern crude into Canada, 550,000 bbl/day.

This information was included as a footnote in the analysis we prepared over the weekend.

## PORTLAND, MAINE: SPILLS/1971

*Nature of spills*

From vessels-----	41
At terminals-----	7
From tugs-----	2
Not known-----	17
Total incidents-----	67

NOTE.—8,710 gallons (207 barrels) for year.

Source: Harbor Master



*B. Both Oil and Gas to west coast*

Oil transport 4.15 billion, gas transport 5.60 billion (includes saving for parallel gas pipeline). Total 9.75 billion.

*C. Gas to Chicago; Oil to west coast*

Oil transport 4.15 billion, gas transport 4.50 billion. Total 8.65 billion.

*Estimated Alyeska costs begin 1973*

	<i>Millions</i>
Pipe: 789 miles at \$190,000 per mile-----	\$150
Valves -----	15
<b>Total -----</b>	<b>165</b>
<b>Pipe construction:</b>	
Spread 12—60 miles at \$1.4 million per mile-----	84
Spreads 9—11—168 miles at \$1.7 million per mile-----	286
Spreads 6—8—188 miles at \$1.2 million per mile-----	226
Yukon Crossing (Alyeska share only)-----	5
Spreads 1—5—373 miles at \$0.95 million per mile-----	354
Pipeline General—789 miles at \$0.24 million per mile-----	190
<b>Total -----</b>	<b>1,145</b>
<b>Pump Stations: 1 at \$25 million, 5 at \$20 million, 6 at \$17 million-----</b>	<b>227</b>
Communications; materials handling, design and research, A/C support, right-of-way -----	65
Hard Road, Lengood-Prudhoe Bay: 360 miles at \$0.5 million per mile-----	180
Terminal -----	400
<b>Subtotal -----</b>	<b>2,192</b>
Overhead at 4½ percent-----	99
<b>Subtotal -----</b>	<b>2,291</b>
Contingency at 5 percent-----	115
<b>Subtotal -----</b>	<b>2,406</b>
Working Capital-----	50
Interest Charges-----	200
Cost of Delay (1 year at 5 percent)-----	120
<b>Total -----</b>	<b>2,776</b>

## FACT SHEETS TAPS 102 ANALYSIS

*Environmental Considerations:*

## Favorable:

1. Projected maximum annual loss to salmon industry: \$400,000.

## 2. Pollution:

## Port Valdez:

Ballast treatment: 8—24 bbl/day.

Transfer spillage: 3 bbl/day.

Total: 11—27 bbl/day.

## Open Ocean:

Tanker accidents: 384 bbl/day.

Total: 140,000 bbl/year.

## Unfavorable:

## 1. Permafrost:

TAPS: 770 miles.

Canada: 1205.

*Economic and Energy Considerations:*

## Favorable:

## 1. Oil Pipeline Investments

Canadian Joint Venture 1.7 billion

Alyeska 4.15 billion (with tankers)

2. Oil and Gas Transportation
  - Canadian Joint Venture 3.1 billion
  - Alyeska & Gas Utilities Co. 8.65 billion
3. Canadian—U.S. Pipelines
  - Inter Mountain—550,000 bbl/day
  - Continental—95,000 bbl/day
  - Interprovincial—1,300,000 bbl/day
  - Portland, Me.—Montreal—550,000 bbl/day
4. 10-15% savings on parallel gas pipeline

## Unfavorable:

1. 500-700 million additional for tanker cost out of Puget Sound
2. 65% of TAPS line moved 1,600 miles of additional pipe to Seattle; 2,450 miles of additional pipe to Chicago.
3. Loss of about 1/2 of 8,000 American jobs in Alaska—offset by jobs on a Chicago or Puget Sound pipeline.
4. Loss of less than 2% of revenues to State:
  - 95% of State Revenue from royalties and production taxes.
  - 3% corporate income taxes.

## THE ALASKA RAILROAD

## Present Route:

Seward to Fairbanks, 470 miles via Anchorage (1969—carried 71,536 passengers and 1.3 million pounds of freight):

Total income—\$16.5 million

Net income 1969—\$313,000

Loss—1968—\$1.4 million

60% of revenues, civilian passengers, and freight:  
operates at 50% of capacity going north  
operates at 5% of capacity going south

## RAILROAD EXTENSIONS

*Fairbanks (Nenana) to Bornite (390 miles)*

	<i>Million</i>
Nenana to Alatna—275 miles (\$700,000 per mile)-----	\$176
Alatna to Bornite—115 miles (\$450,000 per mile)-----	100
<b>Total</b> -----	<b>276</b>

*Fairbanks (Dunbar) to Prudhoe Bay (565 miles)*

Dunbar to Bettles—280 miles (\$830,000 per mile)-----	196
Bettles to Prudhoe—285 miles (\$629,000 per mile)-----	177
<b>Total</b> -----	<b>373</b>

## CRUDE OIL FROM COOK INLET, ALASKA

	Barrels per day	Tankers per year <sup>1</sup>
Shipped out of Cook Inlet, Alaska-----	163,000	282
To San Francisco-----	276,000 <sup>2</sup>	132
To Los Angeles-----	87,000	150

<sup>1</sup> Based on assumption of 30,000 deadweight-ton tankers.

<sup>2</sup> Includes small quantity into Puget Sound (3,000 barrels per day).

Note: Source of oil movements is U.S. Bureau of Mines, based on 2d half 1971.

Chairman PROXMIRE. Our next witnesses are the Governor of Alaska, Governor Egan, Senator Hansen, Senator Stevens, Congressman Begich, and I wish these gentlemen would come together to the table so we could have them testify seriatum, and then we will question them.

Gentlemen, it's very late and we have to get along. Governor Egan, you've come all the way from Alaska. I'm sure now that you understand why we have to confine this to 10 minutes each, and your entire prepared statement will be printed in full in the record, and we will proceed with the questioning.

Go right ahead.

## STATEMENT OF HON. WILLIAM A. EGAN, GOVERNOR OF THE STATE OF ALASKA

GOVERNOR EGAN. Mr. Chairman and members of the committee, I do appreciate the opportunity to appear before you today. The subject matter of this stage of your hearings, the trans-Alaska pipelines, is the most critical matter to Alaska's future of any since statehood.

The two are inextricably late. Statehood, conveyed to Alaska from Congress and the other States of the Union, the commitment for self-destiny, the opportunity to finally overcome and alleviate the long-standing deprivations of the people of Alaska under Federal administration during territorial days.

The development of Alaska's petroleum resources, which the trans-Alaska pipeline will enable, is nothing less than the keystone on which the promise of statehood, self-destiny rests. Unless revenues from North Slope oil productions begin to flow into the State treasury reasonably soon, Alaska will within just a very few years be in desperate financial straits.

Already, lost revenues from delayed pipeline construction approximate a staggering \$1.2 billion to the people of Alaska. In my full prepared statement to this committee I have set forth the reasons for my conviction that the trans-Alaska pipeline can be built as an environmentally safe project.

I have also outlined my reasons for believing that an endless pursuit of open, often undefined goals in the name of conservation protection, in the absence of a Governmental framework to clearly define environmental objectives, will result in stagnation of the American economy through Federal inaction or delay.

Because of Alaska's circumstances as an emerging economy and as a major target of undefined environmental goals, a particularly severe hardship is being worked right at this minute on our State.

In my condensed remarks here I will concentrate mainly on the matter of Alaska's tremendous financial stake in construction of the trans-Alaska pipeline. And in the course of that, the shortcomings or financial drawbacks of a Canadian route.

A Canadian crude oil pipeline route must cross a far greater distance over permafrost, swamp, and pond terrain. This means much higher construction costs are inevitable because of the more expensive construction techniques necessary to protect that area of the Canadian environment.

It should also be borne in mind that the assumption that an oil line and a gas line through Canada would closely parallel one another may not be technically valid. The oil line and the gas line would operate at different temperatures. Thus, soil conditions that might be acceptable to one might be totally unacceptable for the other.

The different engineering requirements involved may not permit a single corridor, but in some areas two routes widely separated. The conclusion that the trans-Alaska would bring quick gas quicker to Midwestern markets is also a false conclusion.

The Alaska oil line is planned for completion in mid-1976. Although for purposes of conservation, North Slope gas production might be delayed for a year or two period beyond that, full gas production should be available in 1978, at which time a gas line is planned for completion.

This would be the earliest time North Slope gas could be piped to the Midwest. The same considerations as to natural gas apply regardless of whether the oil pipeline crosses Alaska or Canada, except that a crude oil line through Canada would delay the transport of natural gas directly to the Midwest for a several yearlong period.

Regarding costs, an estimate worked out by the State, using one given set of constraints, is filed with the committee in exhibit C of my prepared statement.<sup>1</sup> The State's comments on the environmental impact statement under the assumptions made there, which we believe to be reasonable, the cost of an oil pipeline through the Mackenzie Valley is projected at approximately \$8.47 billion.

To transport North Slope oil to the nearest United States market via Canada would cost an average of 87.4 cents more for each barrel than through a trans-Alaska pipeline to the nearest United States market via Valdez.

The price differential between west coast and midwestern markets is not likely to approach that amount. There is simply no question that the delay of construction in a Canadian route would deal a severe blow and a tragic one to State of Alaska revenues, both in postponing the time when these revenues would begin to flow into the State treasury and drastically reducing them when they do begin.

If production from Canadian fields requires 50 percent of the line, then Alaskan production would be cut by 50 percent, as would the revenues to the State of Alaska. And since State revenues depend on the rate of production, such a cut would work a tremendous additional financial burden on the State of Alaska.

These economic questions are of vital importance to Alaska. The first and greatest impact is in royalty and tax income to the State treasury, both short term and long term. The sale of the North Slope leases in 1969 did produce moneys permitting the State to make a start on meeting some of the desperate educational, housing, health, and social service needs of Alaskans. But the delay in North Slope production revenues is seriously undermining the State's ongoing programs.

Originally we anticipated that North Slope income would start in 1973. Now, income at that anticipated 1973 level could not possibly begin until 1976 or later, and the effect of this is indicated in exhibit A attached to my prepared statement.

This means that we have several very lean, difficult years ahead of us in Alaska before we can resume the kind of progress needed to achieve decent education, housing, and other urgent human and environmental goals in Alaska.

As I mentioned earlier, the State is losing approximately \$1.2 billion in revenues because of the delay. Exhibit B attached to my prepared

<sup>1</sup> A copy of exhibit C may be found in the committee room files.

statement points out that continued delay in North Slope oil production beyond 1976 or 1977 would mean an actual cutback of vital State expenditures to a point where the general health, safety, and welfare of Alaskans would be seriously jeopardized.

There is no doubt in my mind that beyond the royalty and tax revenue from production, the construction and operation of the trans-Alaska pipeline will be highly beneficial to the economy of the State and of the Nation. I think this is obvious in that so many government and political leaders are so keen on having this industry locate in their particular region.

State planning can go a long way to even out any ups and downs of the pipeline construction period itself. This is treated in detail in the State's comments on the impact statement.

One very mystifying conjecture is that the trans-Alaska project will somehow increase unemployment. To the contrary, the pipeline project will create jobs which people who are out of work will then have a chance to obtain. While all of the people seeking jobs may not be able to obtain them, including some who may journey to Alaska seeking work, the pipeline will in no way contribute to the Nation's unemployment problems.

The simple fact is that when pipeline construction begins, there will exist jobs which did not exist before. There will exist jobs that did not exist before long after the completion of the construction. The construction of tankers in American shipyards will also create jobs for Americans. It is absurd to say that all of this will somehow increase unemployment. And there can be no doubt that economic activity even after completion of the pipeline will be higher than it is now.

On a more long-range basis, State economic planning is now directing itself to the question of securing stable employment opportunities of non-seasonal nature for all Alaskans. If we are not thwarted in our efforts to budget wisely during the next several years when all projected revenues are needed for all ongoing programs, and if we are able to realize adequate revenues in the future beyond this trying period, we will then be able to invest oil revenues to develop commerce in the renewable resource areas which have historically been the backbone of the Alaska economy.

Only with North Slope revenues in the 1976-77 time frame, however, can we be talking seriously about further economic growth in Alaska consistent with environmental quality.

Short-range pipeline construction employment could merge into employment in long-range native development programs. The regional corporations are actively planning development programs which do not depend on pipeline construction as well as assuring that the Alyeska Pipeline Service Company provides training programs to equip them for pipeline employment.

I should emphasize, however, that the funding of the Native Claims Settlement Act will provide the means for rural Alaska to emerge into a self-sustaining economy, not the jobs which will be provided by the construction of the line itself.

The Settlement Act provides that over one-half of the monetary settlement will come from the royalties, rentals, and bonuses Alaska will receive for its oil. A long delay in the flow of North Slope oil

will mean a long delay in giving rural Alaska the economic means of breaking the poverty cycle which has too long been part of rural Alaska life.

Mr. Chairman and Committee Members, I am convinced the trans-Alaska pipeline route is the superior one from the standpoint of environmental protection, national security and national economic considerations. The State of Alaska is not asking for any concessions, or any slighting of these important concerns, in urging that the trans-Alaska pipeline project be given a final go-ahead as soon as possible.

The State is only asking that the best route, the trans-Alaska route, be allowed to proceed so that the State may carry out the orderly development of its rich petroleum resources which were recognized from the start as being the vital financial foundation in Alaska statehood.

In brief summary, the conclusive factors are the following ones:

One, the trans-Alaska pipeline route is the most logical, the most economical, and the safest route.

Two, the State of Alaska urgently needs the maximum revenues from its North Slope petroleum, which can only be realized from the trans-Alaska route. Substantial additional support for these two assertions is provided in the State of Alaska's "Comments on the Trans-Alaska Pipeline and Its Alternatives," which are in exhibit C accompanying my prepared statement.<sup>1</sup>

Three, the nation urgently needs Alaskan oil and gas to meet its energy requirements, and only the trans-Alaska route can deliver North Slope oil to the nation without the certain prospect of further and unneeded delay and the uncomfortable weight of foreign control, no matter how friendly, over this major interstate conveyance.

Gentlemen, to deprive Alaska of this keystone facility in the development of its petroleum resources would be a disaster of the first order for the human environment of the Alaskan people. I ask that you in your wisdom weigh carefully in your deliberations the justified needs of Alaska's citizens and our aspirations as a state.

Thank you.

Chairman PROXMIRE. Thank you, Governor.

(The prepared statement of Governor Egan follows:)

PREPARED STATEMENT OF HON. WILLIAM A. EGAN

Senator Proxmire, members of the committee, I appreciate the opportunity to appear before the Joint Economic Committee today. Some of us in Alaska have been long aware of the importance of the work of the Committee and the contribution made by it and its chairman to the thoughtful examination of the Nation's economic policies over the past several years.

Mr. Chairman, your efforts on behalf of the American consumer are particularly well known and appreciated by Alaskans who are burdened by some of the greatest extremes of poverty, unemployment and high cost of living experienced anywhere in the Nation. However, as owner of some of the greatest undeveloped oil and gas resources anywhere in the world, including the oil which will be shipped in the Trans-Alaska pipeline, the state of Alaska has the means of alleviating these burdens. As the committee knows, the right to develop some of these resources under terms and conditions described both in contract and State law has been granted by the State by lease to various oil companies. But though these leases have created certain rights in the contracting oil companies, State interest remains paramount.

<sup>1</sup> A copy of exhibit C may be found in the committee room files.

The State retains compelling interests in the management and direction of petroleum development, both as beneficiary of the fruits of development and as the primary custodian under the Constitution of the United States of the human and natural environment of Alaska and of the welfare of its people. The State of Alaska is just as intent as this committee and the Department of the Interior, if not more so, in assuring that the major decisions made by private enterprise in the development of these resources are correct ones.

Though our most immediate responsibilities are to the people of Alaska, Alaskans are deeply conscious of their obligations as citizens of the United States. We share concern for the objective voiced by the Chairman in his letter to Secretary Morton: to assist in assuring an adequate national energy supply at the lowest possible cost consistent with meeting our environmental and national security needs.

We are also well aware that there is a national interest in providing for the conservation and sound management of the public domain in Alaska which is held for all the people of the United States; though it is not out of place to remind you that as to the vacant, unappropriated and unreserved public domain, this tenure is subject to the selection rights granted to the State of Alaska in the amount of approximately 103 million acres, a little less than a third of the land mass of Alaska, as a term of entry into the Union under the Alaska Statehood Act.

Through the device of review of an application for a right of way permit, largely over public domain subject to State selection, it now appears that the federal government intends to exercise a much larger role in the management of the State's petroleum resources than had been earlier realized. For the past year and a half, that role has loomed increasingly larger relative to the role of the State and of private industry. Elaborate and laborious procedures have been followed and an enormous amount of time has been consumed in the exercise of that federal role. The rise of a point of view which your letter to the Secretary can now make explicit, without apparent public sensation, appeared to require such a response from the federal executive branch. It is a current understanding of the National Environmental Policy Act, reflected in your letter and shared by many, that each agency of the federal government is obliged in the issuance of any permit relating to any action having a major impact on the human environment to balance well, as you put it, "the environmental, economic, national security and other social demands that are integral to maintaining the Nation's general welfare in this case."

The National Environmental Policy Act was a welcome command to federal agencies to give greater recognition to environmental goals. The goal of improved environmental consciousness is surely shared by all Americans.

However, if we continue to interpret the National Environmental Policy Act as requiring the federal administrator to exercise the same scope of inquiry and review into the grant or withholding of a permit as he would for an action initiated by the federal government itself, the net effect, whether good or bad for the national economy or the national environment, is a restructuring of American enterprise, public and private, based upon highly centralized planning and decision making.

The impact statement produced by the Department of Interior on the right of way application for a trans-Alaska pipeline represents an unparalleled effort of extraordinary thoroughness, scope and frankness, absorbing the energies of hundreds of people over months of valuable time.

When, as I believe the case to be, the Federal Government is totally incapable of performing with comparable excellence the same task in the thousands of other major Federal actions, the net effect of Federal review of this magnitude in the future will be stagnation of the American economy through federal inaction or delay.

At the time the leasing programs of the State of Alaska first evolved a decade ago, it was our assumption that much of the decision making involved in the development of Alaska's oil resources, particularly marketing decisions, would be left to the play of market forces subject only to such regulatory control as might be exercised by the State for the protection of the environment and the conservation of the resource and possibly by the United States to the extent of Interstate Commerce Commission jurisdiction over pipeline transportation.

Increased realization of the extent of our stake and the responsibility to unborn generations of Alaskans for the rational and safe development of our natural resources has given us good reason to take a new look at the management and control of Alaskan oil development and the distribution of costs and benefits.

In addition, since the demonstration of profound interest and willingness to intervene in the management of our resource development by national interest groups, we have had to assess our policies and programs in the light of the concern that the interests of the people of Alaska might be lost in the play of such interests.

To establish these new directions, we have just been through the longest session of the Legislature in the history of the young State of Alaska. The length of this session was largely determined by the weight of measures which I ask the Legislature to consider involving conservation, land planning, taxation, regulation and rights of way legislation relating to oil and gas development and transportation. The adoption of these measures affirms that Alaska will not again let her resources be developed without a fair return to her people. Nor will the State allow its political processes or economic life to be dominated by an absentee interest, an experience still fresh in memories from the dominance of industries controlled from outside Alaska during territorial administration.

While national publicity has focused on the right-of-way permit to be issued by the Secretary of Interior, we have by now made it clear that any pipeline built in or through Alaska for the transportation of Alaskan oil or gas is also going to have to meet the requirements and stipulations which may be imposed by law by the sovereign State of Alaska for the orderly development of these resources.

In saying so I reaffirm my conviction that pipelines should and must be built for the development of Alaska's northern resources and that the first step in that development should be the laying of an environmental safe crude oil pipeline from the vicinity of Prudhoe Bay, Alaska to Valdez.

Notwithstanding the charge of the National Environmental Policy Act that federal agencies consider the economic impacts on the State of Alaska, the government of the State of Alaska does have primary responsibility for both the economic welfare of its citizens and the development and conservation of its resources. I believe that the jurisdiction of the federal executive should be exercised under general law and principles of administration applicable to all the United States.

Attachment to the purity of the air, water and soil of Alaska is deeply felt by the great majority of Alaskans. This point I cannot emphasize too strongly. Most Alaskans I believe, would not have made the decision to move to the relatively harsh climate of the State or to stay there in the land of their birth unless they were in fact attracted by the unspoiled natural beauty of the State lost so long ago in so many parts of the lower 48. Alaska, by any measure, has far less environmental degradation than any other state of the union. We would only hope that if the national conscience has been turned on by the purity and beauty of our last frontier, the energies unleashed should be applied also to the much more serious environmental degradation prevalent in the lower 48 states.

For the problem with the environment of the United States is not the environment of Alaska. The job of cleaning up and of assuring sound environmental decisions in the future is a task for every state if it is to be a meaningful national goal. Alaska's citizens expect their national government to pursue these objectives not in Alaska alone but in all the states and on an even-handed basis. Singling out Alaskan resources alone as subject to federal allocation is not only unfair but unproductive. It does not face the real problem. Fairness—and achievement of the intended goal—would require for example that if we are to have stipulations on the range of markets for Alaskan oil, we should have stipulations applicable to all American oil.

The Congress has not given the executive branch the substantive standards it would need to have for the kind of centralized decision making which is being attempted through the National Environmental Policy Act. In the absence of laws of general application regulating the market economy, and executive expertise to administer them, perhaps a more restrained view of the responsibilities of the federal government is called for in the review of federal actions as they affect the economic aspects of the human environment.

The enormous problems of intersectional conflict in resource allocation decisions do not become overwhelming if the executive branch avoids presuming to the ultimate wisdom which it does not yet possess nor is equipped to exercise in this regard. The realities of federal capabilities suggest a more restrained interpretation of the National Environmental Policy Act. It seems to me that in an application for a pipeline right-of-way the government should confine its review mainly to the environmental effect of committing the land applied for

to the right-of-way and determine what can be done to minimize risks to the environment in that right of way and the land and water affected by movement of the oil to the refinery. Federal and state governments should also assure that the industry pays the cost of any environmental degradation, including hidden economic costs, and change from remote but still potential hazards.

The task of defining a whole world view of the human environment and rationalizing the role of one right-of-way application in it against a background of constantly changing circumstances, facts and figures is staggering. This is illustrated by the enormous effort which has been required by the preparation of the Interior Department's monumentally comprehensive impact statement on the Trans-Alaska pipeline.

We have pretty well crossed the hurdle with the American people, if not with the courts, that we should be allowed to develop our oil and gas resources. The main thrust of opposition to the Trans-Alaska Pipeline, including the minority faction that opposes any development, is now directed to the proposition that the Secretary should deny the application because it would be better for the United States if someone built the pipeline in Canada, ending up in the mid-western United States. In my opinion, the impact statement developed by the Secretary does not and could not sustain a decision to deny the application for a Trans-Alaska permit on that ground.

The factual basis necessary to sustain such a view does not exist. The development of the same detailed plan for a Trans-Canada route as has been invested in the Trans-Alaska route would constitute a shocking waste of resources in elaboration of the obvious. Because of the far greater length, including over twice the distance through soils affected by permafrost conditions, of various Trans-Canadian proposals, a proportionate investment would call for a far greater outlay in gross millions of dollars and expenditure of time in a fruitless effort. It is obvious from the Environmental Statement that a tremendous effort was made to explore fully the Canadian alternate. Yet a less intensive view of the Canadian alternative would have sufficed since a number of rather obvious overriding factors make the Alaskan choice a reasonable one and the Canadian choice unreasonable.

The Department's conclusion that a Canadian oil line is cost-comparative with the Trans-Alaska and ocean route is more than generous. A Canadian crude oil line is likely to cost in the magnitude of \$8 billion according to State estimates. This \$8 billion pipeline cost, rather than the \$5.4 billion figure used in the Impact Statement, will make the Canadian transportation alternative decidedly less efficient economically.

The cost of a natural gas pipeline along the Mackenzie River to Emerson, Manitoba, on the Manitoba border, was estimated at \$5 billion in a February 29, 1972, statement by the Northwest Project Study Group. The far greater distance over which a Canadian route crude oil pipeline must cross permafrost, swamp, and pond terrain means that much higher construction costs are inevitable because of the more expensive construction techniques necessary to protect the environment.

Relatively precise estimates of the cost of a Canadian crude oil line are difficult to make because of the uncertainty of the line's route. The line may continue to follow the proposed Northwest Project Study Group natural gas line along an entirely new corridor to Emerson, Manitoba—leaving another 845 miles to Chicago—or it may follow the route proposed by Gas Arctic System south from Prudhoe Bay to Fort McPherson and to a point north of Edmonton, Alberta, where the gas line would connect with existing lines. Then, either through new crude oil lines or major loops in existing lines, and probably using some new right of way, North Slope oil could be carried the remaining distance through Wisconsin to whatever midwestern markets are designated.

It should also be borne in mind that the assumption that an oil line and a gas line through Canada would closely parallel one another may not be technically valid. The oil line and the gas line will operate at different temperatures and soil conditions that might be acceptable to one might be totally unacceptable for the other, particularly through areas, 1,400 or 1,500 miles, affected by permafrost. Where a crude oil line may follow the same corridor as one of the proposed natural gas lines, this corridor may have to be quite wide to accommodate the different thermal and hydraulic properties of oil and gas and to provide for the safety of one in the event of accident to another. In addition, the different engineering requirements may not permit a single corridor but in some areas two routes widely separated. Conceding some saving from building two pipelines from a common service road, the advantage should not be exaggerated.

The conclusion that the Trans-Canadian route would bring gas quicker to mid-western markets is also a false one. The Alaska oil line is planned for completion in mid 1976. Although for purposes of conservation North Slope gas production might be delayed for a one to two year period, full gas production should be available by 1978 at which time a gas line is planned for completion. This would be the earliest time North Slope gas could be shipped to the midwest.

For North Slope reservoirs the same conservation considerations apply regardless of whether the oil pipeline crosses Alaska or Canada. On the issue of volume gas production to the midwest, the controlling factor remains the period of time before oil first flows in volume. Since the Alaska line is planned for earliest completion, that oil production will provide the first opportunity for North Slope gas to be shipped to the midwest.

The greater environmental risks of a Canadian route mean greater construction costs that the operation of the line must bear. We think that cost has been substantially underestimated. And the additional cost of delay has been well documented.

According to the Impact Statement, Alyeska estimated in December 1971 "by applying current working estimates for the Trans-Alaska pipeline to different distances and conditions to be encountered on a route across Canada" that an oil line from Prudhoe Bay to Chicago would cost \$5.4 billion. The State's first estimate offered for the Federal Impact Statement was that the Trans-Alaska line would cost between \$2.3 billion and \$2.5 billion. The State's current estimates are that the planned line will cost \$3.5 billion. In making a rough estimate of the current cost of a Canadian line to Chicago, the ratio of increase in cost on the Trans-Alaska route may be used to update Alyeska's estimate of \$5.4 billion as follows.

$$\begin{array}{r} \$3.5 \text{ billion} \\ \hline \$2.4 \text{ billion} \end{array} = 1.46$$

$$\$5.4 \text{ billion} \times 1.46 = \$7.9 \text{ billion}$$

Thus, with an appropriate payback cost for capital, the cost of a Canadian crude oil line would approximate \$8 billion.

A large number of variables and uncertainties exist as to a Canadian route for a crude oil pipeline so that differing assumptions may be made and different modes of analysis used in an effort to estimate the cost for such a line. A more detailed estimate worked out by the State using one given set of constraints is filed with the Committee in Exhibit C,<sup>1</sup> the State's comments on the Environmental Impact Statement. Under the assumptions made there, which we believe to be reasonable, the cost of an oil pipeline through the MacKenzie Valley is projected at approximately \$8.47 billion, compared with \$3.5 billion for the line to Valdez. Comparing the full length of each transportation route, this study shows that to transport North Slope oil to the nearest United States market via Canada would cost an average of 87.4 cents more for each barrel than to transport North Slope oil through a Trans-Alaska pipeline to the nearest United States market via Valdez. The price differential between West Coast and Midwestern markets is not likely to approach that amount. Consequently, a Canadian pipeline for North Slope oil would not be equally efficient economically. Here we are also assuming, without particular foundation, that Canada would not exact a substantial tariff, tax and right of way fee of its own.

Admittedly, any figures on the cost of building the Trans-Canadian line are highly speculative as are operating costs with the ever present risk that the Canadian government or its provinces may "want more". In addition to the significantly higher construction costs of a Canadian line, Alaska wellhead value could be further reduced by the level of through-put tariffs and taxes on capital plant that the Canadians might choose to impose.

Who should bear the risk of error in that speculation? Surely it is most logical to place that risk on those who much pay for the line and assure that its cost makes the oil competitive at the prevailing market prices at its destination. That risk is primarily a risk of the Alaskan people whose ability to share in the value of the production is limited by market price, less the cost of transportation.

There is just no question that the delay of construction involved in a Canadian route would deal a severe blow to State of Alaska revenues, both in postponing the time when these revenues would begin to flow into the State treasury and in

<sup>1</sup> A copy of exhibit C may be found in the committee room files.

drastically reducing them when they do begin. The Canadian government has made clear that it intends to preempt for Canadian use a portion of the oil line's capacity as a condition for crossing Canadian soil. If production from Canadian fields required 50 per cent of the line, then Alaskan production would be cut by 50 per cent. Since State revenues depend on the rate of production, such a cut would work a tremendous financial burden on the State. This would render the State incapable of providing the services which Alaskans have a right to expect from their government. Additional serious impacts can be expected nationally from the adverse effect on balance of payments arising from increased Canadian imports and increased dependence of the American energy economy on foreign controlled resources.

From the standpoint of economics, the pipeline owners had every reason to make the right decision in selecting the trans-Alaska route. This was borne out, as can be seen from the comparative figures I presented above, when the state studied the cost and economics of a Canadian route. While a great caution is required in examining the advantages of routes and route variations where risks to the natural environment are involved, there is every reason to believe the choice of the Trans-Alaska route as against the Trans-Canadian route is sound.

These economic questions are of vital importance to Alaska, primarily because the overwhelming economic impact as far as Alaska is concerned is the benefit to State and local government treasuries and to the treasuries of regional and village native corporations from the flow of oil revenues. Though your question number 8 to Secretary Morton refers to various short term dislocations, all of the factors to which you refer have compensatory short term benefits also. More important, in the long run, the construction of the Trans-Alaska pipeline will be overwhelmingly beneficial to the economic development of the State and the welfare of its people.

The first and greatest impact is in royalty and tax income to the State treasury, both short term, considering the revenue-expense squeeze in three or four years, and long term. The fact is that the sale of the leases in 1969 did produce moneys permitting the State to make a start on meeting some of the desperate housing and health needs of Alaskans. But the delay in North Slope production revenues is seriously undermining the State's on-going programs. Originally we anticipated that North Slope income would start in 1973. Now, the income projected from the oil revenue measures of this year's legislative session will produce annual revenues at that anticipated 1973 level beginning only in 1976, for use in fiscal 1977, as indicated in Exhibit A attached to my written testimony. This means that we have several very lean, difficult years ahead of us before we can resume the kind of progress needed to achieve decent housing and other urgent human environmental goals in Alaska.

If oil is not flowing on the tentative completion dates of 1976 or early 1977 but instead is delayed several more years, the State will find itself in a condition of economic distress and unable to provide a minimum level of services to Alaskans.

Exhibit B, attached to my written statement, points out continued delay in North Slope oil production beyond 1976 or 1977 would mean an actual cutback of vital State expenditures to a point where the general health, safety and welfare of Alaskan citizens would be seriously jeopardized. The postponement of oil receipts resulting from abandonment of the Alaska route in favor of a Canadian route would bring drastic financial consequences and drastic reductions in programs by 1980 unless we confine the State's operating budget to a zero growth rate. This actually would mean a real decrease in annual expenditures of from 2 to 5 per cent depending on the rate of inflation.

I will not dwell on this further except to point out that the exhibits submitted with my testimony show that North Slope revenues no later than 1976 or 1977 are essential to the viability of Alaska as a State.

In your question to Secretary Morton regarding the basis for the statement that the Alaska pipeline will be beneficial to the economic development of the State, you mentioned some of the possible temporary socio-economic dislocations which pipeline construction could produce.

There is no doubt in my mind that beyond the royalty and tax revenue from production, the construction and operation of the Trans-Alaska pipeline will be highly beneficial to the economy of the State. I think this is obvious in that so many governments and political leaders are so keen on having this industry locate in their particular region.

State planning can go a long way to even out any economic ups and downs of the pipeline construction period itself. We have implemented the first phase of the State economic plan by accelerating our capital bonding program in order to provide the necessary highway, airport, health, educational, and other public service facilities which are now necessary and will become even more essential with the anticipated increased economic activity and population influx attendant upon construction of the North Slope pipeline.

In going forward now with these capital programs, which were authorized by voter approval of \$146 million in bonds in 1970, we are also to some extent cushioning the adverse impact of the long delay the State has experienced in the actual construction activity of the North Slope pipeline.

Airport and highway and other capital projects are being constructed to the degree financially feasible to provide vitally needed facilities for the far reaches of the State.

As a coordinate feature of our economic plan the State will be watching for inflationary signs during the pipeline construction phase so that we may adjust the pace of public capital expenditures during those years as necessary to help deal with any temporary ups and downs in the economic and employment picture.

One very mystifying conjecture is that the trans-Alaska pipeline project will somehow increase unemployment. To the contrary, the pipeline project will create jobs which people who are out of work will then have the chance to obtain. While all the people seeking jobs may not be able to obtain them, including some who may journey to Alaska seeking work, the pipeline will in no way contribute to the nation's unemployment problem. The simple fact is that when pipeline construction begins, there will exist jobs which did not exist before. It is absurd to say this will somehow increase unemployment.

And there can be no doubt that economic activity even after completion of the pipeline will be higher than it now is. Nationally, both employment and the general level of economic activity will have been enhanced by the trans-Alaska pipeline and Americans will be the primary beneficiaries of the payroll expenditures over the years of construction involved.

During the long period of delay in actual commencement of the pipeline, one favorable aspect of the economic development has been the expansion of retail business capacity and housing facilities in both the Anchorage and Fairbanks areas which will be most heavily impacted during pipeline construction. Anchorage now has excess retail capacity as well as hotel and housing capacity. This has come about in large measure through the continuing economic growth of the State which has occurred apart from the North Slope discovery. Some of the growth, however, was in anticipation of an earlier start to pipeline construction than has in fact occurred. The State has had a "breathing spell" which, although it has produced serious financial losses for some local businessmen, has had the beneficial effect of giving us, in advance, needed capacity to handle the increase in economic activity which pipeline construction will bring. The State has expanded its ability to provide the social services necessary during pipeline construction and, among other initiatives, my Administration has made a start on satisfying the desperate need for low income housing with direct lending of North Slope lease sale money for housing development.

On a more long range basis, State economic planning is now directing itself to the question of securing stable employment opportunities of non-seasonal nature for all Alaskans. If we are not thwarted in our efforts to budget wisely and responsibly during the next several years when all projected revenues are needed for on-going programs, and if we are able to realize adequate revenues in the future beyond this trying period, we will then be able to invest oil revenues to develop commerce in the renewable resource areas which have historically been the backbone of the Alaska economy.

Only with North Slope revenues in the 1976-1977 time frame, however, can we be talking seriously about further economic growth consistent with environmental quality in our State.

The employment of a Canadian alternative for oil transportation from the North Slope would intensify the factors of higher cost and delay in production to a point where major cutbacks in State and municipal services provided to our citizens would be inevitable. Not only would such things as increased action to combat environmental pollution in general become impossible, but more basic

needs such as sewers could not be provided in rural areas now looking forward to them.

You have noted that the Economic and Security Analysis finds that constructing the Trans-Alaska pipeline will not, in a major way, reduce the existing barriers to native employment. The author states that "this finding flows from the disadvantages that the Natives currently have in competing for employment, their isolation from centers of employment and the existence of a large job pool from immigrants."

The impact of the Trans-Alaska pipeline on the Native people should not be treated out of the context of the Alaska Native Claims Settlement Act. Delay of the pipeline development will mean delay in payment of the cash compensation under the Act, depression of the rate of increase in rural living standards, delay in any development of Native land resources, and delay in the development of a rural economic base.

Also, short-range pipeline construction employment could merge into employment in long-range Native development programs. The regional corporations are actively planning development programs which do not depend on pipeline construction as well as assuring that the Alyeska Pipeline Service Company provides training programs to equip them for pipeline employment.

Programs have already been established for training natives in oil industry jobs. Pipeline storage conditioning work on hundreds of miles of pipe already delivered was conducted under contract with a firm owned by and employing Alaskan Natives.

I should emphasize, however, that the funding of the Native Claims Settlement Act will provide the means for rural Alaska to emerge into a self-sustaining economy, not the jobs which will be provided by the construction of the line itself. The Settlement Act provides that over one-half of the monetary settlement will come from the royalties, rentals and bonuses Alaska will receive for its oil. A long delay in the flow of North Slope oil will mean a long delay in giving rural Alaska the economic means of breaking the poverty cycle which has too long been part of rural Alaska life.

In Valdez and Prince William Sound, there is no doubt that a permanent, year round increase in employment and economic activity will result from servicing of the line and port and terminal facilities.

Mr. Chairman and committee members, I am convinced the trans-Alaska pipeline route is the superior one from the standpoint of environmental protection, national security and national economic considerations. The state of Alaska is not asking for any concessions, or any slighting of these important concerns, in urging that the trans-Alaska pipeline project be given a final go-ahead as soon as possible. The state is only asking that the best route, the trans-Alaska route, be allowed to proceed so that the state may carry out the orderly development of its rich petroleum resources which were recognized from the start as being the vital financial foundation for Alaska statehood.

In brief summary, the conclusive factors are the following ones:

1. The trans-Alaska pipeline route is the most logical, the most economical, and the safest route.

2. The state of Alaska urgently needs the maximum revenues from its North Slope petroleum, which can only be realized from the trans-Alaska route.

(Substantial additional support for these two assertions is provided in the State of Alaska's *Comments on the Trans-Alaska Pipeline and its Alternatives*, Exhibit C accompanying my written testimony.)<sup>2</sup>

3. The nation urgently needs Alaskan oil and gas to meet its energy requirements, and only the trans-Alaska route can deliver North Slope oil to the nation without the certain prospect of further and unneeded delay and the uncomfortable weight of foreign control, no matter how friendly, over this major interstate conveyance.

Gentlemen, to deprive Alaska of this keystone facility in the development of its petroleum resources would be a disaster of the first order for the human environment of the Alaskan people. I ask that you, in your wisdom, weigh carefully in your deliberations the justified needs of Alaska's citizens and our aspirations as a state.

Thank you.

<sup>2</sup> A copy of exhibit C may be found in the committee room files.

## EXHIBIT A

## NORTH SLOPE REVENUE ESTIMATES OIL ROYALTY AND PRODUCTION TAX (ESTIMATED)

Fiscal year:	Barrel throughput per day (1,000)	Reference price per barrel	Total in millions (including Native share)	5 cent Native share (millions)
1977.....	600	2.65	109.82	10.95
1978.....	900	2.65	164.72	16.43
1979.....	1,350	2.65	247.09	24.64
1980.....	1,500	2.65	274.54	27.375
1981.....	1,500	2.50	259.00	27.375
1982.....	1,500	2.50	259.00	27.375

Note: From royalty and production tax only. Does not include gas, income tax, or property tax.

## EXHIBIT B

## STATE OF ALASKA CASH FLOW ANALYSIS, GENERAL FUND RECEIPTS AND EXPENDITURE

[In millions]

Fiscal year	Non- invest- ment revenue	Invest- ment revenue	Total revenue	Total expenses	Surplus or deficit	General fund end of Year
North Slope production beginning fiscal year 1990; State operating program expenditures \$278,890,300 fiscal year 1973 and increasing 0 percent each year thereafter (2-4 percent annual decrease in real terms); other State expenditures at program level:						
1971.....						836,536
1972.....	148,976	70,042	219,018	294,276	-75,257	765,387
1973.....	158,880	51,775	210,655	316,113	-105,456	659,927
1974.....	165,235	45,366	210,610	320,946	-110,345	549,579
1975.....	171,844	43,765	215,609	326,248	-110,638	438,938
1976.....	178,717	31,529	210,246	329,147	-118,900	320,035
1977.....	183,672	22,941	206,613	332,960	-126,347	193,686
1978.....	189,115	7,351	196,466	338,799	-142,332	51,354
1979.....	196,106	-1,351	194,754	342,520	-147,765	-96,411
1980.....	317,700	-7,227	310,471	358,589	-48,117	-144,529
1981.....	386,520	-8,293	378,227	365,629	12,597	-131,932
1982.....	481,749	-5,007	476,741	379,827	96,913	-35,019
North Slope production beginning fiscal year 1980; State operating program expenditures \$278,890,300 beginning fiscal year 1973 and increasing 5 percent each year thereafter (1-3 percent annual increase in real terms); other State expenditures at program level:						
1971.....						836,536
1972.....	148,976	70,042	219,018	294,276	-75,257	765,387
1973.....	158,880	51,775	210,655	316,113	-105,456	659,927
1974.....	165,235	44,965	210,200	334,890	-124,689	535,234
1975.....	171,844	42,059	213,903	354,833	-140,929	394,302
1976.....	178,717	27,512	206,230	373,106	-166,875	227,423
1977.....	183,672	14,043	197,715	393,061	-195,345	32,077
1978.....	189,115	-5,027	184,087	415,849	-231,761	-199,684
1979.....	196,106	-19,812	176,293	437,366	-261,073	-460,758
1980.....	317,700	-33,275	284,423	472,122	-187,698	-648,457
1981.....	386,520	-43,582	342,937	498,783	-155,845	-804,303
1982.....	481,749	-51,353	430,395	533,583	-103,187	-907,492

Chairman PROXMIER. Senator Hansen, go right ahead.

STATEMENT OF HON. CLIFF HANSEN, A U.S. SENATOR FROM THE  
STATE OF WYOMING

Senator HANSEN. Mr. Chairman and members of the Joint Economic Committee, it is no longer news to talk of a national energy crisis. The fact of the crisis is upon us, and it is a well recognized fact. Many efforts are being made by many different organizations to study the crisis.

The need for a careful and balanced approach for all proposed solutions contributing to the abatement of the energy crisis is well-founded. The future of American citizens is at stake.

To approach the subject of finding rational solutions to the energy crisis in the style of a political "dog and pony show" makes a mockery of the seriousness of the national energy situation.

In view of the need to place public responsibility in finding solutions to the energy crisis before political grandstanding it is difficult for me to understand the rationale that prompted the Joint Economic Committee to hold hearings on the trans-Alaska pipeline system without inviting a balanced cross section of expert views on the subject. Of the witnesses previously testifying whose testimony concerned the trans-Alaska pipeline, other than FPC Chairman Nassikas, all stated opposition to the trans-Alaska pipeline. This seems to have been no accident. Much of the testimony you have heard today is likely to compensate somewhat for the lack of balanced expert testimony on June 8th and 9th, but it seems to me the Joint Economic Committee should have made a far greater effort to avail itself of the expertise earlier.

Briefly, I would like to comment on qualifications of, and the validity of the testimony of David Freeman, David Anderson, Charles Cicchetti, and Richard Nehring, all of whom were invited to make statements opposing the trans-Alaska route and all of whom favored a trans-Canada route for moving oil from Alaska's North Slope to markets in the continental United States.

The four witnesses do have several notable characteristics in common. They are not geologists. They are not arctic engineers. They are not oil economists. Nor are they trained environmentalists. They are, in fact, laymen who at the very most have had limited exposure to one of the most complex problems ever undertaken by private industry and government.

Mr. Freeman, of course, was head of the energy policy staff of the Office of Science and Technology during the former administration and during the first months of the Nixon Administration. He has stated frequently that he opposes the trans-Alaska pipeline system. How objective can he be expected to be in any appraisal of a system he has publicly opposed from the outset? I have previously wondered aloud if the Ford Foundation Energy Study, under the direction of Mr. Freeman, will indeed be an objective study rather than an echo of his personal views. On the same day he last testified before this Committee he assured me that the Ford Foundation Energy Study would be objective and not a reflection of his biases. His testimony before your Committee on June 8 leaves me still needing reassurance as to the Ford study.

Before moving on to Mr. Anderson, I would like to read rule number VII, paragraph 5 of the Standing Rules of the Senate. It reads:

"Every petition or memorial shall be signed by the petitioner or memorialist and have indorsed thereon a brief statement of its contents, and shall be presented and referred without debate. But no petition or memorial or other paper signed by citizens or subjects of a foreign power shall be received, unless the same be transmitted to the Senate by the President."

The purpose of that rule is to prevent the Congress from becoming a shopping center for assistance to foreign nations without prior transmittals of such requests by the President. The record should reflect that the President did not transmit Mr. Anderson's views to the Congress. The fact that the Joint Economic Committee has no legislative jurisdiction should not exempt it from the spirit of the rule.

Mr. Anderson, who is a member of the Canadian Parliament from British Columbia, never seems to have difficulty finding an American audience when he comes down to oppose the trans-Alaska pipeline, even though he speaks only for himself and most decidedly not for the Canadian government. He continues to oppose the presence of tankers off the Canadian West Coast but fails to mention that more than half of Canada's crude oil supply is from overseas imports—more than 700,000 barrels daily—coming in to Portland, Maine, by tanker and from there to Montreal by pipeline. Also that tankers from Alaska's Cook inlet have been using the West Coast route for several years is not mentioned.

The benefit of his testimony to the Committee seems questionable at the very least, inasmuch as he could hardly be considered an objective spokesman for the U.S. national interest.

Mr. Cicchetti, of Resources for the Future, has developed quite a complicated case for moving two million barrels of oil a day across Canada and into the Midwest. The assumptions from which he begins his analysis are not of clear origin. For example, in view of restrictions on production in Venezuela and Kuwait, nationalization in Iraq and Libya and recent steps toward nationalization in Ecuador, it is not clear to me why he believes that the U.S. can be assured or should seek assurances, of importing all the oil it needs, and that foreign crude oil prices can be expected to remain below prices of domestic crude for very long. In the face of all that is going on in the OPEC countries, how can he or anyone else seriously assume that oil prices will not increase in the future?

His testimony before this Committee would have been far more meaningful, it seems to me, if he had been asked some of these questions.

Before his appearance at your hearings, Richard Nehring announced that he had resigned his job with the Department of the Interior because he disagreed with Secretary Morton's decision on the trans-Alaska pipeline. From the very outset, his bias was evident. Let's take a look at Mr. Nehring's qualifications. His job at Interior was his first full time job with the Government. Prior to that time he was a student in Political Science. He has not yet earned a Ph. D. in Political Science, let alone economics. This twenty-eight year old dissident was never previously exposed to energy programs before his eight and a half month stint at Interior. Yet Nehring concluded that the trans-Alaska pipeline was not needed because he was certain that the Gulf of Alaska could furnish west coast markets with ten billion barrels of oil. The most experienced and knowledgeable petroleum geologists in the Interior Department's Geological Survey were unable to conclude that Gulf of Alaska oil consisted of sufficient reserves to accommodate, on an adequate and timely basis, the west coast demands.

In my comments on the testimony given before you by these four witnesses, I do not mean to imply that you should not have heard them.

That is your prerogative, but on the other hand it seems to me that you have an obligation to be as objective as possible by balancing their opinions with testimony from recognized experts in the field.

Certainly Secretary Morton relied upon experts for advice before making his decision. The Senate Interior Committee, of which I am a member, is listening to experts of more than one persuasion for testimony received as part of the Senate's National Fuels and Energy Study.

Should Secretary Morton have chosen not to proceed with the TAPS alternative, his decision would have been even more vigorously attacked, probably not only by this Committee, but by others in both houses of Congress. Although I favor going ahead with the Trans-Alaska pipeline, my personal opinions are unimportant. What is important is that the Congress and the government should hear all sides of the issue presented by the most qualified experts we have.

I am confident that Secretary Morton has carefully evaluated all the arguments for and against the Trans-Alaska Pipeline. The time now is for action—not further debate and delays. The national interest demands no less.

Mr. Chairman, if I may, let me observe that I omitted certain portions.

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

Senator HANSEN. Thank you very much, Mr. Chairman.  
(The prepared statement of Senator Hansen follows:)

#### PREPARED STATEMENT OF HON. CLIFF HANSEN

Mr. Chairman and members of the Joint Economic Committee, it is no longer news to talk of a national energy crisis. The fact of the crisis is upon us, and it is a well recognized fact. Many efforts are being made by many different organizations to study the crisis.

I am sure that all of you are well aware that the Senate's National Fuels and Energy Study itself is well beyond the half-way point. Many agencies within the executive branch have been conducting energy studies. The National Petroleum Council is concluding a monumental three-year study involving the participation of over 1,000 experts.

These extensive studies are being conducted in an attempt to find solutions to the energy crisis; to come up with a rational analysis which will culminate in well-reasoned, sensible solutions. The need for a careful and balanced approach to the evaluation of all proposed solutions contributing to an abatement of the energy crisis is self-evident. The future well-being of American citizens is at stake. To approach the subject of finding rational solutions to the energy crisis in the style of a political "dog and pony show" makes a mockery of the seriousness of the national energy situation.

In view of the need to place public responsibility in finding solutions to the energy crisis before political grandstanding it is difficult for me to understand the rationale that prompted the Joint Economic Committee to hold hearings on the trans-Alaska pipeline system without inviting a balanced cross-section of expert views on the subject. Of the witnesses previously testifying whose testimony concerned the trans-Alaska pipeline, other than FPC Chairman Nassikas, all stated opposition to the trans-Alaska pipeline. This seems to have been no accident. Much of the testimony you have heard today is likely to compensate somewhat for the lack of balanced expert testimony on June 8th and 9th, but it seems to me the Joint Economic Committee should have made a far greater effort to avail itself of the expertise earlier.

Briefly, I would like to comment on qualifications of, and the validity of the testimony of David Freeman, David Anderson, Charles Cicchetti and Richard Nehring, all of whom were invited to make statements opposing the Trans-Alaska route and all of whom favored a trans-Canada route for moving oil from Alaska's North Slope to markets in the continental United States.

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By way of example, Mr. Freeman suggested five means of compensating for the shortage of Alaskan oil pending completion of a trans-Canadian pipeline. He said to use Canadian oil. We are already doing that.

He said increase domestic production by improved secondary and tertiary recovery. The petroleum industry, as a matter of economics, has only been able to improve its recovery rate by a half a percentage point a year. There seems to be no technological breakthroughs in sight.

He said use standby reserves for emergencies. With domestic production at nearly one hundred percent of capacity, where do the reserves come from?

He said use additional imports. The OPEC countries are in the process of nationalizing U.S. industry assets. We are becoming increasingly dependent on OPEC countries for their oil. In the face of current expropriations by OPEC countries, are we to tell them that it is our national policy to become more dependent upon them?

Mr. Freeman said conserve energy and thereby reduce demand. The experts agree that the opportunities for reducing demand are limited. Thus how can energy be conserved if demand cannot be effectively reduced?

Before moving on to Mr. Anderson, I would like to read rule number VII, paragraph 5 of the Standing Rules of the Senate. It reads:

Every petition or memorial shall be signed by the petitioner or memorialist and have endorsed thereon a brief statement of its contents, and shall be presented and referred without debate. But no petition or memorial or other paper signed by citizens or subjects of a foreign power shall be received, unless the same be transmitted to the Senate by the President.

The purpose of that rule is to prevent the Congress from becoming a shopping center for assistance to foreign nations without prior transmittals of such requests by the President. The record should reflect that the President did not transmit Mr. Anderson's views to the Congress. The fact that the Joint Economic Committee has no legislative jurisdiction should not exempt it from the spirit of the rule.

Mr. Anderson, who is a member of the Canadian Parliament from British Columbia, never seems to have difficulty finding an American audience when he comes down to oppose the trans-Alaska pipeline, even though he speaks only for himself and most decidedly not for the Canadian government. He continues to oppose the presence of tankers off the Canadian West Coast but fails to mention that more than half of Canada's crude oil supply is from overseas imports—more than 700,000 barrels daily—coming in to Portland, Maine, by tanker and from there to Montreal by pipeline. Also that tankers from Alaska's Cook inlet have been using the West Coast route for several years is not mentioned. He also is noticeably quiet about the fact that the Canadian government recently granted permits for oil exploration activities in 2.7 million acres of coastal waters off British Columbia, in Hecate Strait and Queen Charlotte Sound. I think it would have been interesting for the Committee to know if any attempt has been made to assess the environmental and economic impact on Mr. Anderson's province if commercial oil and natural gas reserves are discovered in these offshore areas.

It is my understanding that this Committee made an effort to get testimony from someone in the Canadian government, but that effort was not successful. Given that, it still seems somewhat odd for Mr. Anderson to have been given a forum to expound on either his personal views or the official views of Canada

without prior transmittal of such views by the President. The benefit of his testimony to the Committee seems questionable at the very least, inasmuch as he could hardly be considered an objective spokesman for the U.S. national interest.

Mr. Cicchetti, of Resources For the Future, has developed quite a complicated case for moving two million barrels of oil a day across Canada and into the Midwest. The assumptions from which he begins his analysis are not of clear origin. For example, as I earlier suggested with respect to Mr. Freeman's views in view of restrictions on production in Venezuela and Kuwait, nationalization in Iraq and Libya and recent steps toward nationalization in Ecuador, it is not clear to me why he believes that the U.S. can be assured or should seek assurances, of importing all the oil it needs; and that foreign crude oil prices can be expected to remain below prices of domestic crude for very long. In the face of all that is going on in the OPEC countries, how can he or anyone else seriously assume that oil prices will not increase in the future?

I do not know how Mr. Cicchetti supports his contention that developments of nuclear power, shale oil, tar sands, etc., will reduce the value of crude oil. I would be interested in his reasoning. Rather it seems to me the exact opposite is true: Those developments will not occur unless the value of crude oil increases sufficiently to cause developers to take up the alternatives.

His testimony before this Committee would have been far more meaningful, it seems to me, if he had been asked some of these questions.

Before his appearance at your hearings, Richard Nehring announced that he had resigned his job with the Department of the Interior because he disagreed with Secretary Morton's decision on the trans-Alaska pipeline. From the very outset, his bias was evident. Let's take a look at Mr. Nehring's qualifications. His job at Interior was his first full time job with the Government. Prior to that time he was a student in Political Science. He has not yet earned a Ph. D. in Political Science, let alone Economics. This twenty-eight year old dissident was never previously exposed to energy problems before his eight and a half month stint in Interior. Yet Nehring concluded that the trans-Alaska pipeline was not needed because he was certain that the Gulf of Alaska could furnish west coast markets with ten billion barrels of oil. The most experienced and knowledgeable petroleum geologists in the Interior Department's Geological Survey were unable to conclude that Gulf of Alaska oil consisted of sufficient reserves to accommodate, on an adequate and timely basis, the west coast demands.

In my comments on the testimony given before you by these four witnesses, I do not mean to imply that you should not have heard them. That is your prerogative, but on the other hand it seems to me you have an obligation to be as objective as possible by balancing their opinions with testimony from recognized experts in the field.

Certainly Secretary Morton relied upon experts for advice before making his decision. The Senate Interior Committee, of which I am a member, is listening to experts of more than one persuasion for testimony received as part of the Senate's National Fuels and Energy Study. Certainly I hope the Joint Economic Committee is availing itself of this diversity of expertise, too. Only then will we be able to come up with studies that will lead us to sensible solutions to a crisis that affects all of us.

To couch the TAPS decision as an "either-or" is to forget the facts. Alaska or Canada, one or the other, is not a fair appraisal of the situation. Last week Gas Arctic Systems and Northwest Project Study Group announced a merger. This newly merged group of Canadian and American petroleum companies plans to file early next year applications with Canadian and U.S. energy agencies to build a gas pipeline from Prudhoe Bay in Alaska through the Mackenzie Delta region of Canada into the U.S. Many experts have suggested that it will be only a matter of time before an oil pipeline is constructed from Canada to the Northern Midwestern U.S.

Should Secretary Morton have chosen not to proceed with the TAPS alternative, his decision would have been even more vigorously attacked, probably not only by this Committee, but by others in both houses of Congress. Although I favor going ahead with the Trans-Alaska Pipeline, my personal opinions are unimportant. What is important is that the Congress and the government should hear all sides of the issue presented by the most qualified experts we have.

I am confident that Secretary Morton has carefully evaluated all the arguments for and against the Trans-Alaska Pipeline. The time now is for action—no further debate and delays. The national interest demands no less.

Chairman PROXMIRE. Senator Stevens, please proceed.

**STATEMENT OF HON. TED STEVENS, A U.S. SENATOR FROM THE STATE OF ALASKA**

Senator STEVENS. Mr. Chairman, I am appreciative of the opportunity to appear before your Committee. However, I am deeply disturbed by this Committee's apparent one-sided examination of this most complex issue.

I would expect, in order to conduct a thorough analysis of the issues involved with the trans-Alaska pipeline, that the Committee would first have heard from witnesses favoring the construction of pipeline, and then from pipeline opponents.

Instead, the Committee has chosen to hear first from a string of opponents, many of whom have personal or regional reasons for their opposition. To date, the only proponent to speak, to my knowledge, has been my colleague, Senator Gravel, and even then, he spoke earlier than the time scheduled for him due to difficulties in his personal schedule.

In addition, this Committee has not scheduled time for the appearance of witnesses whose interests would be deeply affected by the choice of an alternate route for the oil pipeline. Mr. Don Wright, President of the Alaska Federation of Natives, could have eloquently explained the drastic effects that the trans-Canada oil pipeline would have on his people.

As the Committee will remember, last year the U.S. Congress finally passed the landmark Alaska Native Claims Settlement Act. One of the Act's provisions is that \$500 million of the settlement funds will be paid to our Alaskan Natives from a 2% overriding royalty on mineral production.

In my prepared statement I have explained that a Canadian oil pipeline would not only be delayed nearly five years longer than a trans-Alaska pipeline, but that when constructed it would most likely also be filled with oil from the Canadian Arctic. Such a development would mean a reduced level of oil production on Alaska's North Slope and thus a delay in the infusion of revenue to our Native population. Had Mr. Wright been allowed to testify before the Committee, he could have portrayed the difficulties that would thus be imposed on our Alaskan Native people in our efforts to improve their future.

Now, let me first of all discuss the need for oil on the West Coast as has been discussed in the past as compared with the needs of the rest of the Nation. I believe that an objective view of this problem reveals that the real need for the oil from the North Slope of Alaska is on the West Coast, the area to which the trans-Alaska pipeline would be delivering its oil.

It must be pointed out that the portion of the United States east of the Rockies, known as Districts I through IV, has had a well integrated petroleum production, refining, and supply network which provides substantial flexibility in arranging and rearranging inter-district transfers, when shifting supply problems or demand problems arise.

On the other hand, a similar flexibility in petroleum supply simply does not exist as respects the West Coast known as District V. The western oil region is essentially isolated from the Eastern region by its geography and historical self-sufficiency. The lack of interconnecting supply lines with the rest of the nation is vital, considering the growing dependence of the West Coast upon foreign oil imports.

At the same time that District V demand for oil is expected to increase dramatically in the next 15 years, production of crude oil in District V is rapidly falling off. The only solution to such a trend is increased imports. The area's dependence on overseas imports will thus continue to grow from 32% of its demand in 1975 to 61% of its demand in 1985.

The comparable dependency of Districts I to IV for the same years will increase only from 8% to 37%. However, with the oil from the North Slope, the West Coast dependency in 1985 would fall from 61% to 3%. Should Alaskan oil be shipped to the midwest, however, the foreign oil dependency of Districts I through IV would fall only from 37% to 26%.

Thus, it is clear that the trans-Alaska oil pipeline would deliver domestic oil to an area of the nation which is now the most heavily dependent upon insecure foreign imports and would reduce this dependency to a trifle. The oil pipeline to the Midwest, however, would have only a small effect in reducing the dependency of the rest of the nation.

Because a hot, oil pipeline, the Canadian oil pipeline, would be 700 miles longer and would necessitate a more careful construction technique than the proposed cold, gas pipeline across the Canadian country, I believe it is reasonable to expect that a trans-Canada oil pipeline would exceed \$6 billion in costs. In addition—and the Governor has projected more than \$8 billion in his analysis—in addition, there would be about \$300 million in trans-Alaska costs of planning, design, and right-of-way acquisitions that would be lost should a trans-Canada route be chosen.

More important, would be substantial benefits in employment and investment opportunities created by the trans-Alaska route that will be totally lost in a trans-Canada route. Twenty-two thousand jobs will be created in Alaska in connection with pipeline construction and a gross payroll of \$800 million per year will be generated. Expenditures for materials, supplies and transportation will total \$1.5 billion, a major jortion of which will be distributed throughout the lower 48 states.

In addition, 33 new tankers must be built for oil transport which will cost \$1 billion. This will generate 73,480 man years of shipyard employment and 770 man years of annual fleet inspection.

In short, the trans-Alaska pipeline will not only cost 50-percent less than the trans-Canada pipeline, but will also have a direct, beneficial effect upon American employment and our maritime industry.

Mr. Chairman, one of the things I think that you should also take into account—and a most important development which would likely delay any proposed trans-Canada oil pipeline—is the land claims of the Canadian Native population. In recent years the northern Natives of Canada have organized to press for settlement of their treaty and aboriginal rights, much as the Alaskan Natives did in the recent past.

In 1968, Canada's Indian population numbered over 237,000. Although most of this number have assimilated into Canadian life and live in the more urban provinces, many groups still have outstanding land claims with the Federal Government. In 1899 and 1921 Treaties 8 and 11 were negotiated with the Indians in the Mackenzie District of the Northwest Territories.

These treaties granted the Indians one square mile of land for each family of five. However, the obligations were never fulfilled. A large part of the 8,000 or so Indian population in the Northwest Territories is covered by these two treaties.

In 1959 a Royal Commission was appointed by the Federal Government which recommended an alternative to granting the land in the form of the payment of \$25 million, plus the annual payment of one half of 1 percent of any revenues received by the Crown for mineral, gas, and oil reserves in the area of the treaties. These recommendations also were never implemented.

Other Indians are expected to seek settlements on the basis of aboriginal rights, the foundation for the claims of Alaska's Natives.

The position of the Canadian Government toward the various treaty and aboriginal claims of Canada's Indians has not so far been a favorable one. Prime Minister Trudeau has indicated that although his government will honor its original treaty obligation, it does not recognize the validity of the aboriginal claims of the other Natives.

However, the activities of the three Indian groups indicate they will not accept the present offers of their government, but will press for a settlement to include compensation for their aboriginal claims. Their declared aim at this time is, "No settlement, no pipeline," referring to the proposed oil and gas pipelines down the Mackenzie Valley. The groups plans to go to court to halt construction of any such pipelines if they begin before they receive the kind of settlement that they are seeking, to both their treaty and aboriginal claims. Thus, obstructing lawsuits are planned to block any such projects, much as the lawsuit filed in April, 1970 by five Alaskan Native villages resulted in an injunction barring the Secretary of the Interior from issuing a pipeline permit.

It can be expected that the legal battles involved with any such litigation could reach to the Canadian Supreme Court. The generous settlement gained by the Alaskan Natives of 40 million acres of land and \$1 billion for their aboriginal Native claims should prove important as a legal, as well as a political, precedent for Canadian Natives. Therefore, it does seem plain that Canada's Natives should be able to delay significantly the construction of any pipeline through Canada, be it for oil or natural gas.

Finally, I believe that a fair examination of the current trends in Canadian political and public opinion spheres reveals that an application for a right-of-way permit for a trans-Canada oil pipeline would receive as thorough and detailed an environmental consideration as similar applications have in the United States. Several new laws have been enacted in Canada in the last 2 years, both on the federal and the provincial level to control environmental pollution. In light of this new ecological interest, it seems obvious that a 3,200 mile hot oil pipeline, crossing 275 streams and rivers, 2,100 miles of cross drainage, and 1,150 miles of continuous and discontinuous permafrost would be given the most careful and detailed analysis and consideration before approval is given and construction allowed. Indeed, it is unrealistic and even presumptuous for Americans to assume that rapid consideration and approval would be given to any proposed trans-Canada oil pipeline.

It took us 3 years and \$12 million to examine 789 miles. I wonder if the chairman would realize how long it would take to consider 3,200 miles of pipeline that would cross similar terrain.

In conclusion, I reiterate that construction of a trans-Alaska oil pipeline should begin as soon as possible for many reasons. In addition to delivering oil to the area of the country that is most dependent upon insecure, foreign oil, the trans-Alaska oil pipeline will be able to do so at the lowest cost and in the shortest period of time. It also offers important economic benefits in opportunities for employment and investment.

Thank you.

(The prepared statement of Senator Stevens follows:)

PREPARED STATEMENT OF HON. TED STEVENS

Mr. Chairman, I do appreciate this opportunity to appear before the Joint Economic Committee to discuss some of the issues related to the proposed trans-Alaska pipeline. This is a subject of vital importance both to my State of Alaska and to the nation as a whole.

A great deal has been said before this Committee and elsewhere about the shortage of low cost and available energy resources which faces our country today. Because so many knowledgeable experts have discussed this problem, I believe no further words are necessary. However, this extensive discussion has made one point clear beyond a doubt: the real question facing the top decision makers of our country is not whether or not to permit the construction of an oil pipeline from Alaska's North Slope, but rather what route such a pipeline should follow.

I have consistently been a strong supporter of a trans-Alaska pipeline. I believe that there are many sound reasons, both economic, environmental, and in terms of national security, why the construction of a trans-Alaska pipeline must be commenced as soon as possible.

Today I wish to concentrate on some of the various economic issues which have been the focus for discussion in recent months on the trans-Alaska pipeline. I realize that the Committee has also been examining this subject recently, and I hope that some of my remarks will bring to light certain issues which apparently have not come to the Committee's attention.

I have been informed that the Committee has received information in the form of testimony from other witnesses regarding the need for oil on the West Coast as compared with the need in the rest of the nation. I believe that an objective view of this problem reveals that the real need for the oil from the North Slope of Alaska is on the West Coast, the area to which a trans-Alaska pipeline would be delivering its oil.

It must be pointed out that the portion of the United States east of the Rockies (Districts I-IV) has always had a well integrated petroleum production, refining and supply network, which provides substantial flexibility in arranging inter-district transfers, when shifting supply problems, or demand problems, arise.

The East Coast utilizes a high percentage of foreign crude coming from diverse sources, including the Middle East, Africa and Venezuela. However, District I is not critically dependent upon any particular foreign source or upon all foreign sources. The cessation of production from any given foreign source might be remedied by increasing purchase from a different foreign source or, as indicated by the Department's Analysis of Economic and Security Aspects, by increased transfers from District III. In an emergency, tankers bringing foreign crude to East Coast ports could be shifted to the transportation of crude from other sources into District I. There is an inherent flexibility which, for security objectives, requires consideration of Districts I through IV as a composite supply area, as they usually are for national petroleum planning purposes.

A similar flexibility in petroleum supply does not exist as respects District V. The western oily region is essentially isolated from the eastern region by its geography and by its historical self-sufficiency. Restrictions upon tanker size imposed by the Panama Canal place limitations upon waterborne transfers. If there were an interference with far eastern sources of supply, tankers which now bring foreign crude into California and Washington could only with great diffi-

culty be shifted to the transfer of crude from Venezuela or from District III to District V.

In the past the isolation of the West Coast from the rest of the nation's oil network has been a distinct problem. In 1944, when the war in the Pacific was accelerated, domestic production in District V was increased to record levels and refinery runs broke all previous records. Yet it was necessary for oil to be shipped by railroad tank car in large quantities from District II and III to District V. The Petroleum Administration for War reported that moving the required quantity of oil across the Rockies was "more difficult than moving 5 times as much over a distance in the east coast service."<sup>1</sup>

Again, during the Korean War, under the Petroleum Administration for Defense, crude oil was in shorter supply in California than it was in other parts of the country, and it was the Pacific Coast from which the Defense Department had to draw as much product as possible for the Korean War.

Although there is now one 16-inch crude line from the 4 Corners area to California, and the 24-inch Trans-Mountain line, there are no comparable interconnections, such as the many oil and product lines, barge routes, rail routes, tanker routes, that integrate Districts I, II, III, and IV.

The National Petroleum Council's Oil Logistics Task Group states "the opportunity to increase interdistrict receipts of crude oil products into District V during the decade of the 1970's is not too promising."<sup>2</sup>

An increase in transfer from eastern districts into District V will occur only when synthetic hydrocarbons are developed from shale, coal and tar sands.<sup>3</sup>

For the foreseeable future, the west coast's oil supply must increasingly be waterborne, either from foreign sources, essentially eastern hemisphere, or from Alaska. Consequently, District V will need to develop direct access to additional U.S. oil sources if the integrity of its energy supply is to be maintained.

A comparison between the security of supply of District V (excluding Alaska) and Districts I-IV discloses that, according to the Department's own statistics, without North Slope oil, District V will be much more dependent upon foreign oil than will Districts I-IV.

District V, comprised of the Western states, Hawaii and Alaska, required some 2 million barrels per day (BPD) of petroleum products in 1970. It is widely recognized that this requirement will increase at a rate substantially in excess of the rate of increase of requirements for petroleum products in Districts I-IV, the rest of the United States. Oil economists point to California's population and automobile registration increases, and it is expected that California's strict emission control laws will have the effect of increasing the consumption of gasoline there in the near future. The most recent estimate of product requirements in District V by the National Petroleum Council projects an average compound growth rate of 4.6%, resulting in requirements as shown in the following table:<sup>4</sup>

#### *District V—Product demand*

[Million barrels per day]

1970	2.0
1975	2.4
1980	3.1
1985	3.7

Conservatively assuming that District V crude demand will continue to run at 90%<sup>5</sup> of product demand, the crude requirements for District V are:

#### *District V—Crude demand*

[Million barrels per day]

1970	1.8
1975	2.2
1980	2.8
1985	3.3

<sup>1</sup> *A History of the Petroleum Administration for War, 1941-5*, Dept. of Interior, 1946, p. 94.

<sup>2</sup> *U.S. Energy Outlook*, Volume II, 1971, p. 63.

<sup>3</sup> *Ibid.*

<sup>4</sup> *U.S. Energy Outlook—An Initial Appraisal (1971-1985)*, Interior Report, National Petroleum Council, Draft, Vol. II. Before rounding, the figures in thousands of barrels per day were: 1970—1,952; 1975—2,439; 1980—3,085; 1985—3,711.

<sup>5</sup> This percentage is expected to be considerably higher over the next 15 years as North Slope crude becomes available and the proportion of District V production with respect to local demand increases. Between 1955 and 1970, however, District V refinery runs ranged from a high of 104% in 1957 to a low of 83% in 1967 and averaged 89% of District V product demand for the period.

At the same time that demand is increasing sharply, production of crude oil in District V, outside of Alaska, is falling off and the gap in District V between production and demand is cause for governmental as well as industry concern. As a recent article points out, oil production in California is heading downward: offshore production has temporarily leveled off, steam stimulation for heavy oils has reached its peak and is headed down and production from the huge East Wilmington field has begun to decline.<sup>4</sup>

The government view was succinctly stated for the Office of Emergency Preparedness in its Director's comments on the 1971 Draft Environmental Statement prepared by the Interior Department:

I believe it is particularly important to stress the need for early availability of Alaskan oil to meet the petroleum needs of the West Coast (District V). As you know, this region is not only a crude-deficit area, but the availability of imported oil there is threatened by the burgeoning Japanese requirements for petroleum and the competition which seems likely to result with Japan for Eastern Hemisphere oil. In short, the national security implications of the crude oil supply situation on the West Coast give me increasing concern; the importance of accessible Alaskan oil for this region cannot, in my view, be overstressed.<sup>7</sup>

Even under an optimistic estimate, District V crude oil production (except for North Alaska) is expected to decline gradually at a rate of approximately 1.5% each year. At this rate, the production of crude in District V would look something like this to 1985:

*District V (without North Slope)—Crude production*<sup>1</sup>

[Million barrels per day]

1970	-----	1.3
1975	-----	1.2
1980	-----	1.1
1985	-----	1.0

<sup>1</sup> Production for 1970 from Mineral Industry Surveys. Estimated decline in production of 1.5% annually includes calculation for significant new oil discoveries. If such discoveries are not realized, the decline will be greater.

It is obvious that the difference between District V demand and production, the gap, will have to be supplied by imports, from Canada or elsewhere. Without available North Slope oil, this gap or dependence on imports can reasonably be expected to rise from roughly a half million BPD or 28% of District V demand in 1970 to 2.3 million BPD) or nearly 70% of District V demand by 1985.

Thus, a consideration of the rapidly increasing District V requirements for crude oil, the decline in production there—except for the prospect of Northern Alaska—and the delay of several years in anticipated start-up of the trans-Alaska pipeline, all point to the same conclusion: District V, particularly the West Coast of the United States, will need a substantial part if not all of the North Slope production for the foreseeable future, if the District is to avoid either a crude oil shortage or far greater dependence on imported foreign oil.

The possible throughput of a trans-Alaska line at different times should be considered in light of West Coast needs. If construction were to start next season, a trans-Alaska line could not be completed before summer 1975, at the earliest. Any substantial delay in construction would push the starting date up to 1976, and 1976 would, in any event, be the earliest full year of operation. It is presently planned that the line will start at a throughput of 600,000 BPD which may be increased to 1.2 million BPD by the third year (1978) or sooner. Seven years after startup the line will reach its maximum throughput of 2 million BPD. Comparison of the forecast throughput volumes with the predictable crude oil gap in District V shows that substantially all of the forecast North Slope production will be required for District V over the short term future. Beyond 1985 or so, District V requirements will substantially exceed North Slope throughput.

<sup>4</sup> "Petroleum Supply Picture Deteriorating in the West," *The Oil and Gas Journal*, March 29, 1971.

<sup>7</sup> Letter of Director G. A. Lincoln, Office of Emergency Preparedness, to Secretary Morton, February 18, 1971, re draft Environmental Impact Statement for the trans-Alaska pipeline.

DISTRICT V CRUDE GAP VERSUS NORTH SLOPE THROUGHPUT<sup>1</sup>

[Million barrels per day]

	1970	1975	1980	1985
Demand less production.....	1.8-1.3	2.2-1.2	2.8-1.1	3.3-1.0
Gap.....	.5	1.0	1.7	2.3
Available North Slope throughput.....		.6	1.2-2.0	2.0

<sup>1</sup> Secretary Stans has estimated a crude deficit of "at least 1,000,000 barrels per day by 1980" in pointing out the seriousness of the west coast deficit: "Our supply problems are particularly acute on the west coast where the crude deficit is expected to increase to at least 1,000,000 barrels per day by 1980. While imports from Canada into this region may increase somewhat, it is expected that a majority of these demand shortfalls must come from Alaskan production or from the Persian Gulf and Indonesian sources. I believe that it would be an unwise decision on the part of this administration to voluntarily increase our dependence upon foreign sources of oil at a time when the Middle East oil-producing countries are coming increasingly under the political and economic influence of the U.S.S.R." Letter of Secretary Stans to Secretary Morton, Apr. 16, 1971, regarding draft environmental statement.

A brief consideration of these figures makes clear why the West Coast is not only the most direct but also the most logical market for North Slope oil.

When the District V projected dependence on foreign imports is contrasted with that projected for the rest of the United States (Districts I-IV), this problem can be viewed in its true perspective. For the following table, present imports of Canadian oil at the rate of .3 million BPD are included with domestic production as a part of District V supply.<sup>8</sup> District I-IV estimates for demand and domestic and Canadian supply were obtained by subtracting comparable District V estimates from the United States totals provided in the Interior Department's Draft Environmental Impact Statement, January, 1971. On this basis, comparative dependence is shown by the following table:

## DEPENDENCE ON OVERSEAS IMPORTS

[Percent of crude demand]

	1975	1980	1985
District I-IV.....	8	26	37
District V.....	32	50	61

Note: The impact of either a trans-Canada line to the Midwest or a trans-Alaska line to the west coast may also be shown by table. Both cases assume throughputs of 2,000,000 b.p.d. by 1980.

## EFFECT OF TAPS OR TCP ON OVERSEAS IMPORTS DEPENDENCE

[Percent of crude demand]

	1975		1980		1985	
	TAPS	TCP	TAPS	TCP	TAPS	TCP
District I-IV.....	8	9	22	12	37	26
District V.....	9	32	0	50	3	61

This table shows that without delivery of North Slope oil to District V that District would be 61% dependent on overseas crude oil imports by 1985. A trans-Alaska line could reduce this dependence to an insignificant percentage, but a trans-Canada line would do nothing to alleviate it. In District I-IV, on the other hand, dependence on overseas sources would not exceed 37%, even with a trans-Alaska line and tanker deliveries to the West Coast. Comparable figures are particularly significant in the light of superior pipeline distribution systems already existing in Districts I-IV and the extremely limited access to the West Coast from all other domestic sources.

<sup>8</sup> Imports from Canada have gradually increased from 162,000 b.p.d. in 1966 to 220,000 b.p.d. in 1970. "Petroleum Statement Monthly" (December 1970, Bureau of Mines) and the 1969, 1968, and 1967 "Petroleum Statement Annual" (Bureau of Mines). This approximately 200,000 b.p.d. volume of imports coupled with the existing 400,000 b.p.d. capacity of Trans-Mountain Pipe Line servicing Canada and the United States supports projected estimates of Canadian imports of approximately 3,000,000 b.p.d.

Thus, rejection of the proposed trans-Alaskan line in favor of a trans-Canada line would ignore the growing demand in District V and would transport Alaskan oil to a more distant market—the Midwest—without relieving tanker traffic on the West Coast. This result would be, overall, an inefficient transportation system, which would place the West Coast in the precarious position of being at least 61% dependent on foreign imports by 1985.

The only feasible alternative to transporting the crude oil on Alaska's North Slope through a trans-Alaska pipeline is the construction of an oil pipeline through the Mackenzie River Valley or northern Canada to the vicinity of Edmonton, Alberta, and thence to the lower 48 states by existing pipeline routes. It is my belief that such a route, in addition to failing to deliver the North Slope oil to the area of the country that is most dependent on foreign imports, would also cost significantly more to construct and operate and could only be built after a long period of delay.

It is not disputed that the trans-Alaska pipeline could be completed a substantial period of time before a trans-Canada line. Alyeska Pipeline Service Company estimates that if the court litigation now blocking construction on the trans-Alaska line is completed by January of 1973, that oil can be flowing to the port of Valdez by October of 1975. On the other hand, the proposed trans-Canada line would involve, by all reasonable estimates, a minimum time delay of an additional two years, with other estimates ranging to five years or more.<sup>9</sup> I believe, and will discuss this point later in greater depth, that the later estimates are more valid in light of many, often ignored, considerations.

The reason that a five year period of delay is vital to the consideration of a trans-Canada route is that during such a period of time the United States would have to spend greater amounts of its national resources in importing costly foreign oil. The Department of the Treasury estimated in its comments to the 1971 Draft Environmental Impact Statement that the cost of substituting import of foreign oil from the Eastern Hemisphere for Alaskan oil would involve by 1980 an annual net import cost of at least \$1.2 billion (Economic and Security Analysis, App. M-3). And, this figure does not take into account the recent agreement to increase payments to Persian Gulf countries as a result of dollar devaluation. This agreement would result in further adverse impacts on the balance of payments and comparative resource costs. Thus, a five year delay in the completion of the construction of a Canadian pipeline would exact a great cost to the U.S. economy and its balance of payments problem.

Although some Canadian officials have stated that Canada would be willing to make a supply of additional oil available to the United States during the period of delay so that the U.S. would not be forced to import costly foreign oil, the ability of Canada to fulfill this pledge seems questionable as long as Canada itself is a net importer of oil and thus similarly vulnerable. (See particularly "Alberta Output Based on High Crude Demand," *Oil Daily*, June 2, 1972, and "New Supertanker Port Planned Near Quebec," *Oil Daily*, June 5, 1972.)

In addition, the cost of constructing a 3,200 mile pipeline through Canada would exceed greatly the costs of a 789 mile trans-Alaska line, even when the costs of constructing additional tankers necessary for oil transport down the West Coast are calculated. Current cost estimates for the whole TAPS-tanker system is \$4.2 billion. At present there is no accurate estimate of the cost of a trans-Canada oil pipeline. Directly relevant to this question, however, is the recent estimate of the cost of trans-Canada *gas* line published after the Final Environmental Statement had been prepared. Wilbur H. Mack, President of Michigan-Wisconsin Pipe Line and Chairman of the Northwest Project Study Group, stated in a speech in Washington, D.C., on February 29, 1972, that the cost of a gas line from the North Slope to only Emerson, Manitoba, had increased from \$2.7 billion to \$5 billion due to delays in construction startup, cost escalation, and design changes.

This information is most revealing, considering the fact that the proposed gas line ends at Emerson, 700 miles from Chicago, and involves no thermal difficulties as does an oil line. A new oil pipeline would have to be constructed not only from the Alaskan North Slope to Edmonton (a distance of 1,700 miles), but also from Edmonton to the Chicago area (a distance of 1,560 miles), since existing oil pipeline facilities south of Edmonton are not capable of transporting the large volumes of oil to be produced from the Prudhoe Bay Field.

<sup>9</sup> The Interior Department's Analysis states, "A pipeline through Canada . . . would impose a delay of up to five years." *Economic and Security Analysis*, Vol. I, p. C-21.

In addition, thermal problems associated with a hot, oil line would probably involve a 20-25% greater cost than a comparable cold, gas line, since the design and engineering problems are considerably greater. While a cold gas line may be buried or laid by more conventional construction techniques, a hot oil line will require special treatment, including elevation on pilings or gravel berms. Finally, the Canadian route crosses 450 miles more of continuous and discontinuous permafrost than does the Alaskan route and nearly four times the number of rivers.

It thus seems accurate to state that a trans-Canada oil pipeline would cost more than \$6 billion. However, this \$6 billion cost estimate is based on current construction costs and does not reflect the effect of a substantial delay in construction which increases line construction costs significantly. Costs of construction for a trans-Alaska line have been increasing at the rate of 10% per year and construction in Canada would not be subject to U.S. price controls.

In addition, there are about \$300 million in TAPS costs of planning, design, right-of-way acquisitions, etc., that would be lost and unrecoverable and thus chargeable as economic costs of a trans-Canada project. Similarly there are costs incurred and committed of \$630 million for ships for the Alaska project which cannot be readily converted to other traffic.

Furthermore, the average transportation cost to Seattle has been estimated by the Interior Department at 85c per barrel on the TAPS route and 90c to Los Angeles. The costs to Chicago by a Canadian route are estimated at \$1.08 for a difference of 18-23c per barrel. (Economic and Security Analysis, Table C-2).

Thus, a pipeline running through Canada will involve capital investment costs at least fifty (50) percent higher than the TAPS-tanker route, and 25% to 50% higher transportation costs with no increment in the amount of oil delivered. The productivity of that last \$2 billion of capital investment would be zero. At a time when the American economy is having great problems with inflation, it seems rather unwise to go into the capital market for investment funds to finance a \$6 billion project which will yield no more throughput to market than a \$4 billion project.

There also would be great problems in raising the capital required for a trans-Canada line. Because 90 percent of the project would be located in Canada and because of the policies of the Canadian Government on investments in Canada, Canadian investors would be first offered the opportunity to participate in the ownership of the project. However, Canadian financing capability for a project this size is quite limited. Mr. Wilbur H. Mack, Chairman of the Northwest Project Study Group considering the construction of a gas pipeline through Canada, has stated that the financing of the project is the most difficult problem facing the project "whose outcome is by no means assured." (Speech on February 29, 1972, Washington, D.C.) Indeed, Mr. Mack goes on to say ". . . novel rate and inter-governmental approaches will have to be conceived, studied and adopted if the project is to be constructed." In particular, Mr. Mack discusses the possibility that "funds could be supplied prior to operations and during the construction period by a charge added to the rates of pipelines or distribution companies whose gas is to be shipped through the line."

In addition, concern has already been expressed among Canadian officials over the effect of the massive infusion of U.S. dollars into Canada upon the value of the Canadian dollar as a consequence of constructing the proposed gas pipeline costing \$5 billion. Clearly the construction of an oil pipeline at a cost in excess of \$6 billion would cause even greater worry among Canadian leaders. Even if only a portion of this \$6 billion is raised in the United States, the effect of the infusion of such sums of American dollars into the Canadian economy would be to force a great rise in the value of the Canadian dollar and thus cause a massive dislocation of the entire Canadian economy.

This growing concern can also be seen in Prime Minister Trudeau's recently announced policy statement and legislative proposal concerning foreign take-over of existing Canadian-controlled companies. The legislation would require Cabinet approval for any take-over of a Canadian firm by foreign investors. (*Washington Post*, editorial, May 9, 1972.)

Likewise, an article in the *Ottawa Journal* of February 19, 1972 ("Howland suggests U.S. Defer Payments in Financing Resource Projects") discusses statements by Robert D. Howland, the Chairman of the Canadian National Energy Board regarding American investment in the development of Canadian resources. The chairman stated that applicants for permits to build a trans-

Canada natural gas pipeline would have to clear their financing arrangements with the federal departments of finance and the Bank of Canada. He told a Northern Pipeline Research Conference in Ottawa that his Board would find it difficult, if not impossible, to approve a pipeline whose financing had not met criteria for minimizing its impact on exchange rates.

Finally, even assuming that a large portion of the required capital funds for a Canadian pipeline could be gained in Canada, this itself would affect the costs of the project. Interest rates are higher in Canada and if a significant part of the investment is to be gained from Canadian financial sources, higher capital costs would be imposed on the project than have been estimated.

The hypothetical alternative, discussed in Summary Volume I of the Analysis of the Economic Aspects of the Trans-Alaska Pipeline, is a pipeline which would transport North Slope crude to Chicago in volumes identical with that proposed by the TAPS line. Canadian authorities and private Canadian persons have indicated an interest in a pipeline running basically down the MacKenzie Valley to the U.S. markets in the U.S. However, all such proposals which have originated from Canadian sources, have indicated a desire for such a pipeline as a vehicle to move Canadian oil to both domestic and U.S. markets, and a desire to have merely a sufficient input from the North Slope reserves to make such a pipeline economically feasible. In this context, it would not be possible to fill such a pipeline with North Slope crude to the exclusion of Canadian oil reserves.

It would be reasonable to expect that a 48-inch Trans-Alaska/Canada pipeline transporting 2 billion barrels per day of crude oil would have to be a jointly owned common carrier system providing access to Canadian crude as well as to Alaskan crude. Furthermore, Canadian authorities would expect the U.S. markets in the midwest to absorb not only the Alaskan crude but also a substantial portion of the Canadian crude transported through such a pipeline.

There is ample U.S. precedent for such a Canadian position. When Trans-Canada Pipeline initially proposed to construct a wholly owned subsidiary, Great Lakes Gas Transmission, as a bonded gas pipeline, transporting its own gas through the U.S. for redelivery of the Trans-Canada system in eastern Canada, that proposal met with so much domestic U.S. objection that Trans-Canada, as a practical matter, was required to accept 50% ownership by U.S. interests, and to transport gas for sale in the United States for the benefit of U.S. interests. Any pipeline traversing Canada from Alaska to the lower 48 States would be expected to make no less an accommodation to Canadian interests.

Consequently, an evaluation of the economics of a Canadian alternative to the TAPS project must be predicated upon the realistic alternative system—i.e., a common carrier crude line, owned jointly by Canadian and U.S. interests, subject to Canadian provincial and national regulatory agencies, as well as the I.C.C., D.O.T., and State agencies, transporting both Alaskan and Canadian crude on a pro-rata basis and providing joint access to U.S. markets for both Alaskan and Canadian crude oil.

Such a common carrier crude line transporting both Alaskan and Canadian oil would have definite adverse effects to the state of Alaska. A common carrier would have the effect of reducing the rate of production of Alaska's North Slope, and since State revenues depend on this rate, such a cut would reduce the level of royalty payments and taxes on corporate profits. Such a reduced level of State revenue must be viewed as a severe, direct impact on the State's ability to provide needed services and capital improvements for its citizens.

More specifically, a Canadian route would also have a major detrimental effect upon Alaska's Native population. Last December, the Congress finally passed the Alaska Native Claims Settlement Act, thus extinguishing the long outstanding aboriginal claims of Alaska's nearly 60,000 Natives. The provisions of that act specify that the Natives are to receive \$500 million from the State of Alaska for their claims. Such a sum is to be paid from a 2 per cent overriding royalty on mineral leases, including those at Prudhoe Bay. Alaska's Natives are at present organizing to take advantage of the provision of the Act and to improve their future with the tools now available to them. The delay of a Canadian route and reduced level of production at the North Slope which would arise from a common carrier carrying both Alaskan and Canadian oil would delay the infusion of revenues for the Native population. Such a development would cruelly dash Native hopes raised by the passage of this landmark legislation.

Possible new tariffs and taxes imposed upon a transCanada pipeline by the Canadian government would further raise the costs of a Canadian pipeline. Former Secretary of Commerce Maurice Stans in a letter to the Interior Depart-

ment setting forth the Commerce Department's comments on the January 1971 draft environmental impact statement estimated that the payments of estimated Canadian income taxes would be in excess of \$100 million annually.

However, tariffs and taxes imposed in the future could also add greatly to this sum. Although no detailed route has yet been chosen for such a Canadian pipeline, most discussion centers around a Mackenzie River Valley route to Edmonton. Such a route, combined with the additions and improvements necessary for the existing pipelines south of Edmonton, could pass through up to four provinces and both the Yukon and Northwest Territories. Although the federal government of Canada has the statutory authority to regulate interprovincial pipelines, including the right of eminent domain ("the power of expropriation"), the provinces can impose direct taxes on facilities regulated by the federal government under section 92(2) of the British North America Act (B.N.A.)—the Canadian Constitution.

Furthermore, the four western provinces can regulate the production of oil within a particular province. This control over production would have an impact on the pipeline capacity available for North Slope oil in a trans-Canada line. Also the provinces can exercise extensive regulatory control over matters having a local impact upon the province—a police power derived from sections 92(13) and 92(16) of the B.N.A. As with any federal system the demarcation line between federal and provincial control is often vague and imprecise. Thus the legislative jurisdiction of the federal and provincial governments often overlaps. In recent times, the area of provincial regulation has been expanded, particularly with respect to water quality.

There is also little doubt that practical political realities have and will continue to dictate a substantial provincial role in matters subject to federal regulation, such as the route of a trans-Canada pipeline. The selection of a site for the Toronto International Airport is a case in point. Although the federal government has the power to designate and build such airports under the Aeronautics Act, R.S.C. 1952, c. 2, the decision on the appropriate site was reached only after four years of involved consultation and negotiation with provincial authorities through a joint federal-provincial committee. (*Toronto Star*, March 2, 1972).

Therefore, it seems quite possible that the provinces through which such an expanded trans-Canada oil pipeline system would pass impose new taxes of their own on the pipeline and its related activities and operations.

Recent events in the province of Alberta only add further credence to the likelihood of such a development. The provincial administration has proposed a new tax on recoverable crude oil reserves in order to raise \$50 million to \$90 million a year. Although Alberta's petroleum industry has provided the government with 37% of its revenues since 1947 (more than \$3.4 billion) and through related activities employs 30% of the provinces labor force, the provincial government is continuing with plans to impose the new tax. Industry spokesmen late last month stated unanimously that the effect of the new regulations would be to discourage new exploration by up to 20% in Alberta, Canada's dominant oil-producing province, even though drilling activity in the province has been in a serious decline for the last four years. The additional levy could average an additional 20 cents per barrel on an on-going basis—a level which oilmen assert will have the effect of losing considerable sales in the province's export market, particularly in the Puget Sound region of Washington state. (*Oilweek*, May 1, 8, and 29, 1972) Although the Alberta Legislature has not yet approved the new tax, spokesmen for the Canadian Petroleum Association warned the body last month that such a tax would cause major companies to shift away from exploration in Alberta and induce some to invest more capital in the other Canadian provinces.

The point to be noted concerning this development in Alberta is not whether the imposition of such a tax is a wise move. That is a decision for the leaders of Alberta to make. However, it clearly reveals that similar developments are indeed possible regarding an oil pipeline from the North Slope of Alaska to the Chicago area. Consequently, discussion concerning a trans-Canada oil pipeline should take place with the realization that substantial additional costs associated with such a route are possible through the imposition of new taxes and tariffs by various Canadian jurisdictions. This seems to be particularly possible in light of the earlier discussed proposal by Mr. Mack to charge pipeline and distribution companies whose gas would later be shipped through a trans-Canada gas line in order to gain the required \$5 billion for construction of such a line.

Another often ignored factor entering into the economic considerations governing a choice of pipeline routes is the benefits associated with the construction of the Alaska pipeline and the tankers necessary for transport of the oil. Assum-

ing the Alaska pipeline could be completed by 1976 and would be expanded to its full capacity of 2mbpd of crude oil by the early 1980's, the total gross payroll involved with pipeline construction is estimated at \$800 million and \$150 million in federal, state, and local payroll taxes. Expenditures for materials, supplies, transportation, and all other non-labor costs related to pipeline construction are estimated to total \$1.5 billion. The major portion of this construction investment will be distributed throughout the lower 48 states.

Also it is estimated that 41 new U.S. flag tankers will be required for transport of Alaskan oil, 33 of them to be constructed by 1980. The cost of these vessels will be about \$1 billion and the vessels will range in size generally from 50,000 to 120,000 deadweight tons. This would be a significant increase in tonnage of the U.S. tanker fleet—indeed the increase will be equal to the whole 1970 level of American Gross Registered Tons (GRT). In addition, the cost to upgrade major shipyards and facilities will cost \$150 million.

Moreover, during the production life of the pipeline (which should extend beyond the year 2000) the annual payments for labor, supplies, and materials are estimated to amount to \$70 million. The tanker operations alone will add about \$100 million annually to the U.S. economy with the bulk benefiting the West Coast area. These figures do not include the multiplier effect that the expenditure of these sums will involve, nor the total level of taxes to be paid (beyond the immediate purchase and operation of the equipment, etc.).

The Maritime Administration estimates that the trans-Alaska route would generate 73,480 man years of shipyard employment and 770 man years of annual fleet maintenance employment. (Economic and Security Analysis, Appendix G, M-4.)

In light of the earlier discussed dependence of the West Coast (District V) upon foreign oil imports, it must be remembered that if the North Slope oil is transmitted through a pipeline through Canada, the West Coast will still need to import a great deal of its requirements—nearly 70% by 1985. Therefore, the alternatives are only two: foreign oil imported to the West Coast in foreign ships, built and manned by foreign crews and operating under the pollution and discharge regulations of foreign nations or Alaskan oil transported to the West Coast in new American tankers, built and manned with American crews and operating under our own regulations and guidelines.

The State of Alaska will also benefit greatly in terms of employment from the construction of a trans-Alaska pipeline. During the construction phase of the pipeline 7,000–10,000 workers will be employed, and when indirect employment is considered, this figure will rise to 22,000. As a result of oil field and pipeline development, personal income per capita income in the state should rise from an estimated \$6,376 to \$7,012. (Economic and Security Analysis, Appendix M-4.)

In summation, it is abundantly clear that construction of a trans-Alaska pipeline will have direct, beneficial effects upon employment and the maritime industry in the United States. There should be no doubt that if a pipeline is built through Canada to transport the North Slope oil, Canadians will construct it and their economy will be the one to benefit as a result.

In this same regard, the U.S. payments balance would be unfavorably affected if the trans-Canada route were chosen in favor of a trans-Alaska route. The trans-Canada route would cost considerably more (a reasonable estimate is at least 50% more, as discussed earlier), and much of the financing would have to come from the United States. Furthermore, former Secretary of Commerce Maurice Stans estimated in April, 1971, that the Canadian route would mean a continuing unfavorable balance of payments effect of perhaps \$100 million a year for the life of the pipeline for the payment of Canadian taxes and tariffs.

I believe that one of the most serious drawbacks of the proposed trans-Alaska oil pipeline is the disastrous effect that such a line would have upon the construction of a natural gas pipeline from the same area. This is an important argument which has received altogether too little attention in past discussion.

The testimony of Mr. John N. Nassikas, Chairman of the Federal Power Commission, before this Committee on June 8 only further dramatized the gas supply-demand imbalance which is fast reaching crisis proportions. During the last winter of 1971–72 seven major pipelines (including Transcontinental, Texas Eastern, Algonquin, all of which serve the eastern and mid-western regions of the country) were required to curtail service and twenty-seven interstate pipelines have now filed curtailment plans with the Commission. In addition, eighteen pipelines made emergency gas purchases in order to maintain customer service.

The gas shortage can be well portrayed through the use of a few statistics collected in the Federal Power Commission Staff Report No. 2, National Gas Supply

and Demand 1971-1990, issued in February, 1972. The demand for gas in the lower 48 states was projected to increase from 22.6 trillion cubic feet annually in 1970 to 34.5 trillion cubic feet in 1980 and 46.4 trillion cubic feet in 1990. However, domestic production of gas is projected to decrease from 21.8 trillion cubic feet in 1970 to 20.4 trillion cubic feet in 1980 to 17.8 trillion cubic feet in 1990. Thus unsatisfied demands are estimated to increase dramatically during this period from 3.6 trillion cubic feet in 1975 to 9.5 in 1980, and to 17.1 in 1990. In addition, gas reserve life ratios have dropped sharply from 20 years to 12 years. Present deliverability, that is ability of resources to meet current market requirements, is dangerously low at a level of only 4 or 5 years for the industry as a whole.

Nevertheless, the availability and use of natural gas in U.S. markets has represented significant savings to consumers when compared with other energy sources even if natural gas prices were somewhat higher than at present. The Independent Natural Gas Association of America has prepared a yearly survey since 1951 comparing residential heating costs for natural gas, oil, coal, and electricity. The 1970 statistics reveal that for the midwest city of Milwaukee, Wisconsin, the average fuel costs per season for the average home were \$161.08 for gas, \$205.41 for fuel oil, \$265.04 for coal and \$410.87 for electricity. Thus, it is clear that natural gas is a low-cost fuel whose use has meant significant savings for consumers.

The American Gas Association in its annually published figures on year end reserves estimates that there has been a drop in U.S. proved lower 48 reserves from the high of 289.3 trillion cubic feet in 1967 to 247.4 trillion cubic feet by year-end 1971.

Certain areas of the nation are projected to have much greater natural gas shortages than others. Statistics collected by the Future Requirements Committee of the Gas Industry Committee reveal that at present, the Gulf Coast, Appalachia, and the Great Lakes regions have the greatest requirements for natural gas and that these requirements will not only increase absolutely through 1995, but will each year occupy a greater percentage of the total U.S. requirements—from 62.8% to 67.1%. (Future Gas Requirements of the United States, Vol. No. 4, October, 1971.)

The Great Lakes region alone (comprising the states of Wisconsin, Illinois, Michigan, and Indiana) will by 1975 have nearly doubled its 1970 requirements for natural gas. By 1995, its 1970 requirements in billions of cubic feet of natural gas will have quadrupled. Furthermore, the requirements of the Great Lakes region, while constituting 13% of the total U.S. natural gas requirements in 1970 will constitute 17.3% in 1995—thus, along with the Southeast region, having the fastest growing requirement rate in the nation.

One of the chief reasons for the rapid growth in requirements for natural gas in the Great Lakes region of the nation is that natural gas is a virtually pollution free form of energy. Increasingly strict controls and regulations on air pollution mean that natural gas is an attractive form of energy for use by Great Lakes industry and electric generation plants. An increased forecast for natural gas energy requirements is thus warranted due to increased energy needs and continued penetration of gas into the energy intensive Great Lakes industrial market. Substantial increases in the equivalent costs of competing fuels relative to gas also justifies the existence of a large industrial conversion market.

Statistics regarding the uses for which natural gas is employed in the Great Lakes region further dramatize this point. In 1970, 45% of the natural gas supplied to this region was utilized in the industrial sector (industrial firms and utilities for power generation). By 1975, it is estimated that this percentage will rise to 52%. (Future Gas Requirements of the United States, Vol. 4, October, 1971, p. 32.)

However, at the same time that the demand for natural gas is increasing, the expected available supply is decreasing in every region of the country except the Pacific Northwest and Alaska. Therefore, the operational estimate (the percentage of the estimated requirements that is expected to be filled) is decreasing for every region of the country except the Pacific Northwest and Alaska. The Southeast area of the country will have an operational estimate by 1975 of only 76.0%; the Great Lakes region with 76.3% follows closely, as does the Rocky Mountain area with 82.2%.

In short, there is a natural gas shortage in most of the nation today which is growing and which will become increasingly severe in particular regions of the country.

Likewise, the natural gas companies servicing particular regions of the country increasingly expect to be unable to deliver the amount of gas requested by their customers. The Michigan-Wisconsin Pipe Line Company primarily serves distribution companies in Wisconsin, Michigan, and Iowa and reports that it will not be able to meet the full supply of additional volumes requested by its customers during the coming winter. In addition, the Northern Natural Gas Company servicing customers from Kansas to Wisconsin and Upper Michigan was forced to make summer curtailments in 1971 and 1972 and expects to be forced to do the same for the winter heating season of 1972-73 (from testimony of Chairman Nassikas of the FPC, before the Joint Economic Committee on June 8, 1972).

Nevertheless, the discovery of oil on Alaska's North Slope has revealed vast reserves of natural gas which offer hope for alleviating the gas shortage in the lower 48. Although the proved reserves of gas in Alaska have been estimated at 31.4 trillion cubic feet at year end 1971, the Potential Gas Committee in December, 1970, attributed 327 trillion cubic feet of potential gas to Alaska. This is a figure which represents 28 percent of the total estimated United States gas potential! Thus, the reserves in Alaska could assist greatly in reducing the current gas shortage.

Since the discovery of oil and gas in Prudhoe Bay, a number of proposed projects have been announced for the purpose of transporting gas from that area to markets in the contiguous 48 states. In each instance, gas would be made available to West Coast and/or Great Lakes markets. A common feature of the northern gas pipelines which have been proposed is their potential to tap both North Slope and Canadian Frontier gas potential. It is estimated that the Western Canada Sedimentary Basin which includes Alberta, the Mackenzie River Valley of the Northwest Territories and the Yukon Territory, contains potential gas supplies of about 185 trillion cubic feet. However, because of the much larger potential reserve at Prudhoe Bay (327 potential trillion cubic feet) and the plans to develop the oil reserves there, the main interest of the three groups studying transport of the natural gas centers on the Alaskan find.

To date three groups have studied the transport of the North Slope gas to the lower 48 market (the Northwest Project Study Group, the Gas Arctic Systems Group, and the Mountain Pacific Project). These groups recently pooled their efforts.

Nevertheless, all of the major pipelines serving the northern regions of the U.S. (Tennessee, Transcontinental, Consolidated Natural Gas, Columbia Gas, Michigan-Wisconsin, Natural Gas Pipeline, and Northern Natural) are relying on access in the near future to Alaskan and Canadian gas to meet their long-range needs. If Alaskan gas cannot be brought into the lower 48 market in the near future, the major pipeline systems will be compelled to develop expensive large-scale projects involving the importation of foreign liquified natural gas and the manufacture of synthetic gas. At present net imports of natural gas amount to only 3.5 percent of total gas consumption in the United States, excluding Alaska. Chairman Nassikas, in his testimony before this Committee two weeks ago, estimated that this rate would rise to no more than 9 percent by 1990. In discussing alternate gas sources, he concluded, stating, "In summary, alternate gas supplies to supplement domestic natural gas production will not be available, except at relatively higher prices, in sufficient quantities in the near term to alleviate the gas supply imbalance."

Therefore, in order to ease the current natural gas crisis, additional domestic supplies, such as the reserves discovered in Alaska, must be found and tapped. The Prudhoe Bay resource base thus represents an urgently needed source of secure gas which, in comparison to the other alternatives of foreign gas liquification and importation and synthetic gas manufacture, is low-cost.

The great need for natural gas in the Midwest is one of the strongest arguments in favor of the trans-Alaska pipeline. Because the gas reserves at Prudhoe Bay are primarily associated—dissolved volumes related to the oil reserves, their development is dependent upon the development and marketability of those oil reserves. Thus every year of additional delay in the construction and operation of an oil pipeline means an equal delay in the delivery of natural gas to the midwest, the area of greatest natural gas need.

If, however, the oil line to transport North Slope oil is to be constructed through Canada, it is clear that the natural gas line would be delayed until the mid-1980's or beyond and that the cost of gas transported through the line would be increased so significantly as to cast doubt on its economic feasibility. Already

the delay in authorization of the trans-Alaska oil pipeline has delayed the gas timetable by several years, with the result that Mr. Mack, Chairman of the Northwest Project Study Group, as discussed earlier, estimates costs for a trans-Canada gas pipeline have increased from \$2.7 billion to \$5 billion. Thus the effect of the Canadian oil pipeline alternative would be to make the present and projected gas shortages even more critical.

I pointed out earlier that it is reasonable to expect up to five years delay in the construction of a trans-Canada oil pipeline. Although I will discuss this later in greater depth, completion of an oil pipeline through Canada could not realistically be expected prior to 1980.

If an oil pipeline through Canada were not completed until 1980, construction of a gas pipeline from the Arctic would be delayed until at least the mid-1980's. This would be so for three reasons:

First, as pointed out earlier, no gas can be produced from the Prudhoe Bay field until oil production commences. The gas reserves at Prudhoe Bay will not be tapped immediately as soon as the oil reserves, but will be reinjected into the ground in order to keep up the pressure on the oil reserves and thus increase the continued productivity of the oil field. Producing the natural gas from the Prudhoe Bay field without reinjecting it into the ground would result in the loss of gas drive for future production of oil so that full production of the oil reserves could never be efficiently accomplished. Thus there will be a year or two delay in the possible production of the natural gas fields.

Second, even if sufficient non-associated gas were to be discovered on the North Slope of Alaska and northern Canada to justify construction of a gas pipeline prior to commencement of oil production, it would be impossible to do so. Construction of a trans-Canada oil line of the size required to transport the Prudhoe Bay and northern Canadian reserves would require all available construction equipment, construction personnel, transport, supply and communications facilities. The available resources of the pipeline industry will be taxed to provide the logistical support for even one oil pipeline. There is simply no way by which a gas pipeline could be constructed while construction of the oil line was in progress.

Third, a gas pipeline could not be constructed through Canada at the same time as the oil line because of the impact of the two projects on the Canadian economy. Concern has already been expressed over the effect of the massive infusion of U.S. dollars into Canada upon the value of the Canadian dollar as a consequence of constructing a gas pipeline costing \$5 billion. If an oil pipeline costing in excess of \$6 billion were superimposed on the gas pipeline, it is obvious that the Canadian dollar would rise at such a rate to cause a dramatic disruption of the entire Canadian economy. (*The Ottawa Journal*, "Howland Suggests U.S. Defer Payments in Financing Resource Projects," February 19, 1972.)

It should be reiterated at this point that the problem of financing the gas pipeline alone, utilizing all available sources of capital, is an exceedingly difficult one which has not yet been satisfactorily resolved. If an oil pipeline through Canada requiring an even greater capital investment were to be constructed, it would simply be impossible to obtain sufficient capital to construct the gas pipeline at or about the same time.

In summary, construction of an oil pipeline through Canada would necessarily delay construction of the proposed Arctic gas pipeline for a number of years—certainly until the mid-1980's or beyond. Such a delay is unthinkable in view of the critical gas shortages now facing the U.S. and particularly the Midwest, whose dwindling operational estimate figures are estimated at 76.3% for 1975 alone. By the mid-1980's, this figure, in light of increasing demand the decreasing supply, will surely be considerably lower.

The conclusion which is obvious from this analysis is that construction of a trans-Alaska pipeline will not only deliver oil soonest to the area of the country most dependent of foreign imports, but that it will allow the most rapid construction of a natural gas pipeline through Canada so that the area of the country most dependent on natural gas, the East and the Midwest, will receive additional supplies in the shortest time possible.

Thus far in my statement I have pointed out the great need for oil on the West Coast, the far greater costs of construction and oil transportation associated with a Canadian line, the difficulty raising such a sum entails, the effect on the U.S. economy of the loss of employment and tanker construction which would arise from a trans-Canada route, and finally the substantial delays a Canadian oil pipeline would have on the delivery of natural gas to the Eastern and Midwestern regions of the United States.

I have premised my analysis upon the same assumption of a five year delay in the construction of a trans Canadian oil pipeline as has the Interior Department in its Economic and Security Analysis. I believe that, in light of many developments which I would like to explore in greater depth, that the assumption of a five year delay is indeed justified.

Much of the discussion concerning a trans-Canada oil pipeline ignores the fact that the Canadian government has not at this time received any application for such a line. Canadian officials have never indicated that the Canadian government would build such a line itself. Indeed, the Canadian government's position is that it is "at the present time . . . prepared to extend an invitation to corporations or government agencies to build a pipeline in that area." (Quote of Acting Prime Minister, in Mr. Trudeau's absence, Mr. Arthur Laing, on May 12, 1972 in House of Commons Debates, May 12, 1972, 4th Session, 28th Parliament, Vol. 116, p. 2210). Thus until the interest of private Canadian and/or American investors is aroused, discussion concerning such a project must be considered pure speculation.

Moreover, there are certain unchangeable factors associated with a trans-Canada route which will involve greater amounts of time than a trans-Alaska route. For one, an Alaskan-Chicago route through Canada would be over 3200 miles in length, while the trans-Alaska route is only 789 miles. Constructing a Canadian pipeline and the required additional facilities for a distance of three times the length of an Alaskan route will undoubtedly require at a minimum twice as much time. Alveska Pipeline estimates the construction time required for a TAPS route is 26 months. Thus, it is fair to expect that a Canadian route would require at least 52 months.

It also must be made clear that no design work, soil analysis, hazard evaluation or route alignment has even been begun on a trans-Canada route by the groups which will have to construct it. Careful analysis and selection of a specific route, the engineering and design techniques to be employed, and the sites for pump stations, terminals, and surveillance posts along the 3200 mile route would take long periods of time, considering the difficulties imposed upon working in a Northern environment by the harsh climate.

In this regard, a Canadian route also passes over 1150 miles of discontinuous and continuous permafrost, as opposed to 700 miles in Alaska. Because of the delicate nature of permafrost, building a hot, oil pipeline through it requires detailed analysis and careful design techniques, all of which takes time.

Furthermore, the Canadian route must cross 275 streams and rivers and 2,100 miles of its length passes through areas of cross drainage, while an Alaskan route crosses only 70 streams and rivers and only 435 miles of its length passes through areas of cross drainage, thus requiring fewer carefully designed over-pass facilities.

It is important to recognize that these design and engineering difficulties involved with soil analysis and hazard evaluation are problems which have not even begun to be studied for a Canadian route. Even when such a study begins, it will take longer than the time for a similar study of the trans-Alaskan route, which has already been completed.

New financial arrangements will also have to be worked out to finance a \$6 billion trans-Canada line. As I discussed earlier, it is likely that such a venture would require investment participation by both Canadian and American groups, and the necessity for Canadian governmental funds cannot be ruled out. However, the creation of such a financial system has not gone beyond the discussion phase. In addition, even after a more definite plan is formulated, the experience of the Northwest Study Project Group reveals that the accumulation of a smaller \$5 billion sum necessary for even a cold, gas pipeline is far from certain. In Mr. Wilbur Mack's words,

"The sheer magnitude of the financing presents an absolutely unique funding problem, particularly when consideration is given to the diverse and exceptional elements that must be resolved to make the project viable . . . raising that amount of money would test the capacity limits of the Canadian and U.S. financial markets."

Thus, it is plain that a great deal of time will have to be devoted to the creation of new financial arrangements for a trans-Canada line.

In addition, a trans-Canada oil pipeline probably will require the Interior Department to file a new environmental impact statement before granting a permit for the required right-of-way through the corner of Northeast Alaska. This route would most probably travel near the Arctic National Wildlife Range

and cross the Brooks Mountain Range—a huge area of land withdrawn by the Interior Department under the terms of the Alaska Native Claims Settlement Act.

The impact statement for the trans-Alaska pipeline filed in March of this year by the Interior Department cost a total of \$12 million and took thirty-three months to compile, after a right-of-way application was initially filed in June of 1969. In light of recent federal court cases requiring more thorough discussion in environmental impact statements concerning alternative actions, it is justified to assume that many months of study would be required before the Interior Department would be able to file a statement for the 200 mile stretch in North-east Alaska.

The governmental coordination necessary for a trans-Canada route is another factor which must be analyzed in terms of time delay. Mr. Wilbur Mack has stated that the legal and governmental problems facing the comparable gas pipeline project are "monumental", requiring certificates of public convenience and necessity from both nations, export and import permits to the shippers of the gas, the acquisition of rights-of-way, and the satisfying of different environmental requirements in both nations. Surely the same difficulties would be presented to a similar group seeking construction of a trans-Canada oil pipeline.

Indeed, international negotiations would surely prove to be necessary. An American-Canadian treaty could be needed to work out and formalize arrangements concerning regulation and control of the line, taxes to be imposed on it, possible disasters which might occur during its operation, and other contingencies. Undoubtedly, political reality would require that the four provincial governments through which an Alaska-to-Chicago oil line would pass would also have to be consulted.

The negotiations necessary for such international coordination could themselves occupy months or even years of time. A comparable example can be found in the negotiations which were necessary for the construction of a 250 mile trans-Alpine pipeline running from Trieste, Italy through Austria to Ingolstadt, Germany. Although all study of the project and the route was completed in 1962, actual construction did not begin until 1966 due to the lack of any coordinated regulations and procedures concerning acquisition of rights-of-way and environmental and safety control measures. Both the three federal governments and the local governments of the respective nations had to be consulted.

The same kinds of delays could present themselves in negotiations between Canada and the U.S. concerning the operation of an oil pipeline, considering the multitude of jurisdictions involved (*i.e.*, the state of Alaska, up to four Canadian provinces, and the federal governments of both nations) and the political volatility of the issue involved.

One of the most important developments which would likely delay any proposed trans-Canada oil pipeline is the land claims of Canada's Native population. In recent years the northern Natives of Canada have organized to press for settlement of their treaty and aboriginal rights, much as Alaskan Natives did in the recent past.

In 1968, Canada's Indian population numbered over 237,000, although most of this number have assimilated into Canadian life and live in the most urban provinces. Nevertheless, many groups still have outstanding land claims with the federal government. In 1899 and 1921, Treaties 8 and 11 were negotiated with the Indians of the Mackenzie District in the Northwest Territories, but were never enacted. With other Indians no treaties were ever enacted at all. Finally, with a third group of Indians, no treaties were entered into, in spite of understandings that such treaties would be negotiated. In 1912 complementary federal and Quebec statutes effected a northern extension of the boundaries of the Quebec province. However, although provisions in both statutes record Quebec's recognition of the rights of the Indian inhabitants of the region and its pledge to obtain surrender of such claims by some kind of settlement, no settlement was ever negotiated.

Thus, the claims of the various groups of Canadian Natives vary considerably. The judicial success of Canadian Indians whose ancestors were promised a settlement but which was never negotiated has been very slim. (See MacGuigan, Mark R., "Human Rights and the Native Peoples of Canada" 46 CANADA BAR REVIEW 695-711 (1968)).

The treaties signed in 1899 and 1921 with the Indians of the Mackenzie District of the Northwest Territories (the area, it should be noted, through which the proposed oil and gas lines would travel) granted the Indians one square mile of land for each family of five. However, these obligations were never fulfilled.

A large part of the 8,000 or so Indian population in the Northwest Territories is covered by these two treaties.

In 1959 a Royal Commission was appointed by the federal government which recommended an alternative to granting the land in the form of the payment of \$25 million, plus the annual payment of one percent of any revenues received by the Crown for mineral, gas, and oil reserves in the area of the treaties. This recommendation also was never implemented.

Finally, other Indians are expected to seek settlements on the basis of aboriginal rights, the foundation for the claims of Alaska's Natives. This would include the Eskimos of the Arctic regions and the Indians of the northern Yukon, particularly those in the path of the proposed pipelines from Prudhoe Bay. Most of Canada's present Eskimo population of 15,000 resides in the Northwest Territories and possesses only aboriginal claims.

By legislation enacted in 1965, the Department of Indian Affairs and Northern Development was formed on the federal level with the responsibility of administering Indian Affairs.

The Northern Natives of Canada have at present organized three groups to settle treaty and aboriginal rights. The largest and best organized group is the Indian Brotherhood of the Northwest Territories. The Brotherhood is composed of treaty Indians who presently live on reservations and receive a stipend from the government.

The second group is the Inuit Tapirisat which consists of Eskimos and also receives governmental assistance.

The third group is the Committee for Original Peoples Entitlement (COPE) consisting of Eskimos, Metis (part Native, part white), and non-treaty Indians (i.e., Indians who have left the reservation and no longer receive governmental funds).

The position of the Canadian government towards the various treaty and aboriginal claims of Canada's Indians has not been a favorable one. Prime Minister Pierre Trudeau is on record as stating that the Indians' claims should be dealt with on their legal and not on a basis of moral rights—a statement indicating that he is prepared to deal with the treaty Indians, but not the non-treaty ones—the Eskimos and the Metis. (*Oilweek*, April 10, 1972).

Moreover, Jean Chretien, Minister of Indian Affairs and Northern Development, in a May 18, 1972 appearance before the House of Commons declared that his government was "prepared to abide by the treaties and we have offered two options to the Indians: either their lands or a compensation. They have not made a choice." (House of Commons Debates, 4th Session, 28th Parliament, May 18, 1972, Vol. 116, P. 2384). Thus, it seems obvious that the Canadian Government is not willing to go beyond its original 1899 and 1921 treaty obligations concerning land allotments, or the settlement figure of \$25 million proposed in 1959.

Likewise, Mr. Chretien, in another dialogue this very month (June 5, 1972) in the House of Commons with Robert Stanfield, leader of the Opposition, declared that, although his government was prepared at any time to fulfill its treaties with the Indians of the Northwest Territories, that it intended to proceed with its plans for the development of the North without any effort to settle the question of aboriginal rights. Mr. Chretien declared that only if the Supreme Court of Canada gives a ruling directly with regard to aboriginal rights would the government "take the situation in hand and decide what ought to be done." (House of Commons Debates, 4th Session, 28th Parliament, June 5, 1972, Vol. 116, p. 2836).

The Canadian government thus seems to be indeed unsympathetic with the land claims of its Native peoples. The activities of the three Indian groups, however, indicate that they will not accept the present offers of the government, but will press for a settlement to include compensation for their aboriginal claims. Indeed, all of the various chapters of the Indian Brotherhood have refused to meet with the Indian Claims Commissioner regarding settlement of their treaty rights.

The successful efforts of the Alaska Federation of Natives in obtaining a generous settlement of 40 million acres of land, \$500 million in cash, and gas and oil royalty payments up to another \$500 million have served as a highly instructive model for the Canadian Indian groups.

The declared aim of all three Indian groups is at present "no settlement, no pipeline!" (*The Financial Post*, Toronto, April 15, 1972), referring to the proposed oil and gas pipelines down the Mackenzie Valley. The groups plan to go to court to halt construction of any such pipelines if they begin before the Natives have received the kind of settlements they are seeking to both their treaty and

aboriginal claims. Thus, obstructing law suits are planned to block any such projects, much as the law suit filed in April, 1970, by five Alaskan Native villages resulting in an injunction barring the Secretary of the Interior from issuing a pipeline permit.

It can be expected that the legal battles involved with any such litigation could reach to the Canadian Supreme Court. At present, lawyers for the groups representing treaty Indians are researching the expectations and understandings of the Indians who signed the 1899 and 1921 treaties to portray their belief that the wording of the treaties might not have represented what the signing chiefs thought they were approving. The non-treaty Indians, on the other hand, are trying to win acknowledgement that their aboriginal claims are indeed valid. The fact that the U.S. Congress explicitly acknowledged the validity of similar claims by its passage of the Alaskan Native Claims Settlement Act last December should provide important legal precedent in this regard.

Also it should be noted that concern has grown greatly in this country with the manner in which our Indian population was treated in past eras. This growing sentiment can be seen visibly by comparing the generous settlement terms which the U.S. Congress finally accepted as part of Alaskan Native Claims Settlement Act and the provisions of a similar bill in the 91st Congress which passed the Senate but not the House of Representatives. That bill, passed only 16 months earlier, offered the Alaskan Natives only 11 to 15 million acres of land and \$1 billion compared to the 40 million acres and \$1 billion agreed to 16 months later. In short, although the Canadian government may not now be prepared to accept the validity of the aboriginal claims of its Natives, political reality and public opinion may force it at a later date to accept these claims at a much higher, more costly settlement figure than it could now negotiate.

In summation, the Native groups of Canada are now organizing to press for the settlement of their treaty and aboriginal claims. Whether they can build up sufficient public support and develop the legal arguments necessary for blocking a trans-Canada pipeline until their claims are settled to their satisfaction is impossible to forecast. However, it does seem plain that Canada's Natives, drawing upon the experience of Alaskan Natives, should be able to significantly delay the construction of any pipeline through Canada, be it oil or natural gas.

Finally, I believe that only a cursory examination of the current trends in Canadian political and public opinion spheres reveal that an application for a right-of-way permit for a trans-Canada oil pipeline would receive as thorough and detailed an environmental consideration as similar applications have in the United States.

The Department of Indian Affairs and Northern Development will be the governmental body which will receive any right-of-way application for a trans-Canada pipeline. It will thus be the first agency to consider the various environmental issues involved with a trans-Canada oil pipeline and the one to lay down broad regulations. However, the National Energy Board will then have to be consulted in order to comply with the Board's specific regulations concerning the construction and operation of such a pipeline. In fact, specific land use permits will be required for nearly every activity which will involve the surface of the land. (From speech by A. D. Hunt, Assistant Deputy Minister of Indian Affairs and Northern Development in Boston, January 25, 1972).

Environmental concern has been growing in Canada as witnessed by many recently-passed pieces of legislation. The Department of Fisheries and Forestry was recently reorganized and renamed the Department of the Environment in June 1971, in order to spearhead and coordinate the federal attack on pollution.

In addition, the Fisheries Act was recently amended to expand the means for preventing the pollution of waters inhabited by fish by authorizing the government to levy stiff fines for non-installation of pollution control equipment. The Canada Water Act provides for federal-provincial consultation and agreements for water basin planning. The Clean Air Act was recently enacted to give the federal government authority to set national air quality objectives and national emission standards where there is a significant danger to health. Many other new statutes have also recently been passed to allow improved environmental control.

In particular, the Arctic Waters Pollution Prevention Act is especially revealing in portraying the kinds of international difficulties which may arise in the construction and operation of a trans-Canada oil pipeline. This legislation was passed at the time that the American ice-breaker, the U.S.S. Manhattan, was engaged in a voyage through the northern Arctic islands to determine if it was feasible to transport the North Slope crude oil from Alaska to the U.S. Eastern seaboard in ice-breaking transports.

Fearful for the sensitive environment of the yet undeveloped Arctic area, the Canadian Parliament reacted quickly and unilaterally. The new law imposes stringent anti-pollution regulations and strict liability on ships traveling in "shipping safety control zones," which extend up to 100 miles offshore in Arctic waters north of the 60th parallel—whether such waters are inside or outside Canada's jurisdiction to the north.

Likewise, statements of Canadian public officials have indicated that environmental preservation is a prominent consideration for them. Mr. Jack Davis, Minister of the new Department of the Environment, in a March 19, 1971 speech in Victoria, B.C., declared that proposals for a trans-Canada gas and oil pipeline corridor would be considered from many viewpoints, but that, "Environmental considerations must come first. They will come first. They come ahead of economics and they come ahead of engineering . . ."

The subject of the trans-Alaska pipeline and the alternative trans-Canada line has often been the topic for discussion in the Canadian House of Commons in recent months. The Ministers of the appropriate departments which would be involved in a trans-Canada line have appeared several times to answer questions of members on recent developments. On May 9, 12, 15, 16, 18 and June 2, 5, 6, 7 and 8 the Prime Minister, the Minister of Indian Affairs and Northern Development, the Minister of the Environment, the Minister of Energy, Mines, and Resources, and the Secretary of State for External Affairs have all appeared before Parliament for this purpose.

Ecological concern has also been very evident at the provincial level as well. In 1971 Ontario passed a new Environmental Protection Act to provide for stronger legislative authority for bringing pollution sources under control. In 1971 Ontario created a new Department of the Environment for the same purpose. In British Columbia, any new industrial development which may have a detrimental effect on the environment must obtain a permit from a committee of ministers under a 1971 statute which amends the Province's 1967 Pollution Control Act. These laws are important in light of the intergovernmental coordination and negotiations which would be necessary for the construction of a trans-Canada oil line, as discussed earlier, since the provinces will surely be consulted on such negotiations.

In summary, it is plain that environmental concern is rising as rapidly in Canada as it is in the United States. In light of this new ecological interest, it seems obvious that a 3200 mile, hot, oil pipeline, crossing 275 streams and rivers, 2100 miles of cross drainage, and 1150 miles of continuous and discontinuous permafrost would be given the most careful and detailed analysis and consideration before approval is given and construction allowed. Indeed, it is unrealistic and even presumptuous for Americans to assume that rapid consideration and approval would be given to any proposed trans-Canada oil pipeline. Canadians have as much to lose from the lack of a detailed examination of any such project, as do Americans from a trans-Alaska route.

An examination of the chronology of major events relating to the trans-Alaska pipeline reveals that the application for a right-of-way by the oil companies involved was first made in June of 1969 to the Interior Department. Yet the Department announced that it would approve such a permit nearly three full years later in May of 1972. Thus, the period of due process consideration of the right-of-way application involved a three year period of time.

I believe that it is fair to expect that in light of heightened environmental Canadian concerns that delay in Canada for approval of an oil pipeline application will be comparable to the time delay which has occurred in our own nation. Such a delay would, as I have already stated, have adverse effects upon not only the West Coast because of its growing need for domestic oil, but also upon the Midwest due to its shrinking natural gas supply and the additional delays that would inevitably occur in the construction of a trans-Canada gas pipeline.

In conclusion, I reiterate that construction of a trans-Canada oil pipeline should begin as soon as possible for many reasons. In addition to delivering oil to the area of the country that is most dependent upon insecure, foreign oil, the trans-Alaska pipeline will be able to do so at the lowest cost and in the shortest time. Furthermore, it offers important benefits in the employment opportunities and economic investments which will arise from the construction of the pipeline and necessary tankers. A trans-Alaska route will also hasten the construction of a trans-Canada gas line which will provide urgently needed gas supplies to the Midwestern and Eastern regions experiencing the greatest gas shortages.

I also believe that much of the discussion concerning a proposed trans-Canada oil pipeline ignores the fact that no application has yet been submitted for such

a line and that it may not be possible to raise the capital required for its construction. Furthermore, substantial delays could occur in Canadian consideration and approval of such a project due to pending legal battles over the land claims of Canada's Native population and the growing environmental concern in Canadian political and public opinion spheres. I do believe, in light of all these considerations, that the trans-Alaska pipeline route is clearly the more feasible, economical, and beneficial of the two proposed routes.

Senator STEVENS. Mr. Chairman, I ask that the statement of Donald Wright, which I asked to be delivered to the Committee this morning, be printed in the record as the statement of the President of our Alaska Federation of Natives.

Chairman PROXMIRE. Without objection, it will be so admitted.  
(The statement referred to follows:)

STATEMENT OF DONALD R. WRIGHT, PRESIDENT, ALASKA FEDERATION OF NATIVES

The Alaska Federation of Natives represents the 60,000 Eskimos, Indians and Aleuts in the State of Alaska who are most directly and deeply affected by the construction of the Trans-Alaska pipeline. We live amongst poverty conditions worse than those to be found anywhere in the U.S., but we are a proud people; proud of our cultural heritage, of our State and its development potential and most importantly proud of the great victory we won from Congress last December in the Settlement of our Native Land Claims in Alaska.

We are deeply disappointed that the Joint Economic Committee has not seen fit to permit us to testify during these current hearings. We have been provided the opportunity to submit a written statement, but that hardly seems an adequate hearing for the people who are most directly affected, and have proportionately the greatest stakes in the Trans-Alaska pipeline.

TWO BASIC LEGAL ISSUES

We feel that there are two legal and moral issues of overriding importance which need thorough discussion and analysis in any attempt to evaluate the relative merits of the Trans-Alaska or Trans-Canadian pipeline alternative.

*First*, the rejection or substantial delay of the trans-Alaska pipeline would undermine and violate the intent and terms of the Alaska Native Land Claims Settlement Act, for which we fought so long and hard. The intent of Congress clearly was that a \$500 million payment for extinguishment of aboriginal title would be derived from a 2 per cent overriding royalty on mineral leases, more than 90 per cent of which would be derived from the expeditious development of the oil and gas reserves on the North Slope of Alaska.

It is totally insufficient to maintain that a pipeline through Canada would be just as effective from our standpoint. Such a line would take longer to build, and construction could not even start for at least three years. That delay alone would postpone long-overdue payments for our land. Furthermore, any pipeline through Canada would have to transport both Alaskan and Canadian oil and this, too, would substantially delay fulfillment of the provisions of the Native Land Claims Settlement Act by unduly restraining the production of Alaska's minerals.

*Second*, the Alaskan Natives are deeply concerned about the aboriginal land rights of their brothers and sisters who are the dominant population of the Northwest and Yukon territories in Canada. We have learned from hard experience that it is imperative to settle the question of aboriginal land rights prior to the construction of any pipeline. The resolution of this issue in Canada is still in its early stages, and nothing should be done to undermine its opportunity for successful resolution. To advocate a Trans-Canadian pipeline must include as its premise a fair settlement of Canadian Indian land claims prior to any construction taking place. Based on our experience in the United States this will require a number of years of careful and thorough negotiation, perhaps even litigation.

ECONOMIC IMPACT OF THE PIPELINE ON THE ALASKAN NATIVES

If the crude oil pipeline is not built along the proposed Alaskan route, or if the start of construction is substantially delayed, the Alaskan Natives will suffer financially. Only last year, the Congress of the United States, recognizing its

longstanding obligation to the Native peoples of Alaska, passed the Alaska Native Claims Settlement Act (Public Law 92-203) signed by President Nixon on December 18, 1971. This act provides that in addition to direct payments from the Treasury of the United States the Natives shall receive a 2% overriding royalty on mineral production or leases of mineral lands in the state. These payments to the Alaska Native Fund will continue until they total \$500 million.

Although the State of Alaska presently receives mineral revenues from the oil and gas fields in Cook Inlet and on the Kenai Peninsula and from mining of hard minerals, the Environmental Impact Statement notes that, "In determining the royalty and production revenues which the state will receive, this analysis will assume that 90% of the aggregate of the Native royalty will come from North Slope oil reserves." Thus, we can expect few royalty funds before the North Slope oil and gas begin to flow.

Governor Egan will testify today regarding the importance of North Slope revenue to the State treasury, but I would like to remind you that further delay in building the pipeline will have a direct impact upon the Natives, both financially and psychologically. We are presently engaged in fulfilling the requirements of the Native Claims Settlement Act, enrolling those eligible to participate and organizing regional corporations. If the Congress now acts to delay construction of the trans-Alaska pipeline, however, it will be hard for us to believe that the Settlement Act was really passed in good faith. It will seem to many of us that, once more, what was given with one hand has been taken away with the other.

There has been testimony in these hearings that if the pipeline for the North Slope oil is to be routed through Canada rather than through Alaska as proposed, the delay before construction is completed will be at least two years. While we are aware of the need for energy in the rest of the United States, to us, this delay means principally two years in which the badly-needed revenues from the Prudhoe Bay oil will not be flowing into our Alaska Native Fund.

In a submission to the Department of the Interior Governor Egan has predicted that, if the oil pipeline is built through Canada, the Canadian government will insist on using a portion of the line's capacity for Canadian oil, thus reducing the rate at which the Alaskan oil can be produced. As a result, revenues to the State of Alaska and payments into the Alaska Native Fund would, therefore, not only delay payment to the state and the Natives of all revenues from North Slope oil production, it would also substantially reduce the revenues they will receive once production begins.

The 2% royalty would not be the only economic benefit the Natives would receive from the Alaska pipeline. Construction of the pipeline through Alaska will mean jobs, specifically for Natives, as well as for all Alaskans. In addition to the usual federal clauses requiring that both the pipeline company and its contractors provide equal employment opportunity to all, the Interior Department Stipulations specifically require "recruitment, testing, training, placement, employment, and job counseling of Alaskan Natives." A document submitted to the Department of the Interior by Alyeska Pipeline Service Company in January of this year describes the company's Plan of Action for Native Training in response to this stipulation. This plan estimates that during the construction phase some 2200 Natives will be trained and employed. While employment will naturally drop once the pipeline is completed, there will still be positions available in operating and maintaining the line. For these, Alyeska expects to be able to train and employ from 50 to 100 Natives each year, with the goal that "within 5 years after start-up of the pipeline, the composition of Alyeska's work force will include Alaska Natives as employees in a percentage at least equivalent to their proportion in the make-up of the total Alaska population."

These projections of direct employment for Natives in pipeline construction and operation do not include others who would be employed by Native-owned firms carrying out contracts for the pipeline company. Even during these lean years of waiting, Alyeska has already entered into 24 contracts with 5 Native-owned firms to perform such tasks as seeding the embankments of the completed portion of the pipeline road, removing bevel guards used in shipping the pipe, etc. These small contracts have already brought \$900,000 into Native hands.

A further economic benefit to the Natives of Alaska will come from the increased revenues to the state treasury. In the past few years, the state has been struggling to continue to provide to the people of the state essential services in the fields of education, health and welfare, many of which are of particular importance to the Natives. These efforts will have to be seriously curtailed if the North Slope oil revenues are delayed much longer.

Canadian oil will be developed and transported in due time. The Alaska Native people desperately need employment, full development of their hard won land and mineral resources and a viable economy now. None of these are possible without the prompt construction of the Trans-Alaska pipeline.

#### ENVIRONMENTAL IMPACT OF THE PIPELINE ON ALASKAN NATIVES

The Natives of Alaska do not accept the proposed trans-Alaska pipeline uncritically. We have expressed our concern in the past that the line must be built with sufficient safeguards to protect the natural environment upon which so many Natives depend for their livelihood. After studying both the Interior Department's Environmental Impact State and much of the material submitted to the Department by Alyeska Pipeline Service Company, we are convinced that the technology and knowledge now exists to make it possible to build and operate the line safely. I would like to specifically discuss some precautions that are being taken to protect the natural resources of greatest importance to the Natives.

The Prince William Sound fisheries, upon which many Natives of that area depend both for subsistence and for commercial fishing, will receive a high degree of protection from dangers of oil pollution. The tanker terminal at Valdez is to be built on bedrock on the site of an old fort that remained undamaged through the disastrous 1964 earthquake, while the old town built on alluvial flats was destroyed. All oil storage areas are to be situated well above the highest point reached by the tidal wave that accompanied the earthquake, the most severe known in that area; facilities are designed to withstand such earthquakes and will include the most modern equipment. Great care has also been exercised in the design of all facilities to avoid the possibility of oil spills from any terminal operations. In addition, no dirty ballast water will be discharged at sea from any tanker travelling to or from the port of Valdez. The ballast treatment plant at the terminal will be among the most modern in the world, and the effluent discharged into the waters of Port Valdez will contain no more than 10 parts per million of dissolved, invisible oil. Tanker traffic through Prince William Sound and Valdez Arm into Valdez will be strictly controlled, with only one-way traffic permitted between the entrance of Valdez Arm and the terminal. As well as being equipped with two independent radar systems, each ship will be guided by a pilot and will be in continuous communication with the terminal facility.

An oceanographic baseline study has been made of the Port Valdez marine ecosystem, and this information will be used to determine whether terminal operations are having any negative impact on the marine life of the area.

Fisheries are also important to Natives living in the Interior of the state, who harvest fish from mighty rivers like the Yukon and from smaller tributary streams. The State Department of Fish and Game and the U.S. Fish and Wildlife Service have conducted detailed studies of all streams to be crossed or otherwise affected by the pipeline to gather previously unknown data on types of fish inhabiting the streams, times of fish runs, and location of spawning areas. This information will be used in determining the timing of pipeline construction activities to avoid disturbance of the water at crucial times in the life cycle of certain varieties of fish. The Interior Department stipulations also require that siltation of streams be kept to a minimum, that spawning beds be protected from sediment, and that fish passage structures be constructed whenever pipeline activities would block passage of fish. To prevent thermal pollution, the pipeline will be designed to insure that no heat will be transferred from the buried pipe to any stream.

There are Native communities, particularly in Interior Alaska, that are heavily dependent for their subsistence upon hunting caribou. For this reason it is extremely important that the migration routes of these animals not be blocked by an elevated pipeline or by construction activities. Considerable time and effort has been spent gathering information on the exact routes followed by the two principal northern caribou herds, in order to pinpoint the locations at which the pipeline might impede their passage. Where the pipeline must be laid above ground in such areas, crossings will be provided. Studies are continuing to determine which types of crossing are most easily used by the animals, with various designs of both over and underpasses being considered. I would like to note that residents of Alaska have had long experience in observing the behavior of caribou and moose when confronted with highways, pipelines and other man-made obstructions, which they regularly cross with ease.

With regard to both fish and wildlife, the Interior Department stipulations clearly state that construction and later operation activities may be restricted

during periods of fish and wildlife breeding, nesting, spawning, lambing or calving, and during major migrations. They also require that the pipeline must be constructed and maintained in such a way to allow free passage of large game animals at all times.

We Natives love our land and do not want to see it despoiled by the severe erosion or massive oil spills envisioned by some pipeline critics. Intensive studies have been carried out over the past three years of the terrain to be traversed by the line, the soil characteristics of each portion of the route, and any areas which present the possibilities of such unforeseen natural phenomena as earthquakes, avalanches, or glaciers. Where the soil is stable even when thawed, the pipeline will be buried underground; where the soil is unstable, the line will be laid above ground; and in areas of potential earthquake activity special precautions will be taken to enable the pipe to withstand any quake. Engineering and technological understanding presently exists to permit the construction of earthquake-proof pipelines. For example, an engineering study of the effect of the 1971 San Fernando earthquake in California reported no damage to modern pipelines using the type of welds projected for use in the Alaska pipeline. The steel pipe to be used by Alaska has proved its strength under rigorous testing by enduring considerable displacement without breaking. According to Interior Department stipulations, pipeline designs for each portion of the route will be based on the severity of known earthquakes in that vicinity.

As for the danger that unsightly construction scars will mar the route of the pipeline for years, the stipulations state that all disturbed areas must be left in a stabilized condition and shall be seeded and planted until new growth is established. I might add that I would be happy to show any committee members who wish to visit Alaska this summer an example of how successful such revegetation can be. Along the road constructed by Alyeska from Livengood to the Yukon River, just one year after completion of construction, tall grass flourished on the shoulders and banks of the highway, thanks to an innovative revegetation program carried out for Alyeska by a Native corporation.

#### PIPELINE PERMIT-INDEMNIFICATION STIPULATION

There is one matter of great concern to Alaskan Natives that has not yet been resolved. The acid test for the Natives of the good faith of the Trans-Alaska Pipeline Company and its parent oil companies and the integrity of the Department of Interior's "Environmental Impact Statement", is whether or not the pipeline permit will contain an express stipulation ensuring that the Natives of Alaska will be fully and fairly compensated for all damages to subsistence resources which may result from construction or operation of the pipeline and related facilities.

More than a year ago, the Alaska Federation of Natives submitted a proposed indemnification stipulation to Secretary Morton. The proposed stipulation is reasonable and absolutely essential.

Secretary Morton has recently informed us of his understanding of our concern and his desire to be responsive. The ball now rests in the Alyeska court. Their acceptance of our proposed stipulation will clear the way for Secretarial action. Their resistance to the terms of the stipulation would be a clear indication of their bad faith regarding the environmental hazards of the pipeline and their potential impact on the Native subsistence economy.

#### ALASKA FEDERATION OF NATIVES RECOMMENDED CHANGES IN STIPULATION FOR PROPOSED TRANS-ALASKAN PIPELINE<sup>1</sup>

A. Indemnification of Persons Damaged by Pipeline: 1. Insert a new subparagraph a. to Paragraph 5., page 11, as follows, and redesignate the present subparagraphs a., b., and c., as b., c., and d., respectively.

a.i. Permittee shall be liable for any damage suffered, including economic loss, or for any cost or expense incurred by any person, which damage or cost or expense is in any way connected with or the result of the construction, operation or maintenance of the Pipeline or is in any way connected with or the result of any condition existing with respect to the Pipeline, including damage or cost or expense resulting from harm or injury to any other person or to any structure,

<sup>1</sup> References are to the January 1971 draft Stipulations prepared by the Interior Department and the Federal Task Force on Alaskan Oil Development, appended to the Department of the Interior draft Environmental Impact Statement, January 1971.

property, land, stream, wildlife, vegetative or fishery resource. The liability provided for under this subparagraph shall exist regardless of fault, negligence or breach of any condition of the permit by Permittee, but nothing herein shall relieve Permittee of any liability arising under State or Federal law.

ii. In the event a person claiming damage hereunder and Permittee are unable to agree on the compensation due, it shall be determined by arbitration or court proceedings at the option of the claimant. Arbitration shall be governed by the Alaska Uniform Arbitration Act (Ch. 43, Alaska Code of Civil Procedure; Sec. 1, ch. 232 SLA 1968). All fees and expenses of arbitration, including reasonable attorneys' fees, shall be borne by Permittee.

iii. Pending determination and payment of damages, whether by agreement or otherwise, Permittee shall provide subsistence, shelter, medical care and treatment, and other necessities and make emergency repairs and replacements, or advance funds for any or all of the foregoing, as determined or directed by the Authorized Officer. The value of services provided and any funds advanced shall be deductible from damages payable, but shall not otherwise be reimbursable. A claimant may appeal an adverse decision of the Authorized Officer to the Secretary of the Interior.

iv. As used herein, "person" includes, without limitation, Alaska Native Villages, whether or not incorporated under the laws of Alaska or of the United States, and groups, bands, or associations of Alaska Natives.

2. Add a new d to B.1, page 3: d. That Permittee agrees to the provisions of Paragraph 5.a of this Stipulation B and that its provisions are for the benefit of persons claiming thereunder.

3. Add to 3., page 5: However, any revision or amendment of Paragraph 5.a of this Stipulation B shall require the concurrence of the governing bodies of each of those regional associations of Alaska Natives and of those Alaska Native Villages (whether or not incorporated under the laws of Alaska or of the United States) whose areas are traversed by the Pipeline right-of-way, nor shall any such revision or amendment be made without public notice and opportunity for comment on any proposals for revision or amendment and opportunity for participation by representatives of the persons affected thereby in any discussions thereon which Permittee may hold with the Authorized Officer or with any other official or employee of the Department of the Interior.

4. Add to 6., page 13: Insert after "Pipeline", in the fifth line of second paragraph: ", including obligations to third persons under paragraph 5.a of this Stipulation B."

B. Participation of Natives in Pipeline Activities Under the Permit: Add a new unnumbered paragraph immediately preceding the first full paragraph on page 4, as follows:

The Authorized Officer shall arrange for the participation of Alaska Natives knowledgeable concerning conditions in the areas affected in connection with all inspections, formulations or reviews of plans or proposals, surveys, and other activities or inquiries authorized or required to be made by all Federal agencies under this permit and the Authorized Officer and all Federal agencies exercising initiatory, review, approval, or inspection authority hereunder shall consult with such Natives in the discharge of such authority. All travel and other expenses of such Native participation, including subsistence or per diem in lieu thereof, and reasonable compensation for services, shall be borne by the Permittee. The Authorized Officer shall select Native people for this purpose from among nominees made by the governing bodies of the Regional Associations of Alaska Natives and the Alaska Native Villages whose areas are traversed by the Pipeline right-of-way.

Chairman PROXMIRE. Gentlemen, Congressman Begich had to return to the floor for a vote, and when he returns we'll be happy to hear from him.

Governor. I exempt you from this statement, but in the 15 years I've been in the Senate, this is the first time I've been deliberately insulted, and I think I have been as Chairman of this Committee. I have done my best to try to balance these hearings, and I resent it very deeply that you gentlemen come before this Committee and say that our witnesses are unbalanced.

Now, these—

Senator STEVENS. Mr. Chairman, I called that to your attention.

Chairman PROXMIRE. Wait a minute. I'm not through, Senator Stevens. I am Chairman of this Committee and you will wait until I finish my statement. You spoke ten minutes and I will not take that long to respond.

Let me say that we have had nine witnesses before this Committee, five in favor of the Alaskan pipeline and four against it. We will have six in favor when Congressman Begich comes in. We invited the oil companies to testify. We went after them on the phone. We called them, we pleaded with them. We asked them to come. They didn't do so. We will put in the record the statement of BP Alaska, Incorporated, strongly favoring the pipeline.<sup>1</sup> They are the experts that you called on. We have that. They spent a lot of their time attacking Mr. Cicchetti, but we will put that in the record. The United Association of Plumbing and Pipefitting Industry, they have asked to have their documents put in the record in favor of the Alaskan pipeline.<sup>2</sup> We are doing that.

So, this Committee is not trying to have a series of witnesses who are not fair. I think all of you gentlemen know the subject very well. I have great respect for Senator Hansen, Senator Stevens, in this area especially. They've given a great deal of attention to it. Governor Egan, of course, is the governor of Alaska. I don't know anybody who could speak with more authority for Alaskan interests than he can, and we deeply value his testimony. I think his testimony is most useful to this Committee. It's not a technical committee.

Our responsibility is not to evaluate the substantive technical issues in great detail, but we have had the Secretary of the Interior before us to justify your position in full. We gave him more time than any other witness. He spoke at considerable length. He answered questions at length, and we have been willing to include in the record any documents that he or anybody else would like to put before us.

Now, before I call on Congressman Begich, Senator Stevens if you want to reply to this, go right ahead.

Senator STEVENS. Yes. You are entitled to feel that you are insulted. I would like for you, as the Chairman, to think about this. If I were the Chairman of the Committee and there were a project that was entirely within the State of Wisconsin—perhaps it might be dairy price supports or something like that—and I scheduled hearings, you requested the right to appear before me as I did before you. I would gladly invite you to testify as soon as possible. I find that we appear on the closing date of these hearings and that twenty minutes or thirty minutes will be allocated out of the total hearings to the representatives of the State of Alaska through which this pipeline goes. In my opinion, and I say it to you respectfully, you started off this Committee with a closed mind and you are closing them with a closed mind as far our pipeline is concerned. I think you have insulted our state by not permitting us to appear and not permitting the proponents to appear before you as you started the Committee. Also this is a Joint Economic Committee, but I have heard more about environment and environmental concerns since I have been here than I have heard about economics. However, the representatives of Alaska have tried to direct

<sup>1</sup> See appendix, p. 430.

<sup>2</sup> See appendix, p. 438.

our statements toward economics, particularly the economics as they affect the country and they affect our state.

But I personally take great umbrage, and I shall not forget it, in the manner in which your staff treated us in the beginning. As you know, they denied our original application to appear before you, and, although I am grateful to you personally for allowing us to testify, I think it has occurred too late. It has occurred too late as far as I am concerned to erase the impact on our state throughout the nation. For three weeks now Alaska has received adverse publicity from the opponents of the pipeline. I don't know how much time these other people took, but I know I waited all morning here and I have had ten minutes. Our Governor has had ten minutes. Our Congressman will have ten minutes, and Senator Hansen, who kindly agreed to come and support the proposition of the proponents of the pipeline, has had ten minutes. If you are entitled to feel insulted, I think we are, too.

Chairman PROXMIRE. Senator Stevens, all witnesses have had ten minutes. No witnesses have had more except, you recognize, Secretary Morton, because of the way this was handled. I would say technically he had twenty minutes. You've had twenty minutes on this issue because you appeared before on another issue, but the overwhelming proportion of your testimony related to your support for the Alaskan pipeline. It was very valuable testimony, very useful, very expert. You did a fine job. This is the second time you have appeared before this Committee within the last couple of months on this issue, and I think that that also has to be evaluated.

As I say, it's not in this series of hearings. It was related to another issue at which you spoke at length and with great force on the Alaskan pipeline.

Congressman Begich, go ahead.

#### STATEMENT OF HON. NICK BEGICH, A REPRESENTATIVE AT LARGE IN CONGRESS FROM THE STATE OF ALASKA

Representative BEGICH. Thank you, Senator. I'm grateful for the opportunity. I've been dashing back and forth because we have the Revenue Sharing proposal on the floor of the House.

I'd like to have my entire prepared statement included in the record.

Chairman PROXMIRE. Without objection, the prepared statement will be placed in the record at the end of your oral statement.

Representative BEGICH. And, incidentally, since we are discussing time requirements for the Canadian route, I would like to insert in the hearing record at this point a copy of a deposition taken on June 16, 1972, of Mr. Richard Nehring, who testified earlier in these hearings. This deposition taken in connection with Federal Court proceedings on the TAPS Permit, contains a great amount of information.

Chairman PROXMIRE. That will be put in the record at this point. (The deposition referred to follows:)

AFTERNOON SESSION, 1:45 P.M.

Mr. STOEL. I had finished my direct examination.

Whereupon, Richard Nehring, the witness on the stand at the time of recess, resumed the stand and testified further as follows:

## CROSS EXAMINATION

By Mr. McKeivitt:

*Question. Mr. Nehring, I believe you said you graduated with a B.A. in 1965 from Valparaiso.*

Answer. Yes.

*Question. What was your major?*

Answer. My major then was history.

*Question. Then you studied at Oxford. In what did you get your B.A. at Oxford?*

Answer. I took my degree in what is known as the R style of philosophy, R politics and economics.

*Question. In other words, it is a combined degree; that was not a degree in economics as such?*

Answer. No. You take subjects in each one and then you can elect to take additional subjects in one of those or a combination of two of them and then I took all my additional work in economics.

*Question. What degree are you working for at Stanford?*

Answer. Doctor of Philosophy and political science.

*Question. What is the subject of your dissertation?*

Answer. The Politics of Policy Analysis.

*Question. That is not a degree in economics then.*

Answer. No, that is not.

*Question. Not in the economic field.*

Answer. I did take 18 quarter hours of graduate work in economics.

*Question. But you have no degree as such in economics?*

Answer. No, I do not.

*Question. Just roughly how old are you?*

Answer. Twenty-eight.

*Question. You first came to work for the Department of the Interior in September 1971.*

Answer. Yes.

*Question. How long did you work then totally?*

Answer. Eight and a half months.

*Question. What were you doing primarily before you came into the Department of Interior?*

Answer. I spent the previous two and a half years primarily engaged in research on my doctoral dissertation. This took a long time. Because of the nature of the subject I had to spend a lot of time sort of just learning what policy analysis is, how it is done and how it is used. Essentially, if I could explain this for a short while, policy analysis as I refer to it in my dissertation was technique, also known as systems analysis, also known in some cases as sort of the type of analysis which is used in a program planning budgeting system. It was primarily developed in the Rand Corporation in the period of the 1950s.

*Question. You were brought into the Department of Interior particularly in connection with the pipeline?*

Answer. No.

*Question. Isn't that right?*

Answer. No, I was not.

*Question. What did you do when you first came into Interior in September 1971?*

Answer. I indicated previously in testimony that I began work immediately on the analysis of the Alaska pipeline, specifically Appendix E.

*Question. You started work on this pipeline environmental statement right away but you were not brought in for that specific purpose, is that right?*

Answer. That is right.

*Question. Were there any other number of people that were put to work on the pipeline at that time in the Department of Interior?*

Answer. There were two other people in the Office of Economic Analysis, Mr. Nicolai Timenes and Mr. Robert Lawton.

*Question. Before you went to the Department of Interior did you have any other contact with the Alaska pipeline?*

Answer. No.

*Question. Did you have any knowledge of it?*

Answer. Certainly. I read about it in the newspapers.

*Question. Did you have any opinions about it?*

Answer. No; very substantial opinions at that time in terms of possible alternatives or anything of that nature.

*Question. As to insubstantial opinion, were you for it or against it?*

Answer. They were so insubstantial that I cannot even recall.

*Question. You cannot recall whether your basic feeling was that it, the pipeline, should be built or that it should not be built?*

Answer. Essentially, I formed my opinion as a result of the analysis I did as a result of the subject, not as the result of strong preconceptions I might have had in the beginning of the analysis.

*Question. Well, you might have had them. What were they?*

Answer. I said I might have had, indicating that in some cases people may come to an analysis with strong preconceptions. I didn't come to this analysis with strong preconceptions.

*Question. You say you did?*

Answer. I did not.

*Question. You did not. Now the particular work that you did in the fall of 1971, was that mainly in the economic field of economics?*

Answer. Yes. I was dealing with sort of economic impact on the State of Alaska.

*Question. Well, is that the only thing you dealt with in the fall, economic impact in the State of Alaska?*

Answer. Yes, in terms of the analysis related to the pipeline.

*Question. Was there anybody else working on that particular phase?*

Answer. On that particular appendix?

*Question. Right, on that particular phase of the economic impact on the State of Alaska.*

Answer. I was the only one that did any other work on that. It was, of course, reviewed by other staff members in the office.

*Question. How many would that be roughly?*

Answer. Essentially the other three people in the office who subjected it to review were Mr. Lawton, Mr. Timenes and later Mr. Harvey Mack who came into the office I believe in October.

*Question. Were they all above you, as you might say, on the scale?*

Answer. They all had higher Civil Service ratings, yes.

*Question. Well, would the higher Civil Service rating also mean that they had a review over your work?*

Answer. Well, no. That was sort of on a mutual colleague-to-colleague basis. They reviewed my work and I reviewed their work, and essentially we worked on a level of equality.

*Question. Is that the same with Dr. Vogley?*

Answer. No, he is the Director of the office.

*Question. Right. And he was over you in that sense?*

Answer. Yes.

*Question. Were any of these men over you in that sense?*

Answer. Well, prior to the time Mr. Mack came in, Mr. Timenes would be the Acting Director in Mr. Vogley's absence. I don't know when Mr. Mack came in but gradually as his position became established he would sort of act for Dr. Vogley in Dr. Vogley's absence.

*Question. Would you say that you did any other work in that connection that was not in the field of economics?*

Answer. Well, yes. I mean my job title was essentially that of an economic analyst. Because of the title of the office I more or less thought of myself as a policy analyst or a program analyst. During that time I did some work on the particular question that was brought up, whether Federal revenues from the Outer Continental Shelf should be shared with the adjacent states.

*Question. You did not think of yourself as an economic specialist then?*

Answer. I thought of myself as a person who has proficiency in economics but who essentially had the capability by utilizing the knowledge of other people to deal with broader questions as well.

*Question. Along with proficiency in other fields, is that right?*

Answer. Well, no. I explained that I had the proficiency to use the knowledge of people in other fields in a more comprehensive policy analysis involving more than economic considerations.

*Question. Now when you came to prepare this statement, which has tentatively been marked as Plaintiff's Exhibit 5, about when did you say that you started that?*

Answer. The assignment was given sometime in February but I had several other assignments which had very definite due dates at that time so I was not really able to do much work on the paper until March.

*Question. Did all of your other assignments have to do with the Alaska pipeline environmental statement?*

Answer. Some did. There were others that had to do with preparation of analytic studies for the 1974 budget for the Department.

*Question. While you were working primarily under Dr. Vogley?*

Answer. All this time I was working under Dr. Vogley's direction.

*Question. When he gave you a job to do such as this one, did he just let you go ahead and do it?*

Answer. Yes, essentially that was how the office operated.

*Question. Did he or anybody ever try to influence your thinking or your conclusions?*

Answer. The only direction I was given on this score on any papers was—well, certainly something like this happens in the review process. I mean this is essentially a process of professional questioning of adequacy of your work and the other staff members would go through the document and say: "Well, is that point really well substantiated? I don't think you developed it as well as you could, and I think you better go back and take another look at it."

*Question. That was the only sense?*

Answer. That sort of thing we had. Also there were several times where I made certain arguments where I would say, "I think this is an appropriate frame of reference in which the subject should be considered," and Dr. Vogley thought doing something like that was going beyond the scope of my responsibility so I excluded that from the paper.

*Question. You have no complaints in the way your superiors let you do your work, is that right?*

Answer. Not in the sense of their ever telling me I had to write something this way, no, I never was told that.

Representative BEGICH. Which will place his testimony in clear perspective, and that is this document.

Chairman PROXMIRE. Well, I don't know if we want to print the entire document up, but we will certainly hold it available, and we will print any part of it that you would like us to print.

Representative BEGICH. The reason I made that request, Mr. Chairman, is because it is obvious that once a legal deposition was taken, with the full responsibility that that entails, all of a sudden, some of the statements that he made aren't quite the way they were made before this Committee.

Now, we have come a long way in this discussion after three years, and this massive impact statement, as required by Section 102 of the National Environmental Policy Act, has been completed. It is clear by virtue of its completeness that it will likely be the legal vehicle for testing the reach of NEPA in the courts. From the impact statement research required by the Interior Department and several other Federal departments, plus that of the State of Alaska and of the oil industry, have come a host of technical breakthroughs which are important in the consideration of this question, such as automatic welding techniques of unprecedented capability, pipeline refrigeration, elevation techniques in response to permafrost conditions, which have been little discussed in the press; oil tanker designs which put the vessels of foreign nationals to shame; block valve, monitoring earthquake reaction systems, which are capable of assuring pipeline leak security better than ever before. There are innumerable others, but they are the contents of thousands of pages of research and conclusions.

A set of construction stipulations have been drawn which bind and control this project to a degree not previously experienced, and certainly the lightest footprint of man possible in a project of this kind.

During these three years we've settled the Alaska Native Land Claims, and premised an extremely significant part of the native settlement upon the production of North Slope oil at a reasonably early time. Similarly, the State of Alaska, a state with well-recognized human and social needs, has premised its solution to those needs and its long-term economic planning on the production of North Slope oil. The state has participated fully on the Federal study of the pipeline and has undertaken substantial planning and legislation at the state level, planning to cope with the many technical aspects of regulations and surveillance planning to translate economic benefits into a better quality of life in Alaska, planning to relieve the nation's worst unemployment and poverty of any state in the nation and to avoid a boom and bust pattern. Much more could be added because this 3 year period has been filled with specific and invaluable effort in response to the trans-Alaska pipeline proposal, an effort which has not and could not have been forthcoming under the Canadian non-proposal.

I want to make it very clear to the Committee, however, that despite the work and accomplishments of the past three years, these factors alone could not persuade me of the desirability of proceeding as soon as possible with the trans-Alaska pipeline. It does, however, make a responsible decision possible and bring us to that decision.

The central factor in all these reasons is the existence of a strong time preference for the production of transportation of North Slope oil. At the top of any list is the argument of the state of Alaska, one too often passed over, and I am sure the Governor has covered that today. I suppose in a time when budget deficit is a way of life for states and cities this cannot be overemphasized, but it can never be overemphasized that Alaska has a range of human needs which cannot be ignored or denied. Closely related, and equally strong time consideration is the relationship of the North Slope oil production to the Alaskan Native Land Claims Settlement.

As you know, over 50% of the monetary settlement in Public Law 92-203 is related to the sharing by Alaskan Natives of Alaskan State mineral revenues. This amount will ultimately total \$500 million. It's not a gratuity in the settlement. It is a hard-won compromise based on firm projections of oil revenues and on the firmest promise in this country and the state can make as to when the revenues would be produced.

Since it appears the Committee will be hearing no direct representatives of Alaskan natives, let me say for them that it is unacceptable to defer this promise in that settlement which was historical at the time that it was made by Congress, at a time when adequate facts existed to support a trans-Alaska route, and when the only alternative is a still-to-be-defined Canadian route.

A third factor is the always present relationship of time and cost. As originally proposed, the Trans-Alaska Pipeline had a projected cost of under \$1 billion; that cost has now risen to an acknowledged sum of at least \$3.5 billion. Some of that increase is attributable to valuable new components to increase the safety and efficiency of the pipeline, but much of it is due to the mere passage of time. Quite frankly, I am one who argues that any cost is acceptable which makes the line safer and better, but the pure costs of delay are intolerable for the consumer of America.

Of course, this cost is only that of construction; similar cost increases will occur in all the areas of regulation and surveillance which will be carried out by the state and the Federal Government. Still another crucial time factor is the crisis facing the nation and the rest of the world. Certainly this is not a topic for the few short minutes we have here, but I would make two points. The first is that the United States needs the oil from North Slope fields, and needs it at the earliest possible time.

The recognition by foreign nations that the United States is undertaking a course of inevitable and growing import reliance will affect all the international bargaining points of the future.

The fact that recent information regarding the oil needs of western Canada brings into doubt Canada's desire and ability to increase imports to the United States is also significant. Also significant is the recent nationalization of the northern oilfields in Iraq, and similar incidents in other nations from which the United States imports oil.

As a second matter regarding the time factor, as related to energy requirements, let me simply say that the crisis in the supply of natural gas equals or exceeds that in oil. The testimony by Chairman John Nassikas of the Federal Power Commission during these hearings makes this clear, and makes it clear that natural gas is at the heart of the energy crisis in the Midwestern and Eastern United States, about which so much has been said in these hearings. Since a Canadian natural gas line from the Northwest Territories now seems certain, that line will rely on the availability of Arctic natural gas. It can come from Alaska's North Slope only when oil is produced there. That can be in three years, or it can be several years later if we do not act now on the trans-Alaska route.

Even if my testimony were to stop right here, I believe it would be clear that the decision to issue the pipeline permit was justified. The time factors making it essential to act at the earliest possible time are persuasive, and the work already done on the trans-Alaska route is clearly sufficient to make a responsible decision possible. Yet, there is another major factor that leads me, even more certainly, to the conclusion that the beginning of the Trans-Alaska Pipeline should not be delayed. That factor is the nature of the Canadian alternative and the reasons for believing that it has a painfully long way to go.

Let us be honest about the Canadian route alternative. The most forceful and definitive proposal for it which has ever been made was in the recent and well publicized letter by Canadian Natural Resource Minister Macdonald. Beyond that, one has to rely on occasional statements, such as the one by the Parliament Member Anderson at these hearings, where he did not even appear as a representative of the Canadian government, just for himself.

Still, the Macdonald letter is the firmest statement made, and I must say in all candor, that it does not appear very firm. First, there is the entire matter of statements of this type made in the past. As you recall, Minister Macdonald promised expeditious action on a Canadian pipeline in his letter. The Committee will remember, I am sure, that then-Secretary of the Interior Walter Hickel made almost an identical promise in December of 1969 regarding the Trans-Alaska permit. Similar statements were made by Secretary Morton several months ago.

Each of these men made their statements in good faith, but without contemplation of the future events which would intervene. The Alaska Native Land Claims, the proper demands of environmental concerns, and the delays of thorough scientific study all contributed to the three year wait since 1969. I see absolutely no reason to believe, given the lack of study on a Canadian route, that we should expect the delay on that route to be one day less. Moreover, given the benefits that were gained during the three years of study on the Alaska route, there is no reason we should not desire the same Canadian route.

To answer this, there are the gentle assurances of Minister Macdonald and others that the Canadian pipeline will be expedited.

As if to prove it can really go quickly, some of us are told that Canada has no burdensome National Environmental Policy Act to slow things down and that the Canadian Native land claims do not have the same legal or political basis as those in Alaska.

To all of this, I ask two questions. First, is it possible for a Canadian route to be approved on the expeditious schedule promised, and in view of the time factors I expressed earlier, on the schedule necessary?

Second, in view of what such an expeditious schedule really means, is it in any way desirable that it be done? The answer in both instances is in the negative.

Let me assure you, Mr. Chairman, in my closing minute that the Canadians have just begun for the battle we've had in Congress for six years of land claims. They have a serious question there.

It is also to assure the people of this country and this continent that they have just begun to answer the environmental questions, and they have not begun the exhaustive study that is required that has piled up 27 volumes of pipeline description, almost 3,950 pages of printed material just on the geological information and 6,000 holes, and the 9 volumes just submitted to the courts now.

This is the most studied single free enterprise project in the free world today. Even the impact study on the blast in Amchitka took only 47 some pages, so we've come a long way and I think the time for decision is here.

And the time to bring cheap gas and cheap oil to all the consumers in America is now. And that the pipeline through Canada will delay this project from five to eight years at the minimum, which would give your consumers in the Midwest—and I formerly came from the great State of Minnesota, your neighbor state—and they will pay a far greater price by the delay that we are intending to foster upon that development in the great North Slope.

I thank you very much for the opportunity to appear.

(The prepared statement of Congressman Begich follows:)

#### PREPARED STATEMENT OF HON. NICK BEGICH

Mr. Chairman, I appreciate the opportunity to appear here today on behalf of the people of the State of Alaska. I place particular emphasis on that representation because, although my remarks will relate substantially to national aspects of the pipeline decision, I believe I can serve both my constituents and this Committee best by speaking primarily to the factors which are vital to Alaska.

My understanding of the purpose of these hearings is that they are intended to foster a discussion and examination of the substantial work already done on the pipeline proposal, rather than undertaking a comprehensive and duplicative re-investigation of the entire matter. This is a wise choice, as the work which has already been done is certainly adequate for responsible decision-making.

As the pipeline proposal has been subjected to the study and approval process required both by law and common sense, unprecedented quantities of human and other resources have been expended to accumulate the information necessary for a sound decision. Few can now deny that this is the most thoroughly studied project of its kind in history, and that this is entirely appropriate, given the size and implications of the project. In every aspect—engineering, environment, economics and energy needs—the level of effort is unprecedented.

We are still at it here today, and the federal courts will be at it for months to come. Quite frankly, few of us can doubt that this project is immeasurably better because of this level of effort. But we have reached a point of decision.

As my own part in the Committee's efforts to foster discussion, I would offer a portrayal of this point of decision, and the course of events leading to it. My thesis is a simple one, and it is that the decision recently announced by Secretary Morton was not only correct on the merits, but also mandatory in view of information and time considerations.

Although efforts are made to broaden the issue, it is reasonably straightforward. I believe it is the issue of the Canadian alternative and its meaning to the Trans-Alaska Pipeline decision.

I am no stranger to this issue, nor to the Canadian alternative. Over a year ago, in my testimony regarding the first environmental impact statement for this project, I directed sharp criticism toward the analysis of alternatives, which I believed largely deficient. Then, and in later months, I urged a better analysis of all alternatives, including the Mackenzie River route through Canada.

Then, as now, however, any attempt to study this alternative was frustrated by the total lack of a concrete proposal. There was not, and is not, such a proposal—not by oil companies, by the government of Canada, nor by any of a number of interests from which a proposal could legitimately have come. This is significant, and the continued life of this alternative as only a suggestion, a dim outline, lends a great advantage to it. It cannot be studied, analyzed and criticized as can a concrete proposal which is open to real scrutiny.

It was three years ago, almost to the day, that the application for a Trans-Alaska Pipeline was filed. Since that time, this proposal has been seriously studied, criticized and pursued, for motives of environmental concern, engineering standards, the economy, energy needs, and even corporate profit. What has occurred during that time, and in response to that specific proposal, is impressive.

1. A massive impact statement, as required by Section 102 of the National Environmental Policy Act, has been completed. It is clear, by virtue of its completeness, that it will likely be the legal vehicle for testing the reach of N.E.P.A. in the courts.

2. From the impact statement research by the Interior Department and several other Federal Departments, plus that of the State of Alaska and of the oil industry, have come a host of technical breakthroughs. Although peripherally applicable to other pipelines, they are in specific response to the Trans-Alaska proposal. Included are: (a) Automatic welding techniques of unprecedented capability, (b) Pipeline refrigeration and elevation techniques in response to permafrost conditions, (c) Oil tanker designs which put the vessels of foreign national to obsolescent shame, (d) Block valve, monitoring, and earthquake reaction systems which are capable of insuring pipeline leak security better than any before, (e) There are innumerable others, but they are the contents of thousands of pages of research and conclusions.

3. Also, a set of construction stipulations have been drawn which bind and control this project to a degree previously not experienced, and certain to leave the lightest footprint of man possible in any project of this type. I asked for and approve of the strict nature of these stipulations, and if this Committee believes it can suggest additional and essential stipulations (perhaps to improve surveillance capability even though expensive or strict, I suspect I would support them, also.

4. During these three years, we have settled the Alaska Native Land Claims, and premised an extremely significant part of the Native settlement upon the production of North Slope oil at some reasonably early time, and certainly upon refusal to engage in only tactical delay on the Trans-Alaska Pipeline.

5. Similarly, the State of Alaska, a state with well-recognized human and social needs, has premised its solutions to those needs and its long-term economic planning on the production of North Slope oil. The State has participated fully in the federal study of the pipeline, and has undertaken substantial planning and legislation at the state level—planning to cope with the many technical

aspects of regulation and surveillance; planning to translate the economic benefits into a better quality of life in Alaska; planning to relieve the Nation's worst unemployment and poverty and to avoid a "boom-bust" pattern.

Much more could be added, because this three-year period has been filled with specific and invaluable effort in response to the Trans-Alaska pipeline proposal; effort which has not, and could not, have been forthcoming on the Canadian "non-proposal." I want to make it very clear to the Committee, however, that in spite of the work and accomplishments of the past three years, these factors alone could not persuade me of the desirability of proceeding as soon as possible with the Trans-Alaska Pipeline. It does, however, make a responsible decision possible, and bring us to that decision. Further, there are crucial reasons for that decision to be made and carried out at this time.

The central factor in all these reasons is the existence of a strong time preference for the production and transportation of North Slope oil. In my view, the factors constituting this time preference make a persuasive argument for action now.

At the top of any list is the argument for the State of Alaska, one which has been too often ignored and passed over in the consideration of this matter. Although Governor Egan's testimony surely expresses the situation in greater detail, let me emphasize the effect that delay of North Slope production will have on the State of Alaska. According to the State's most recent projections, even under the baseline assumption of production beginning in 1976, and only 5% State budget increases each year, the State will have a general fund deficit of \$20 million in 1978, growing to \$663 million by 1982.

Even under the more conservative assumptions of the Department of Interior (Appendix E, Volume II, Economic and Security Aspects of the Trans-Alaska Pipeline), smaller but similar deficits are projected even if only a maintenance of effort budget is continued, and construction of an Alaska pipeline is begun at the earliest reasonable time. In the same analysis, and in recognition of this economic situation, Interior took the almost unprecedented action of recommending that Alaska increase its severance tax in response to the threat of deficits.

All of this is under reasonably favorable conditions. Further delay of the Trans-Alaska route will only increase the hardship on the State. I suppose in a time when budget deficits are nearly a way of life for states and cities, this can be overemphasized, but it can never be overemphasized that Alaska has a range of human needs to fulfill which cannot be delayed or denied. Oil production will address these needs in two ways: the immediate employment and economic benefits of the construction effort, and the eventual revenues at the well-head. I am unwilling, with the present knowledge regarding the Trans-Alaska Pipeline in hand, to further delay Alaska's access to these economic benefits, and to deny the State the ability to address its human needs in a responsible manner.

Closely related, and an equally strong time consideration, is the relationship of North Slope oil production to the Alaska Native Land Claims settlement. As you know, over 50% of the monetary settlement in Public Law 92-203 is related to the sharing, by Alaska's Natives, of Alaska State mineral revenues. This amount, ultimately totaling \$500 million, is not a gratuity in the settlement; it is a hard-won compromise based on firm projections of oil revenues, and the firmest promise that Congress and the State could make as to when the revenues would be produced. Since it appears that the Committee will be hearing no direct representative of the Alaska Natives, let me say for them that it is unacceptable to defer this promise in that settlement at a time when adequate facts exist to support a Trans-Alaska line, and when the only alternative is still-to-be-defined Canadian route.

A third factor is the always present relationship of time and cost. As originally proposed, the Trans-Alaska Pipeline had a projected cost of under \$1 billion; that cost has now risen to an acknowledged sum of at least \$3.5 billion. Some of that increase is attributable to valuable new components to increase the safety and efficiency of the pipeline, but much of it is due to the mere passage of time. Quite frankly, I am one who argues that any cost is acceptable which makes the line safer and better, but the pure costs of delay are intolerable.

Of course, this cost is only that of construction; similar cost increases will occur in all the areas of regulation and surveillance which will be carried out by the State and the federal government. I note here that I am comparing only the costs of building an Alaskan pipeline now, as opposed to building it later. I leave to others the comparisons of the cost of an Alaska line as compared to a Cana-

dian line, but it is clear that a Canadian line cost nearly twice as much, up to \$8 billion. But again the question: should we not act now on the line we have fully investigated?

Still another crucial time factor is the nature of the energy crisis we confront as a nation and as a world. Certainly this is not a topic for the few short minutes we have here, but I would make two points. The first is that the United States needs the oil from North Slope fields, and needs it at the earliest possible time.

The recognition by foreign nations that the United States is undertaking a course of inevitable and growing import reliance will affect all the international bargaining points of the future.

The fact that recent information regarding the oil needs of Western Canada brings into doubt Canada's desire and ability to increase imports to the United States is significant. Also significant is the recent nationalization of the northern oilfields in Iraq, and similar "incidents" in other nations from which the United States imports oil. We should accept the opportunity to decrease our nation's sensitivity to such factors by acting now to produce North Slope oil.

As a second matter regarding the time factor, as related to energy requirements, let me simply say that the crisis in the supply of natural gas equals or exceeds that in oil. The testimony by Chairman John Nassikas of the Federal Power Commission during these hearings makes this clear, and makes clear that natural gas is at the heart of the energy crisis in the Midwestern and Eastern United States, about which so much has been said in these hearings. Since a Canadian natural gas line from the Northwest Territories now seems certain, that line will rely on the availability of Arctic natural gas. It can come from Alaska's North Slope only when oil is produced there. That can be in three years, or it can be several years later if we do not act now on the Trans-Alaska route. The natural gas requirements of the United States, especially the Midwest and East Coast, should simply not be deferred pending a complete investigation of a Canadian oil pipeline route. Those who suggest that the considerations for an oil and gas pipeline are the same do no justice to the volume of work already done on the Trans-Alaska Pipeline or their own demands for still more study.

Even if my testimony were to stop right here, I believe it would be clear that the decision to issue the pipeline permit was justified. The time factors making it essential to act at the earliest possible time are persuasive, and the work already done on the Trans-Alaska route is clearly sufficient to make a responsible decision possible. Still, there is another major factor that leads me, even more certainly to the conclusion that the beginning of the Trans-Alaska Pipeline should not be delayed. That factor is the nature of the Canadian alternative, and the reasons for believing that it has a painfully long way to go.

Let us be honest about the Canadian route alternative. The most forceful and definitive proposal for it which has ever been made was in the recent and well publicized letter by Canadian Natural Resource Minister Macdonald. Beyond that, one has to rely on occasional statements, such as the one by Parliament Member Anderson at these hearings, where he did not even appear as a representative of the Canadian government. Or we must rely on what a wide variety of sources, for a wide variety of reasons, occasionally say they want the route to be.

Still, the Macdonald letter is the firmest statement made, and I must say in all candor, that it does not appear very firm. First, there is the entire matter of statements of this type made in the past. As you recall, Minister MacDonald promised expeditious action on a Canadian pipeline in his letter. The Committee will remember, I am sure, that then-Secretary of the Interior Walter Hickel made almost an identical promise in December of 1969 regarding the Trans-Alaska permit. Also, I think I can say that Secretary Morton expressed optimism for the granting of the Trans-Alaska permit long before it became a reality.

Each of these men made their statements in good faith, but without contemplation of the future events which would intervene. The Alaska Native Land Claims, the proper demands of environmental concerns, and the delays of thorough scientific study all contributed to the three year wait since 1969. I see absolutely no reason to believe, given the lack of study on a still-to-be disclosed Canadian route, that we should expect the delay on that route to be one day less. Moreover, given the benefits that were gained during the three years of study on the Alaska route, there is no reason we should not desire such a similar study for any Canadian route.

To answer this, there are the gentle assurances of Minister Macdonald and others that the Canadian pipeline will be expedited.

As if to prove it can really go quickly, some of us are told that Canada has no burdensome National Environmental Policy to slow things down and that the Canadian Native land claims do not have the same legal or political basis as those in Alaska.

To all of this, I ask two questions. First, is it possible for a Canadian route to be approved on the expeditious schedule promised, and in view of the time factors I expressed earlier, on the schedule necessary? Second, in view of what such an "expeditious" schedule really means, is it in any way desirable that it be done? I submit that the answer in both instances is in the negative. Allow me to comment.

Neither the Natives nor the environmentalists in Canada have been heard from, and I assure you that they will be. Although there is not time here to detail these things, it is growing increasingly clear that the Canadian Native land claims will be asserted in the strongest possible manner. I add that it will likely be done with the counsel of the Alaska Natives who won their claims here. Similarly the Canadian environmental movement is in its infancy, but growing. Our own experience indicates that pipeline proposals are vital nutrient in such growth.

Far more important than this project of what *may* occur to delay consideration of the Canadian route is what *should* be done. The fact that Canada has no N.E.P.A. counterpart does not reassure me; it concerns me. The fact that Canada feels the Native claims have little substance does not comfort me; it alarms me. I must wonder if the promise to expedite a pipeline is not a promise to roll over the rights of Canadian Natives; a promise to treat lightly the serious environmental issues in such a route. These are the same claims and the same issues that have been the subject of three long years of effort regarding the Trans-Alaska route.

Similarly, I wonder if the open-hearted supporters of a Canadian route would find themselves, at some future time, and in view of substantial environmental and other concerns later revealed, so deeply committed that they were unable to withdraw? Finally, I wonder if the promise to expedite does not work a disservice to the very values this Committee espouses in such a cause; the values of study, deliberation, and fair determination?

My own answer is that any reasonable evaluation of a Canadian route *will take and should take* at least two, and perhaps three years, to allow an analysis comparable to that made for the Trans-Alaska route. Moreover, it should include a resolution of the Canadian Native land claims.

Projected, this could mean a Canadian pipeline, which is agreed to require around five years of construction, and could not be completed until 1979 or 1980. Short of this, any projection seems to me to violate every value now being urged for the Trans-Alaska route.

This, then, concludes my own portrayal of the point of decision, and the factors affecting it. I believe that a fair analysis of those factors supports the decision of Secretary Morton to proceed on a Trans-Alaska Pipeline.

I thank you for your attention, and hope that my comments have been helpful to the Committee.

Chairman PROXMIER. Thank you, gentlemen, very much. I don't think there's any need for apologies on the record that we've made.

We now have six witnesses speaking for the Alaskan pipeline and four speaking against it. I think you've been not only forceful, but highly persuasive.

You have argued not only in terms of the interest of Alaska, of course Senator Hansen has other interests too, but for the national interest, and I think you've done an excellent job. I would like to ask some questions along this line.

Governor Egan, one of the problems that has puzzled me is there seems to be a—at least a likelihood, and it is not at all certain, and you indicated in your prepared statement that it was perhaps not likely, but I think there is a likelihood that if we proceed immediately as Secretary Morton has decided, with the trans-Alaska pipeline, that

we would probably have an oil pipeline in operation before we had a gas pipeline in operation. We then would be in a position where we have two choices about the gas. A very, very precious limited resource.

I think it's more necessary now for the country—certainly in my area, and I think for the whole country, than oil. You either flare it, waste it, burn it off or re-inject it.

Now, if we re-inject it, the economic cost is high and there is some question as to economic feasibility. What is your response to this?

Governor EGAN. Now, Mr. Chairman, if the trans-Alaska pipeline is constructed, the feeling is from the time the engineering experts—from the time they begin construction until it could begin to be used would be a maximum of two and a half years. Now, just by the nature of the huge gas formations in the Prudhoe Bay field, the gas, as I understand it, is interlaced with the oil, rather than separate gas fields. so you can't plan to use that gas as quickly as you can plan to use the oil.

The oil must start to move before the gas can be moved—before you hook on with any gas line. There might be a six month delay, or up to a year delay before the gas line built in Canada or whatever, and incidentally, I am sure you are well aware that the problems—the environmental problems and the other problems relating to construction of a gas line are not nearly as severe as those we are considering with the oil lines.

So I don't see any real problem there. The re-injection for a limited length of time, or some flaring for a limited length of time until a gas line can be operable would not be—in any event, the gas cannot begin to move until some time after oil is on stream.

Chairman PROXMIRE. Well, the point was that if the trans-Canada route were taken, that the timing of the gas pipeline and the oil pipeline might be somewhat closer, and therefore there would be less flaring and less waste of a finite resource. We don't have, as we all know, an unlimited amount of gas and oil there, and if we flared it means gas that will never be used, and as I understand it, it is against the law just to flare it, anyway.

Of course, you can change that.

Governor EGAN. It is. We now have regulations that will not permit flaring.

However, in a case of this nature, where it might possibly be, for a limited length of time, you would have to permit some flaring between the time that the gas line would be developed. But it is also my understanding that various gas groups have expended about \$20 million on their feasibility studies and environmental impact studies for a gas line, as against no planning for a crude oil line going through Canada.

There are certain plans already that have been developed for the gas line, so I don't believe that if the gas line goes through Canada that its relationship to how fast a gas line could go through Alaska would be much different in the length of time it would take. I don't think it has really any relationship to the oil line as such—whether an oil line went through Canada or it went through Alaska.

Chairman PROXMIRE. Well, the only relationship, of course, is once you start using the gas, or using the oil or pumping the oil, you can produce your gas, so you have to do something with it—either reinject

it or you flare it, and from that point on it is a waste. It's either an economic waste or it is a waste of a precious, limited, valuable natural resource.

Governor EGAN. And that gas will be used—it will be utilized—it will be in a line or lines carrying that gas based on the best conservation practices the State of Alaska is able to apply to that effort.

That gas will start moving through Canada just as quickly as it would start moving through Alaska, in any event. The time—we are talking about several years in advance here, and the time—regardless of where the gas line goes, it will start moving at the earliest possible time.

Chairman PROXMIRE. Well, then it will start moving at the earliest possible time, but if you start with the Alaska route and maybe Senator Stevens would have an observation on this. Maybe he would like to respond, but as I understand, if you proceed to pump oil and follow the Alaskan route, you would not be in a position for some years—two, three, or four or five years, depending on how long it takes, before you can use your gas—put your gas in a line and send it to the lower 48.

Governor EGAN. There would be no difference in that respect, Senator, than if you had the Canadian route.

Chairman PROXMIRE. But the difference would be if you follow the Canadian route, it won't—you say five years, others have said two years, but it will be some time before you can start on your oil line. Meanwhile, the construction of the gas pipeline could proceed so there would not be the same timing.

Governor EGAN. Well, that isn't my understanding. My understanding, Senator, is that the make of that field from the conservation standpoint is such that gas in no event, in any sizeable volume can begin moving out of the field until oil is on the line going somewhere, down the Alaska route. It wouldn't make any difference insofar as the time.

Chairman PROXMIRE. Well, I can see where we differ.

Do you want to comment, Senator Stevens?

Senator STEVENS. I point it out in my prepared statement.

The information that we have is that for approximately a year or two years there will be a delay in the production of the natural gas because it will be re-injected to assure the continued productivity of the field. This is a gas-dry reservoir, and as such they wouldn't take it out, so it wouldn't make any difference if you built both pipelines through Canada—there would still be a gas pipeline there for approximately two years before it would have any gas.

I would ask this, Mr. Chairman. I've got another hearing.

If you have any other questions, I'd be happy to respond to them, but I do have to go to another hearing.

Chairman PROXMIRE. Well, why don't you go there now, and if we do have any questions, we can put them in the record.

Senator STEVENS. Thank you very much.

Chairman PROXMIRE. I would like to ask about another issue, Governor Egan—you can speak with great authority on this and perhaps Congressman Begich has some ideas too, but the Alaskan economy and the problem that you have of raising funds, which all states have now, of course, is very serious.

As a matter of fact, as I understand it, the State of Alaska has over \$800 million in the general fund, from the North Slope lease sale. Furthermore, the argument has been made that this will be enhanced.

Mr. Cicchetti made this comment from Resources of the Future. This will be improved if you have the Canadian route, because he argued if you go the Canadian route, you will sell your oil at a higher price, in the Chicago and New York market—your revenues would yield approximately a billion dollars a year more, and in the long run, Alaska would be a whale of a lot better off if you waited for two or three or even five years and went the way that you could get a higher price.

Now, this—you'd have serious problems over this five year period, I'm sure, but I'm sure you do have in your general fund this amount. But in the long run you'd be sending your oil to the place where it would bring a higher price, and your tax revenues would yield a greater amount for the Alaskan treasury.

What's the answer to that?

Governor EGAN. Mr. Chairman, I cannot but totally disagree with the statement that that gentleman apparently has made, because any way you look at it, the cost of moving oil—Alaska's oil—and incidentally, it is the State of Alaska's oil we're moving in Prudhoe Bay—through a Canadian line, in any event it's going to be considerably more costly to move that oil over that route than it will be to move the oil through a west coast port or into the Los Angeles area, down where the west coast oil is needed, and it is estimated—we have estimates that it will cost at least 87¢ a barrel more based on our estimate of additional cost of building the Canadian system, over the cost of building the Alaska system.

In addition to that, Mr. Chairman, something I think that is indisputable is that the Canadians have made it clear Minister Sharpe and Minister Macdonald and Minister Chretien and others, that if there were a line—a crude oil line going through Canada, that it would be on their terms. In other words as their oil comes on stream, they will undoubtedly say that they will reserve at least 50% of the volume of that line for their own input.

Every barrel that goes into that line that is Canadian oil would diminish the return to the State of Alaska and the amount of oil—American oil from the State of Alaska that went into the line—would have a drastic affect on the projected revenues of the State of Alaska, and if that happened, if the Canadian line were built, there's no question in my mind we would not only be in serious financial straits these next few years, but for generations to come. We'd have nothing to look forward to at all insofar as revenues.

Chairman PROXMIER. Well, now Governor, I wondered about that. The Canadians undoubtedly would want some of their oil in the pipeline, because it's over their own land, and I see that as an excellent point that Mr. Cicchetti did not take into account.

It would modify the implications of the questions I asked, but I don't know anybody who would argue that we could satisfy our needs by reliance on Canadian oil, or even Canadian and Alaskan oil, we are still going to have to import an enormous proportion of our oil, so that we're going to use every bit of oil that we can get out of Alaska and we're going to exhaust it over the next fifteen to twenty years, according to all the testimony that we've had so far, and in addition to that, we're going to have to import a great deal of oil from the middle east, and in addition to that we're going to have to move very, very rapidly

developing atomic energy, solar energy in these others because we have such a terrific shortage of energy in this country. We need so much.

Isn't that correct?

Governor EGAN. I agree that all of the Alaskan oil eventually is going to be needed, but if you put it into a line, that the Alaskan oil can only have a 50 percent volume in that line, you cut down the revenues to the State of Alaska by that action.

Chairman PROXMIRE. Temporarily, yes. But this is what I'm getting at, and I wish that Senator Hansen and Congressman Begich might want to comment on this.

We must have a gas pipeline. We need that more than we need an oil line.

It is a matter of national need. We have a greater shortage of natural gas.

That gas pipeline must come—should come—almost everybody believes, through Canada. We will need good relations with Canada to do so.

Under these circumstances, why would it not be wise for us to work with Canada on the oil pipeline too? They have a deep interest—have a real desire for this.

You are right. They would probably want some of their own oil in this pipeline. That would somewhat reduce temporarily the amount of revenue for Alaska, but only temporarily.

In the long run as you can see, the Alaskan revenues would be more, as it would use all Alaskan oil and every gallon would bring a higher price. Under these circumstances, shouldn't we take into consideration, very, very carefully, our relationship with Canada, and cooperate with them as fully as we can?

Governor EGAN. I think it is in the interest of the nation to see to it that the first quality oil of the largest field we've ever discovered on the North American continent that is under the control of our nation and our states, and then after, I have no objections in my mind to a gas line—

Chairman PROXMIRE. Why is it so important that it be under our control? We have good relations with Canada—we have had. We depend on them, they depend enormously on us, in many aspects.

Governor EGAN. That's right, Mr. Chairman, but also the Canadians have problems. The Indian population is now beginning to make their noises, and they are going to have for the next few years, a very difficult situation with the native population we do have, from the standpoint of economics—we do have a serious situation, as I understand it from reading the business magazines of our nation, at the present time, with the Canadians, and while they have an excellent relationship, Alaska and the adjoining areas—British Columbia and the Yukon, even Alberta Province, nevertheless, it is a foreign nation and it seems to me—I'm very clear in my own judgment, that if they had this pipeline going through with this huge volume of crude oil, that their diplomats would be in a great position to whipsaw our country in certain other ways other than directly with relation to the oil shortage problem, and with respect to the statement about the shortage of gas, I recognize that, but with respect to the crude oil in that context. Mr. Chairman, I think that depends on what part of the nation you are talking about.

Now, the west coast is short of crude oil at the present time, and by 1976 the experts estimate—at a very low estimate, that by 1976 that shortage will be at least 1,200,000 barrels. But by 1980—and there again, they're seriously estimating real low, the shortage on the west coast, and the west coast is growing fast in population and in industrial needs—that that shortage will be 2,000,000 barrels of more, so those are very—

Chairman PROXMIRE. Well, I challenge that, very seriously. I think they grossly overestimated the need on the west coast.

They projected a growth almost twice as great as the growth they've had in the past and last year California actually declined in population. California is the gigantic dominant state, as we all know, on the west coast.

It is the state that has the great need for all of these resources, so I think you can make a case that that west coast need may be greatly exaggerated.

Let me ask Senator Hansen and then Congressman Begich.

Senator Hansen.

Senator HANSEN. Thank you very much, Mr. Chairman. I'd like to make two or three points.

Number one, I don't think anyone here would want to question the loyalty of Canada as a neighbor. It is a very fine neighbor, but I think we ought to keep in mind, when we are talking about national security, and meeting our energy demands—and they are very real and growing every day—if we're going to solve the environmental problems of the east and the cities, cleaning up the water and the air, we need more energy, not less.

The trans-Alaska pipeline admittedly can be built quite a little bit sooner, or more quickly than could the trans-Canadian pipeline. With respect to your question as to Canada's interest in having a pipeline built, let's keep in mind that more than half of the petroleum products produced in Canada are sold.

They are sold principally to the United States, as we all know. More than half of what she consumes is imported.

That comes about because there is no trans-Canadian pipeline. As I say in my first statement, Canada has to depend on imports to come by tanker up the east coast, so Canada has two problems.

The western provinces have the resources, we know that from the present discoveries that have been made. We can speculate on the further resources there on the basis of seismic tests and the geology of the area, and everything else. So Canada needs to find a market for the gas.

She will have a very real interest, and as a matter of fact does have a very real interest. I was up in Canada, in Calgary in January.

I spoke to the Chamber of Commerce there; I talked with a number of people. I met with the Canadian Petroleum Association—I have forgotten the exact names, but I talked with several different groups there.

They are eager to sell their product. They won't oppose a trans-Canadian gas line, because we have gone ahead with the trans-Alaskan oil pipeline.

Second, they need the extra money—the financial background that they do not have. That is a very costly pipeline through there, and

Canada does not have that kind of dough, so she will be equally as eager to get American capital and American participation in building the gas line as we are to provide it.

Second, I think the illusion that these two pipelines can be put side by side ought to be laid to rest. They present very different problems.

According to the figures that I have, a trans-Canadian route would traverse a 37% longer area of continuous permafrost and a 65% longer area of discontinuous permafrost than would the Alaska pipeline, and as the Governor has already pointed out, the oil is hot.

It presents an entirely different problem and I know the Secretary made that same point.

That, I think, covers the points I wanted to make, Mr. Chairman. Chairman PROXMIER. Thank you very much.

Congressman BEGICH.

Representative BEGICH. Mr. Chairman, thank you.

I think sometimes we think of Canada as the 51st state. Let's clear our thinking. I've been reading some of the statements by some of the Congressmen on the House side printed in the Congressional Record recently.

One gentleman in your state has been very prolific in the regard—I think he has inserted many statements and I enjoy reading them, but I want to make sure that we have a clear understanding. Governor Egan who has been Governor of Alaska for 10 years, has built up an excellent relationship with the Canadians. In my discussions with Canada, and with Mr. Chretien, for example, has said this. Now, isn't it as good a policy for me to be pursuing a Canadian pipeline route as it is for you to be pursuing an Alaskan route. I could clearly understand what he was saying, because I read a statement by Premier Trudeau on April 27th of this year in which he said our people will be working on the pipeline, we will train our people to be maintaining that pipeline route over a period of time—our oil will be flowing through this pipeline, and Canada will have a tremendous improvement in its balance of payments problem.

We will be pumping \$2 billion into Canada to aggravate the monetary situation. So rather than have an unhealthy situation, we understand each other's position. They can make a real strong effort for the pipeline at this time, even though I feel there is not one Canadian who believes he can get this pipeline route through their area. I think they are laying the groundwork for future pipelines and they want Canada to be considered.

I think frankly Canada, sometime in the future, may be in that position. They started five years too late. They've done very little work.

I read the release from your Congressman from Wisconsin in which he quoted the preliminary study of 1970, when they had only seven scientists studying the entire route; planning and trying to find out what the problem was. They didn't spend anywhere near the \$3 billion involved in the Alaskan route. They're far, far behind.

In the same speech that Mr. Trudeau made, he said we will not roll over rights of the Canadian natives, and we will not roll over the concerns of the environmentalists.

In other words, if you read his statement, and I know you have access to it, Senator, and read statements by Americans four or five years ago, you will find that is exactly where they are today. It is obvious

that a route going 3200 miles north from Prudhoe Bay all the way to the point you have indicated on the map will cost two or three times as much as the Alaska route. Yes, it is going to cost \$8 to \$10 billion. As Senator Hansen said so well, they haven't begun to discuss all the financial arrangements necessary, and, in fact, they'll have a hard time finding that money when they haven't even begun the preliminary studies.

So to say it doesn't have an effect on the final cost would be a mere economic fallacy. The Alaska route is already designed, a route going 800 miles. Incidentally, for all of my good friends in the conservation movement, this is an oil product that's a very important and a good product. But instead of continuing to bring the Near East oil here at 2 to 4½% sulphur, we should bring North Slope oil which has less than 1% sulphur, a much cleaner product.

In other words, I think if you're for the Alaska pipeline route, you are for clean oil as opposed to dirty oil coming from the Near East. It would be brought in tankers that are not even under our jurisdiction and these tankers are polluting the oceans. I think we should have concern for all the environment, and the ecological system on this continent. The world political situation, as Senator Javits said so well this morning, necessitates a domestic supply of oil. I have said to the Congressmen from New York who represent Jewish constituencies, that America will take another look at its role ten years down the road. Then oil will be a very important item in international diplomacy and we might take a more neutral position toward Israel in view of the fact that the Arabs are going to be supplying 57% of our oil by 1985. A lot has to do with what we want as our position in the Near East. So, there are global political problems that we must also consider along with the environmental.

I'd just like to end where I started. Remember, Canada is another country—another fine country, but not the 51st state of this country.

Chairman PROXMIRE. Well, Congressman Begich, I think you are a clean-cut young Congressman, and I think you make a good appeal for clean Alaskan oil. That's most refreshing.

Gentlemen, thank you very, very much. I can't tell you how much I appreciate your testimony here, and if you would like to file anything additional for the record when you correct your remarks, you'll be welcome to add anything you like.

Governor EGAN. Thank you, Mr. Chairman.

There's one other point that I would like to mention. No one had mentioned what kind of tax levy per barrel the Canadians will place on any of the oil going through the Canadian territory.

Chairman PROXMIRE. You're absolutely right. That was omitted, and if you'd like to expand on that when you correct your remarks, we'd appreciate it very, very much.

It would be very helpful.

Thank you very much. The committee stands adjourned.

(Whereupon, at 1:37 p.m., the committee adjourned, to reconvene subject to the call of the Chair.)

## APPENDIX

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U.S. DEPARTMENT OF THE INTERIOR,  
OFFICE OF THE SECRETARY,  
Washington, D.C., June 24, 1972.

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

Dear SENATOR PROXMIRE: During the testimony at the June 22 hearing on the trans-Alaska pipeline, you made a statement that the Interior Department had used a 7 percent growth rate for demand in District V. I would like to call to your attention the facts in this matter. The best estimate, and the one we used, is that by the Bureau of Mines, which is on page L-3-17, Vol. II, Economic and Security Analysis. From that table the demand or requirements for oil in 1970 were 2,095 thousand barrels per day. The medium forecast for 1980 is 3,315 thousand barrels per day. The annual rate of increase in demand over ten years is computed to be 4.7 percent per year.

This estimate was made by the most authoritative agency in the Federal Government for such estimates, and is a thoroughly reasonable projection of the future.

Sincerely yours,

ROGERS C. B. MORTON,  
*Secretary of the Interior.*

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### STATEMENT OF SENATOR WALTER F. MONDALE THE MIDWESTERN CONSUMER AND ALASKAN OIL

Mr. Chairman, the consumer is the forgotten man in discussions of oil and petroleum policy in the United States. He pays 5 to 9 billion dollars a year to the oil industry in subsidies and tax breaks but his interests still always come last. He just pays and pays and pays.

Once again recently, in the discussions of the gigantic oil pipeline project to bring Alaskan oil to the lower forty-eight states of the United States, the interests of the consumer have come last—dead last. The requirement in the Environmental Protection Act that the Interior Department submit an environmental impact report has been very useful in developing public discussion of the economics of this project, which will affect all of us for years to come. But for projects of this size, the public needs to understand the long-term economic impact in detail. A "Consumer Impact Report" is needed as well as an Environmental Impact Report. The consumer needs to know what the oil companies are planning . . . and he deserves a say in this planning himself.

Earlier witnesses before this Committee have testified that a Trans-Canadian pipeline would be less dangerous to the environment than the Alaska pipeline—tanker project approved by the Administration. The Alaska project would require a pipeline and storage facilities atop two of the most dangerous earthquake zones in the world: It would require the tankering of two million barrels of petroleum a day through some of the world's stormiest seas to the West Coast of the United States. A Trans-Canadian pipeline avoids these twin dangers. Nothing the Administration has said to justify the Alaska project contradicts this open-and-shut environmental case.

Other witnesses have testified that a Trans-Canadian pipeline would be no less profitable to the large oil companies than the Alaska project. I think this is true also, especially if we take the oil companies at their word on certain key matters. The oil companies' preference for the Alaska project stems from the fact that

it can be completed more quickly, and that oil from the project will be available for export to Japan.

I believe that a Trans-Canadian pipeline route from Alaska down Canada's Mackenzie Valley to the Midwest is preferable to the Alaska pipeline-tanker project from the American consumers' point of view also. Midwestern and Eastern consumers who are particularly disadvantaged at present would gain the most from a Trans-Canada route—and this is as it should be.

The reasons why the Midwestern and Eastern consumer should receive special consideration are well documented. An average family of four in Minnesota, for example, is paying about \$50 a year more than a similar family on the West Coast for oil products because of unfair regional differences in petroleum prices.

This is based on data from the President's own Cabinet Task Force on Oil Import Policy. This data shows that the present oil import system costs the average person in Minnesota \$29 per year. This Minnesota consumer charge is 20% more than the charge paid by American consumers on the average: The cost to a Minnesota consumer of the prevailing system was \$12 per person (about 70%) more than the charge to a consumer in California.

The President's Task Force attributed these price differences to "special treatment" rather than economic causes. Its report says that the special treatment "can not be justified on grounds either of security or of equitable distribution" and recommends that the differences be ended.

President Nixon apparently did not agree with this recommendation of the Task Force. Now, two years after the Task Force Report, oil prices in the Midwest and on the East Coast are still far out of line. Minnesota consumers, for example, are still paying \$40-60 million more every year for their gasoline alone than they would on the West Coast.

A barrel of crude oil costs about \$3.80 in Minneapolis, but only \$3.20 in Los Angeles. A gallon of gasoline which cost 17.50 cents wholesale in Minneapolis cost only 13.90 cents in Los Angeles recently. Gasoline often is as much as 30% cheaper in Los Angeles, and usually is 15-20% less. And the East Coast situation is, if anything, worse.

So Midwestern and Eastern consumers are already paying much more for petroleum than do consumers on the West Coast, but the major problem is that this disadvantage will grow if oil and natural gas from Alaska is moved to the West Coast rather than to the Midwest.

While energy demand is growing in the East and Midwest, supplies of readily available domestic and Canadian crude oil are not. We are becoming increasingly dependent on sources of imported and domestic crude oil whose supply is totally controlled by the big oil companies.

As Canadian supplies become less adequate in the Midwest significant price increases of perhaps 1 cent per gallon for gasoline (about 9%) and about 2 to 5 cents per gallon for residual fuel (about 20-50%) might be expected to occur because local refiners will be forced to purchase these products in other areas of the country and bring them to the region. This will surely happen if Alaskan oil moves to the West Coast.

In this case, even if West Coast prices do not change, prices in Minnesota will jump to a level at least 30% higher than on the West Coast. In fact, Pacific Coast petroleum prices could be expected to drop so that even a 40% price differential might be expected. Instead of the average Minnesota family paying \$50 more per year for oil products as it does now, the Alaskan project could make the gap widen to \$100 and perhaps to \$150 or \$200.

And the location of the oil pipeline will affect the price of natural gas in the Midwest and East as well. Minnesota depends on natural gas for almost 70% of its energy requirements. Other states in the Midwest have similar consumption patterns. Minnesota used 334 billion cubic feet of natural gas in 1971. Much more is needed and it is available in Alaska. In fact, there already are plans for a natural gas pipeline from Alaska down the Mackenzie Valley to the Midwest. Obviously, however, this gas pipeline will be more feasible and more economic if it is built in tandem with an oil pipeline. The development of an oil pipeline will ensure the construction of a natural gas line.

If a gas pipeline is not built, the wholesale cost of natural gas in Minnesota could rise from about \$.46 per 1,000 cubic feet now to as much as \$1.00 or \$1.25 per 1,000 cubic feet—the price of synthetic gas made from coal. Natural gas consumers in Minnesota alone would be saved in the neighborhood of \$50 million a year, or another \$50 for a family of four—by pipeline access to Alaskan natural gas.

The meaning of price shifts such as I have described above is obvious. They will increase the difficulty of attracting industry to the Midwest and Eastern Seaboard because fuel costs in these areas will be even more out of line than they are now, and because the cost of living will be automatically 2 to 4% higher than on the West Coast. Alaskan oil and possibly natural gas shipped to the West Coast and to Japan will make it that much harder for Midwestern and Eastern industry to compete.

It is clear from this short analysis of the consumer aspects of the pipeline controversy that we need to know more about them. In a project of this size, the consumers' interest must not be ignored.

I agree with others who have called for a more thorough study of the Canadian alternative to the Alaska pipeline-tanker project. This study should focus much more on the consumer impact of the various alternatives. This is too big a project and too important an issue to be decided take-it-or-leave-it by the big oil companies. We need to establish the principle that the consumer has a right to a voice in such large economic decisions.

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#### STATEMENT OF REPRESENTATIVE LES ASPIN

Mr. Chairman, because Dr. Cicchetti and Mr. Nehring made such excellent presentations before the Joint Economic Committee recently concerning the relative economic merits of Canadian and Alaskan pipeline routes, I would like to largely confine my statement today to discussing the credibility and honesty of the Interior Department's decision making process as it related to the Alaska pipeline issue.

Over the past year and a half the Interior Department has consistently ignored, and in some cases apparently suppressed, data vital to the rational and honest consideration of the proposed trans-Alaska pipeline and its alternatives. I would like to briefly review some of the important documents and reports which have surfaced over the past year and a half.

On February 16, 1971 I placed in the Congressional Record a statement by an Interior Department official, Harold Jorgenson, highly critical of the Interior Department's draft impact statement on the pipeline. Mr. Jorgenson charged that 1) the Department failed to consider "the enormous threat" that the pipeline posed to the way of life of Alaskan natives; 2) "pipeline breaks or leaks could cause pollution of lands and waters that would be indescribable"; 3) "a pipeline break at the wrong place at the wrong time could be devastating to a broad spectrum of the ecology of a significant area, affecting native food supplies"; 4) "with miles between shut-off valves, any rupture would be catastrophic no matter where it occurred."

On March 5, 1971 I placed in the Congressional Record a report by the Alaskan Army Corps of Engineers which charged that the conclusions of the Department's draft impact statement "appear to be unsupported opinions which, in fact, in many instances they indeed are." The surprising Corps of Engineers' report also criticized the draft impact statement for: 1) failing to "fully comply with the letter and spirit of the Environmental Policy Act"; 2) assuming without sufficient data that immediate development of Alaskan oil deposits is necessary for the national security; 3) agreeing to stipulations which "are too general to support the positive assurances given throughout the report that adverse ecological changes and pollution potential will be eliminated or minimized by the stipulations."

On May 5, 1971, I included in the Congressional Record a report by the Alaska State Housing Authority entitled "Community Impacts of the Trans-Alaska Pipeline". This report concluded that construction of the Alaska pipeline could actually have adverse effects on Alaskan employment and would create a severe strain on Alaskan housing.

A few of the significant points the report makes include:

(1) "The permanent pipeline employment would be only about 300, an amount equivalent to one of the department stores in Anchorage."

(2) "Alaska's history is rich with experience—bitter experience that should teach Alaskans to be cautious in approaching a temporary boom time."

(3) "Regardless of the timing of actual construction, news of the pipeline's approval would bring a rush of job seekers to Alaska, people who have been lured by tales of black gold and a land of opportunity."

(4) "Amazingly enough, if the pipeline is approved for 1971 construction, Alaska could reflect the highest unemployment figures in the nation amidst the boom."

The answer is simply that the Alaska job potentials will attract thousands from depressed regions from other states—causing Alaskan statistics to soar upward.”

On June 15, 1971, I placed in the Congressional Record an apparently suppressed report by an Alaskan state official critical of the Alaska pipeline. The report, written by Ted Borden, Deputy Director of the Alaska Industrial Development Division, asserted that construction of a Canadian pipeline as an alternative to an Alaska pipeline, would result in \$18.5 billion more in profits to the State of Alaska. The Borden report notes that the West Coast would originally be able to consume only about .5 million barrels of the 2.0-2.5 million barrel transmission capacity of the Alaska line. The report maintains that construction of a railroad to transport 500,000 barrels of oil per day that is needed for the West Coast would be as profitable a way of shipping the oil as the trans-Alaska pipeline. The report lists the advantages of a railroad over a pipeline, including: 1) that construction of a railroad rather than a pipeline would provide more employment for Alaskans; 2) after completion of construction the railroad would employ more people than the pipeline; 3) a railroad would encourage further development of Alaska's northern areas more than a pipeline.

The Borden report states: “By sending only 500,000 barrels a day to the West Coast, rather than 2-2.5 million barrels a day, you would avoid depressing the price for oil on the West Coast. In other words, if you dump 1.5 to 2 million unneeded barrels of oil per day on the West Coast the price for oil is obviously going to go down and, thus, Alaska's profits on the royalties will be considerably less. By taking only 500,000 barrels out a day you would avoid that, as well as provide a steady income to the State of Alaska for a much longer period of time. Also, Alaska would have the enormous benefits a railroad would bring.”

While I believe the Borden report somewhat understated the West Coast demand for Alaskan oil, and possibly overrated some of the advantages of a railroad, it was at the time a very significant report and provided some important early data suggesting that it makes no sense at all to route the Prudhoe Bay oil to the West Coast.

The Borden report also details some of the problems the state of Alaska was having getting vital information from Alyeska, the consortium of oil companies with interests in the North Slope oil. “We should be suspicious of every effort on the part of the oil or pipeline companies to hide behind any plea that certain information is proprietary,” the Borden report warns.

On July 28, 1971, I placed in the Congressional Record two new Interior Department documents which raised the most serious questions about the honesty of the Interior Department's draft impact statement. The two documents were a report and a memorandum both written by the Alaska Director of the Bureau of Sport Fisheries and Wildlife, which is within the Interior Department. The Alaska BFS and W report was written in December, 1970, before the Interior Department's draft environmental impact statement on the pipeline was published. It concluded that the proposed Alaska route would cause far more environmental damage than the draft statement later admitted.

The BFS and W memo was written after the draft impact statement was published in January. It charges the Interior Department with omitting many of the ecological concerns discussed in the December Alaska BFS and W report. “As the statement now stands, it is difficult, if not impossible to defend,” Gordon Watson, Alaska Director of BFS and W wrote in his memo to Kenneth Roberts, who heads the BFS and W in Washington.

Almost all of the December Alaska BFS and W report was included verbatim in the draft impact statement issued in January. However, a few sections of the December report were omitted. When one sees those sections, it becomes obvious why they were omitted. The omitted sections of the December Alaska BFS and W report included:

(1) “The Alaska-Canada pipeline would not require marine transportation with its danger of massive catastrophic oil spills and certainty of persistent and chronic pollution and would remove the threat of extensive loss to rich fish and wildlife resources of Prince William Sound and the tank ship route to West Coast ports. From an environmental standpoint, the Alaska-Canadian pipeline would be by far the preferred route.”

(2) “The pipeline project has far greater potential for long-term irreversible environmental impact in areas not covered by Interior stipulations than in areas that are.”

(3) “Irreversible losses can be prevented only by keeping oil out of the water altogether . . . with the tremendous amounts of oil handled in Alaska, tank ship

operations under present standards is a commitment of fish and wildlife resources to an inevitable downward trend."

(4) "Oil pollution from the pipeline itself would have a tremendous impact on major segments of fish and wildlife resources of tremendous Alaskan significance. Marine pollution from terminals or vessels could be so severe as to have overwhelming, irreversible impact on birds, marine mammals, and fish resources of national and international significance."

(5) "The permittee (Alyeska, the pipeline company) has already demonstrated his willingness to circumvent the stipulations wherever it is advantageous to do so. The same attitude no doubt applies to the transportation of oil."

Again, these are the statements that did *not* appear in the draft impact statement, even though virtually everything else included in the Alaska BSF and W December report did appear.

On September 21, 1971 I placed in the Congressional Record a 33 page report commissioned by the MacKenzie Valley Pipeline Company (the most prominent Canadian pipeline consortium) which concluded that the operating cost of the Canadian pipeline would be about the same as or less than a trans-Alaska pipeline and its tanker transportation. The study maintained that the cost of building a Canadian oil line from Alaska's Prudhoe Bay to Chicago would cost less than \$2 billion, while the Alaska route, including sea transportation, would cost \$3 to \$4 billion. While I believe the study's estimate of the cost of a Canadian pipeline even assuming it would be built along with a natural gas pipeline, is far too optimistic. What is most significant about this report is that it was written in June, 1970—almost two full years before the final environmental impact statement on the trans-Alaska pipeline was issued. This study, of course, must have been known to the Interior Department and certainly its conclusions were important enough, and well-researched enough, to have warranted a full-scale analysis of the economic merits of a Canadian pipeline alternative by the Interior Department.

On January 3, 1971, I included in the Congressional Record a copy of the Interior Department's proposed stipulations for the final environmental impact statement. This somewhat incredible document revealed that the Interior Department was actually seriously considering making the stipulations in the final impact statement even weaker than the draft impact stipulations, even though the draft impact stipulations were roundly criticized by both native Alaskans and environmental groups.

On May 8, 1971, I inserted in the Congressional Record an application from the Amerada Hess Oil Company to the Costa Rican government to build a pipeline across that Latin American Country. That document substantially confirmed assertions by some pipeline critics that some of the Alaska oil would arrive on the East Coast through a weird, tricky scheme.

The Amerada Hess application explicitly stated that the purpose of the pipeline across Costa Rica would be to transport Alaskan oil to Amerada Hess' refinery in the Virgin Islands. Under this scheme, as much as 450,000 barrels per day might be transported by foreign tanker to Costa Rica where the oil would then be piped across and picked up by other foreign tankers and transported to the Virgin Islands. From there the oil would be shipped to the East Coast for consumption.

This scheme has several advantages to Amerada Hess. By selling the oil first in Costa Rica at the low price, Hess would be able to reduce the revenues going to the State of Alaska, which are based on the price oil is originally sold for. By transporting the oil through Costa Rica by pipeline and refining it in the Virgin Islands, Amerada Hess would avoid the Jones Act, which requires the use of expensive U.S. tankers except when cargo enters or leaves from a foreign country. Avoiding the Jones Act would significantly reduce the transportation cost to the oil company. By selling the oil finally on the East Coast at prices which are much higher than on the West Coast, Amerada Hess would get the maximum profit from the sale of the oil. This sort of scheme helps explain why the oil companies want to build the Alaska pipeline even though oil prices on the West Coast are significantly lower than in the Midwest or East.

Yesterday, June 21, I placed in the Congressional Record a letter written by the President of the National Academy of Sciences to the Interior Department on March 2, 1971 in which the Academy volunteers to help the Interior Department study the Alaska pipeline if Interior would be willing to help fund the Academy study. Unfortunately, the Interior Department refused and, thus, the study was never undertaken.

Mr. Chairman, it seems to me that there are very few such well-documented cases of a government agency going so far out of its way to avoid getting the facts as in the case of the Interior Department's so-called study of the Alaskan pipeline. I believe now the only course left is for Congress to take this decision into its own hands. I have introduced a bill (H.R. 15227) in the House which would postpone construction on any pipeline until a National Academy of Sciences study is completed and would then require Congressional approval before any pipeline from Alaska's North Slope could be constructed. While the chance that Congress will pass this legislation is admittedly slim. I believe passage of this legislation is the most appropriate course we could take at this time.

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SUMMARY REPORT—RAILWAY TO THE ARCTIC: A STUDY OF THE OPERATIONAL AND ECONOMIC FEASIBILITY OF A RAILWAY TO MOVE ARCTIC SLOPE OIL TO MARKET \*

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CANADIAN INSTITUTE OF GUIDED GROUND TRANSPORT, QUEEN'S UNIVERSITY

January 1972—Revised May 1972

RAILWAY TO THE ARCTIC

ABSTRACT

This is a summary report of a much more extensive study conducted by the Canadian Institute of Guided Ground Transport between May and October, 1971, with co-operation and assistance from Carnegie-Mellon University, Canadian National Railways, Canadian National Telecommunications and PROCOR Limited, Rail Car Division. The study grew out of an earlier study by Carnegie-Mellon.

It is concluded that a railway as proposed is technically and operationally feasible and appears financially attractive. The most appealing of three routes studied starts at Prudhoe Bay, proceeds along the Arctic slope to the Mackenzie Delta, and then Southeast along the Mackenzie River valley ending near the Trout River, a distance of some 1,200 miles. From here the oil would proceed by pipeline, since permafrost is no longer a problem.

The railway would require some 360 six-axle locomotive units and 11,000 tank cars of 94 tons capacity. Twenty trains per day, of 168 cars, pulled by five locomotive units, including two "slave" units, seems an optimum configuration to move the necessary 2 million barrels of oil. The railroad would be double track with advanced communications.

The capital cost would be about 2.4 billion dollars, annual operating cost of 193 million dollars. A tariff of about 0.67 cents per barrel, producing \$489 million revenue, would return in excess of 10 percent on equity, with a 7 percent cost of debt (75-25 debt-equity ratio) using discounted cash flow calculations. Using 40 cents per barrel for Trout River to Chicago (in general agreement with Interprovincial Pipeline figures) the cost of transporting crude oil from Prudhoe Bay to Chicago using the rail and pipeline system is conservatively estimated at \$1.07 per barrel.

The railroad would require an average of 5,000 people for construction over a five and one-half year period. In operations it would employ directly some 4,600 people in the N.W.T., Y.T., and Alaska. A town of up to 25,000 people would probably arise near the main terminal. Indirect employment would be substantial in both Canada and the U.S. It is recommended that the project be studied in full detail on the highest priority.

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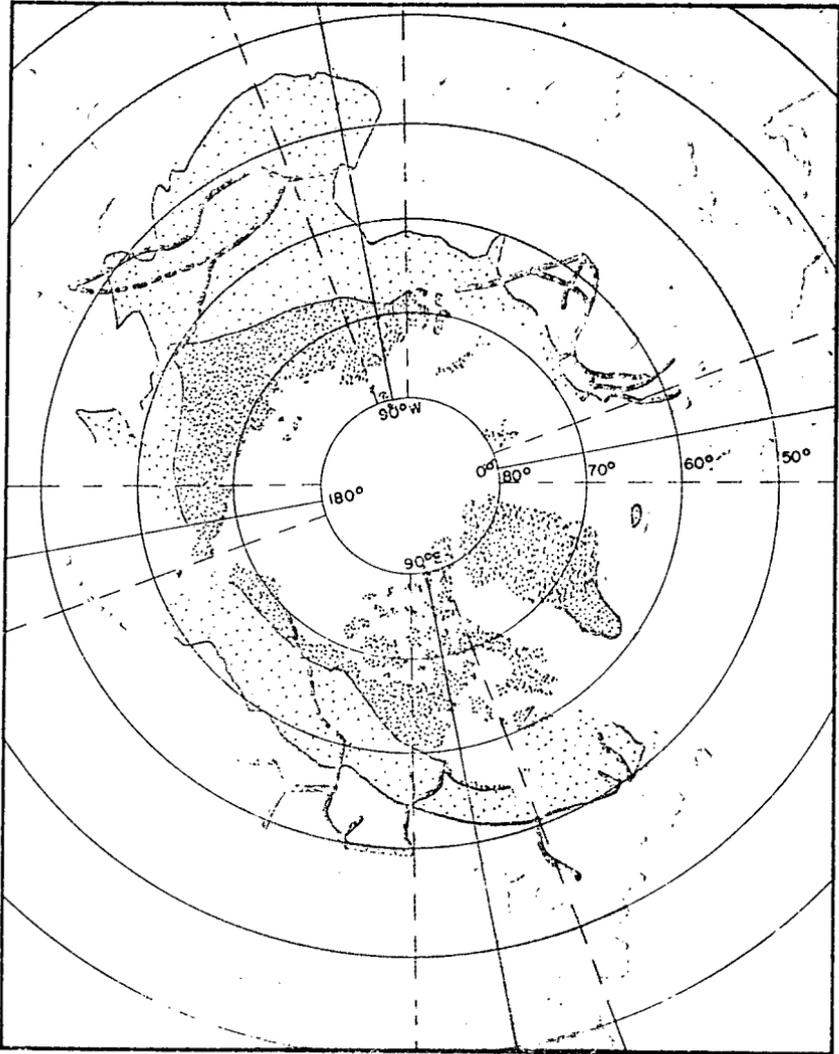
\*This is a condensed version of the summary report.

<sup>1</sup> Queen's University.

<sup>2</sup> Carnegie-Mellon University.

<sup>3</sup> University of Saskatchewan.

<sup>4</sup> Special Consultant.



RAILWAY	EXISTING	CONTINUOUS	PERMAFROST
	PROPOSED	DISCONTINUOUS	

FIGURE 1.—Principal Arctic and Sub-Arctic Railways of the World.

\* \* \* \* \*

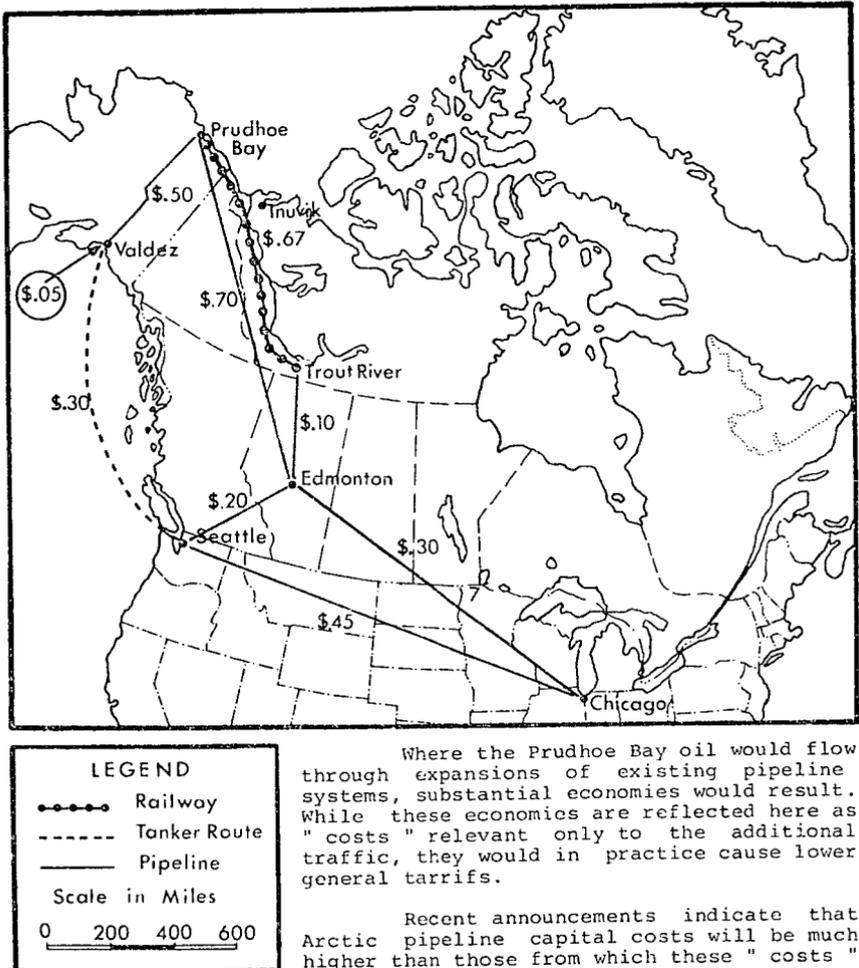


FIGURE 5.—Comparative Costs, Arctic Oil Distribution Routes and Modes.

\* \* \* \* \*

## II

### ARCTIC RAILWAYS AND THE ENVIRONMENT

#### GENERAL

The construction and operation of Arctic railways will interact with the environment in essentially six ways.

1. The construction of the right-of-way will inevitably destroy a certain amount of habitat. Similarly, the buildings and terminals required must remove some segment of the terrain from availability for other uses.

2. During construction, the rail right-of-way will require substantial amounts of granular fill. This fill must be drawn from stream beds or from borrow pits located in old beaches, terminal moraines, eskers, or other gravel beds laid down in the distant past.

3. During construction, the passage of vehicles and equipment could cause damage to the delicate surface layers with consequent melting of the permafrost.

4. A right-of-way of any kind can lead to interference with the delicate thermal and hydraulic balance of soils in permafrost zones with consequent slumping and slipping of soils and the creating or disrupting of drainage systems which further proliferates damage.

5. The presence of construction crews and vehicles comprises a direct threat to wildlife unless stringent controls are applied. Construction crews and camps may also pose problems for local peoples.

6. The operation of trains through critical wildlife areas could lead both directly and indirectly to mortality of wildlife.

\* \* \* \* \*

#### CONCLUSIONS

It is evident that the rail system and configuration presented here is technically feasible. Rail systems presently exist in other parts of Northern Canada, in Northern Scandinavia, and in Russia which operate regularly under similar environmental conditions. The operators of these systems have solved many of the various operational problems faced by the system that is proposed between Trout River and Prudhoe Bay. Furthermore, high density traffic operations, fully controlled, are common in the United States, Canada, and Great Britain. To be sure, the handling of crude oil by rail is not common, but the handling of similar products is being done successfully. Liquefied petroleum gas, for example, is much more hazardous than crude oil, and it is handled successfully. Hot products such as residual oil and sulphur are handled by unit trains over substantial distances without auxiliary heating. Flow through the gathering pipelines will never be stopped completely.

\* \* \* \* \*

#### IV

#### CONSTRUCTION

##### INTRODUCTION

The construction of 1,240 miles of double track railway from Trout River to Prudhoe Bay can be completed five to six years after the decision to commence design and route reconnaissance. Although technological innovation will not be needed, a railway built to the high standards required by the system design and operational concept is in itself a tremendous engineering, construction, and logistical problem. The need for it to be operational within a period of time that is acceptable in relation to the potential development of the Prudhoe Bay oil fields and the movement of that oil to market, makes it an even more complex undertaking. From analysis, however, it is feasible and at least single track operation should be possible within five years of initial engineering and survey work. In addition to the 1,240 miles of double track, the undertaking includes a supply link of 140 miles of single track line to connect the southern terminus at Trout River with the Great Slave Lake Railway at Enterprise, some 28 miles south of Hay River.

The selected route down the Mackenzie River involves two major crossings of the Mackenzie—one 3,160 feet and the other 5,500 feet—plus more than forty crossings of other streams and rivers. Investigations indicate that much of the route north from Trout River for some 700 miles has characteristics similar to those encountered in the construction of the existing railway to Hay River except for more frequent areas of permafrost. (See map, Appendix A). For the northerly 500 miles, west of the Mackenzie delta and generally parallel to the Beaufort Sea, permafrost conditions are general. The following pages summarize a suggested approach to the construction and a feasible time schedule covering location surveys, sub-grade construction, bridging, and tracklaying.

##### LOCATION SURVEYS

Reconnaissance of the proposed route by air, and ground examination to establish and plot a route corridor of one to one and one-half miles in width could be accomplished in sections as follows:

- (a) Enterprise to Strong Point (first Mackenzie River crossing), 220 miles;
- (b) Strong Point to Police Island (second Mackenzie River crossing), 310 miles;
- (c) Police Island to Arctic Red River, 300 miles;
- (d) Arctic Red River to Prudhoe Bay, 350 miles.

\* \* \* \* \*

TABLE I.—OIL SHIPPING COSTS, ARCTIC OIL RAILWAY  
 A: SENSITIVITY TO VOLUME, RESIDUAL VALUE, DEBT REPAYMENT AND LIFE  
 [In dollars per barrel]

Economic life of oil reserves and ultimate daily traffic after phased expansion	Residual Value as a Resource Railway			
	0	\$1,300,000,000 residual debt ratio		
		0 percent	50 percent	75 percent
20 years:				
2,000,000 barrels.....	\$0.7613	\$0.7141	\$0.7016	\$0.6960
4,000,000 barrels.....	.6276	.6002	.5919	.5883
6,000,000 barrels.....	.5629	.5441	.5379	.5347
30 years:				
2,000,000 barrels.....	.7063	.6893	.6756	.6688
4,000,000 barrels.....	.5770	.5690	.5602	.5559
6,000,000 barrels.....	.5177	.5113	.5048	.5016

Note: A volume of 2,000,000 barrels daily is compared with alternatives incorporating expansion to 4,000,000 and 6,000,000 barrels at later dates. Each was considered for no residual (salvage) value, and 3 debt-equity structures of a \$1,300,000 estimated residual value as a resource railway. Each of the 12 combinations was evaluated for 20 and 30 year lives. Interest was paid at 7 percent, a 10 percent return on equity required, and capital cost allowance not claimed until it could be matched with revenue.

B: EXPLOITATION OF PRESENTLY-KNOWN AND INDICATED RESERVES AT RATES PROJECTED BY THE CABINET TASK FORCE ON OIL IMPORT CONTROL—AUGUST 1969

Residual value (millions)	Debt ratio reduced to (percent)	10,000,000,-	20,000,000,-	20,000,000,-
		000 barrels, C.C.A. applied to other revenue	000 barrels, C.C.A. not applied to other revenue	000 barrels, C.C.A. applied to other revenue
\$1,200 <sup>1</sup> .....	75 50 0	\$0.6920 .7119 .7797	\$0.5868 .5971 .6186	\$0.5479 .5597 .5778
Total.....		.8414	.6562	.6036

<sup>1</sup> The lower residual value is produced by reduced asset replacement.

Note: The 10,000,000,000 barrel estimate quoted for Prudhoe Bay and a 20,000,000,000 barrel figure for ultimate reserves are used. Interest is paid at 7 percent and a 10 percent return on equity required.

\* \* \* \* \*

#### CONCLUSIONS

The essential question to be answered by any study of the Arctic Slope oil transport problem is this: Which mode of transport, and which route, can permit the required movement of oil, at acceptable economic cost, within an acceptable time period, with minimum environmental cost, and with the best long term results for the peoples who now live in and around the affected areas? We believe that the modes and routes evaluated, rail by route I best meets these conditions.

A railway to carry the oil over the permafrost is technically and operationally feasible. Transfer to a pipeline near the southern limit of the permafrost appears best for further distribution.

Railway interaction with permafrost can be negligible using already proved construction techniques and interaction with wildlife can be minimized by careful route selection.

Construction of the system using Route I (Mackenzie Valley) would require substantial year round operation for a period of some five years to first revenue traffic. An additional year or more of construction would be required to complete the entire 1200 miles of high grade double track railway.

At a volume of two million barrels daily, we have calculated a system capital cost of 2.4 billion dollars and an annual operating cost of 194 million.

Analysis of various traffic flows, equity and debt mixes, salvage and maintenance policies, and their corresponding rates of return, suitably discounted, show that a tariff of about 67 cents per barrel, Prudhoe Bay to Trout River, would meet requirements for a respectable return over a wide range of conditions. Accordingly, the "cost" of transporting crude oil from Prudhoe Bay to Chicago is estimated at \$1.07 per barrel.

Primary jobs created would be in excess of 4500, many of which would be suitable for native people. Secondary employment is expected to be substantial during construction (some 200,000 man years in Canada) and significant during operations (some 16,000 permanent jobs).

#### RECOMMENDATIONS

1. It is recommended that an immediate and intensive program of research and design be undertaken to establish clearly the detailed technical feasibility of this project, and to develop precise design parameters.
2. Air photo reconnaissance of routes should be done at high priority. A great deal of useful information may already be available from the research work done by the Gas Arctic and Northwest study groups.
3. Detailed bridge reconnaissance and preliminary bridge design should be done in the spring of 1972 to avoid losing a full year of time if the spring break up period is missed and the project does proceed. Strong Point, Police Island and Separation Point sites should all be included.
4. Environmental and political pros and cons of crossing the Alaska Wildlife Reserve should be carefully developed and considered.
5. Comparison of cost/benefits of the routes on the West and East sides of the Mackenzie (Routes I and II) and should be conducted, including both the time and dollar costs of bridging, and considering environmental implications.
6. A route into the possible Tuktoyaktuk peninsula oil field should be examined for its possible impact on the Canadian development of Arctic oil reserves, independently of the decision re Alaskan oil. Environmental aspects must be included.
7. The southern terminal site should be selected, having in mind the size of the town implied and its long term consequences.
8. A trans Brooks Range route should be carefully examined so that more exact comparisons of the Brooks Range and North Slope routes can be made.
9. Stream flow characteristics should be established for each stream crossed by the proposed Routes I and II.
10. Relatively detailed implementation plans should be prepared from the above, perhaps using a PERT approach.

[Telegram]

Congressman WRIGHT PATMAN,  
Vice Chairman, Joint Economic Committee,  
House Office Building, Washington, D.C.

It is my understanding that your joint economic committee is to hold hearings starting today on trans-Alaska pipeline. I should like to make it crystal clear for the record that the International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers are in complete accord with Secretary Morton and the administration in their position as stated by Secretary Morton on May 11, 1972. Our Nations energy needs cannot be disputed by anyone. The completion of the trans-Alaska pipeline as proposed by the administration will help take care of these needs, protect our national security, and create thousands of jobs for American workmen and also contribute an estimated \$2 billion to the American economy. We support this proposition and respectfully ask you to give serious consideration to our views.

Respectfully,

PAGE GROTON,  
(Assistant to International President) International  
Brotherhood of Boilermakers.

[Telegram]

Senator WILLIAM PROXMIRE,  
*Chairman, Joint Economic Committee,  
 New Senate Office Building, Washington, D.C.*

In the name of thousands of members of the Industrial Union of Marine and Shipbuilding Workers of America, I strongly urge you give your support to the trans-Alaska pipeline.

Interior Secretary Morton's recent decision in favor of building the pipeline will result in thousands of new job opportunities for our sorely tried members and for allied workers in other industries. The pipeline construction will usher in a new era that will inevitably employ new tankers that will be required to carry oil from Port Valdez to the lower 48 States. Additional jobs will be required to supply and maintain the pipeline and these tankers.

If a pipeline is constructed through Canada, assuredly these jobs will go to Canadians, and U.S. labor will be shut out. The U.S. Treasury will suffer loss of taxes from both corporations and workers. Balance of trade payments, deficits will also occur. Such a situation will be contrary to the national interest in every respect.

It is our profound conviction that every concern covering construction of the pipeline and regulations that will govern marine transportation from Port Valdez to the lower 48 States will be given every consideration to minimize the risk of pollution resulting from this crucial endeavor to every sector of our people and our Nation.

We should also wish to emphasize that the long range power energy needs imperatively demands the construction and the utilization of the pipeline, especially in the face of the tenuous conditions in the Near East for the vital supply of oil products to the United States.

We will greatly appreciate your placing this wire in the record of the hearings.  
 Sincerely,

EUGENE L. McCABE,  
*President, Industrial Union of Marine and Shipbuilding  
 Workers of America.*

[Telegram]

Senator WILLIAM PROXMIRE,  
*Chairman, Joint Economic Committee,  
 New Senate Office Building, Washington, D.C.*

American Radio Association urges Joint Economics Committee approve legislation authorizing construction of trans-Alaska pipeline to Valdez as early as possible to provide for our nation's energy needs. U.S. Maritime industry would thereby be enabled to play its part and achieve healthy level of activity providing jobs for American maritime workers. Please make this communication part of the hearings record.

W. R. STEINBERG,  
*President, American Radio Association, AFL-CIO.*

ALYESKA PIPELINE SERVICE Co.,  
*Bellevue, Wash., June 21, 1972.*

Hon. WILLIAM PROXMIRE,  
*Chairman, Joint Economic Committee,  
 Congress of the United States, Washington, D.C.*

DEAR MR. CHAIRMAN: We have been following with considerable interest the hearings being conducted by the Joint Economic Committee on the proposed trans-Alaska pipeline system. As the company responsible for designing the system and for its construction, operation and maintenance, we are well aware of the claims, counterclaims, issues and controversies which have arisen since the project was proposed. They have been thoroughly aired in public hearings and comments for the record, in the news media, and in various public forums including the Congress. Except for those few people who feel that Alaska's North Slope should not be developed at all, the consensus of those expressing an interest is that the vast oil and gas reserves which have been discovered there are vitally needed to satisfy the nation's energy requirements and that they should be transported to the marketplace in the most efficient manner compatible with the

environmental and economic interests of the country. This, of course, has been the goal of the companies seeking to develop the North Slope reserves. Indeed, it is the basis for their decision to build the trans-Alaska pipeline system.

After three years of review and analysis, unprecedented in scope and intensity, the Secretary of Interior has decided to grant the necessary permits for the project, subject to the most stringent technical and environmental safeguards ever imposed. We are convinced that the Secretary's decision is fully supported by the record and that any thorough, objective review of the facts will reach the same conclusion.

Much of the testimony that has been presented to your Committee in the current hearings has been in support of a trans-Canada pipeline on the ground that it is a preferable alternative to the trans-Alaska line. This conclusion is supposedly supported by certain assumptions which, we believe, are erroneous. To assist the Committee in an objective assessment of this fundamental issue, we respectfully request that the comments set forth in this letter be included in the hearing record.

Although the economists who have appeared before the Committee in support of a trans-Canada line have generally assumed an environmental preference for this alternative, the main thrust of their argument has been expressed in economic terms based upon the following assumptions:

## I

It is assumed that an oil line from Prudhoe Bay, Alaska through Canada to the midwest, as an alternative to a trans-Alaska line, would be owned by United States interests and would transport only Alaskan North Slope oil to market. This assumption is necessary to support the conclusion that the resource cost of delay in the production of North Slope petroleum involves only the delay in authorization of a trans-Canada pipeline.

The assumption ignores the announced policies of the Canadian government with respect to a trans-Canada line. Canada has made it clear that Canadian interests would have to participate in the ownership of a trans-Canada line (probably with at least a 51 percent share), and that Canadian oil would have a right to share the pipeline capacity on a priority basis.

Any analysis which does not recognize the inevitable delay in production of North Slope oil which would result from the implementation of this Canadian policy is unsound.

## II

It is further assumed that there will be only a one to two year delay in initiating production of North Slope oil by switching to the trans-Canada alternative.

The validity of this assumption is essential to the position of the trans-Canada proponents. For example, one of the witnesses before the Committee, Mr. Richard Nehring, former Economic Analyst with the Interior Department, made a detailed economic analysis of the trans-Alaska vs. trans-Canada line and concluded: "With a delay of more than three years [to put a trans-Canada line in operation], TAPS would be more advantageous under nearly all reasonable projections."

The one to two year delay estimate is arrived at by assuming that construction of a Canadian route could *begin* early in 1975 and that construction of a trans-Alaskan route could not *begin* until 1973 or 1974. Since it is the estimated *completion* dates of the two lines which are critical in measuring delay, the dates construction would *begin* are only useful if both lines could be constructed within the same length of time. Common sense dictates that a pipeline across Canada, which is four times as long as TAPS and traverses over twice as much permafrost and muskeg, will take considerably longer to construct. The most optimistic estimate by experts in pipeline construction is five years from commencement to completion of a trans-Canada oil pipeline from Prudhoe Bay to Chicago. (See Attachment A.)

Assuming that construction of a Canadian line could begin in 1975—and, for reasons set forth below, we are convinced it could not—it would not be completed before 1980. Also, assuming that construction of an Alaskan line could not begin until mid-1974, it could be completed by the end of 1976. Thus, a trans-Canada line would be delayed a minimum of four years simply because of construction time.

Moreover, it is unrealistic to presume that all steps necessary to begin construction of a trans-Canada line could be completed by 1975. Using the history of the TAPS application for guidance, these steps include:

A. Formation of an entity ready, willing and able to undertake the project. Negotiations and agreements would be much more complex than the TAPS agreement in view of the staggering financial commitments required of the participants and the need to accommodate the Canadian government's requirement that Canadians share an equity position.

B. Engineering, route survey, mapping, soil borings, station site selection, and preparation of project description and other data necessary for filing formal applications with necessary U.S. and Canadian authorities.

C. Preparation of Draft Environmental Statement by Department of the Interior for permits across public lands in Alaska; hearings, public comments, and preparation of Final Environment Statement.

D. Compliance with procedural requirements of the Canadian Government, e.g., passage of a Special Act of Parliament, incorporation under Canada Corporations Act, submissions to National Energy Board, possible hearings on environmental impact, etc.

E. Agreements between the U.S. and Canadian governments to resolve the multi-national jurisdictional problems involved.

F. Only after the necessary governmental authorizations have been issued could final arrangements be concluded for financing of the line by individual participants.

Assuming that none of the foregoing steps results in litigation, (e.g., challenging the adequacy of compliance with National Environmental Policy Act, challenging the authority of the Canadian Government to issue permits across lands subject to aboriginal claims) and clear right-of-way and construction permits are issued and all necessary financial arrangements are made, the applicant could then carry out the major purchasing of materials, construction contract negotiations, mobilization of equipment, and manpower and other activities necessary to start construction.

The time it would take to complete all of the steps prior to commencement of construction of a trans-Canada line is conjectural. Barring unforeseen, but not unlikely, delays from Canadian Native land claims, or environmental lawsuits, three years would be optimistic when one considers that it has taken three and one-half years to obtain Secretarial approval of a significantly shorter and less costly line under one government's jurisdiction. Realizing that the unforeseen is likely, it would be imprudent to allow less than a four or five year period for planning purposes.

Delay in completion of a pipeline to transport North Slope oil to market has a direct effect on the time when the associated gas reserves can be delivered to the lower 48. There is no question that these gas reserves are substantial and there can be little dispute that they are badly needed to supply the rapidly diminishing natural gas supplies of the nation. However, the North Slope gas is associated with the oil and a determination of the reservoir mechanics of this oil/gas field cannot be made until the oil flow starts. Thus, oil production from Prudhoe Bay must precede gas production if the optimum quantity of oil is to be recovered from the reservoir. Producing the gas too soon might reduce the amount of oil ultimately recovered.

While there have been studies and planning by various companies looking to the construction of a gas pipeline, the detailed development of a gas transportation system will inevitably be delayed until it is known when and how the oil will be transported. Financing the \$5 billion cost and getting the necessary permits to build a gas pipeline are dependent on firm sales and delivery contracts. Gas commitment dates cannot precede oil production and in fact may follow by up to 3 years.

### III

Another major assumption relied upon by the trans-Canada proponents is that the West Coast market cannot absorb the throughput of a trans-Alaska pipeline and that a transportation system to bring oil where it is not needed makes no economic sense for the companies or for the nation. It may be significant that this theory has been advanced and developed by persons who, no matter how sincere and well-intentioned, have no extensive experience or expertise as oil economists, geologists or market analysts.

From the oil companies' point of view, the assumption implies that the decision to move Prudhoe Bay oil to the West Coast was done by whim or, worse, that ulterior goals are in mind that will somehow redound to the companies' benefit at the expense of the public generally.

Three factors are involved in determining whether oil transported by TAPS will have a market on the West Coast at any particular point in time. They are, simply, (1) the volume of oil flow in the pipeline, (2) the demand for oil on the West Coast, and (3) the available domestic supply on the West Coast.

The maximum capacity of pipeline throughput at any particular future time is dependent on when the pipeline is constructed. Initial throughput capacity will be 600,000 barrels per day, increasing to 1.2 million barrels per day after two years and to the line's ultimate maximum capacity of 2 million barrels a day after seven years of operation. It is important to note that while this is the projected throughput capacity schedule, the proven reserves at Prudhoe Bay are not expected to be produced at more than 1.6 million barrels a day, the maximum capacity of the equipment being installed in the field. Therefore, the projected throughput of 2 million barrels per day after seven years is dependent upon further discoveries totaling 5 billion barrels or more recoverable reserves being made on the North Slope during the interim period. This would be equivalent to another East Texas, the second largest oil field in North America.

Assuming TAPS becomes operational in 1976, the projected maximum amounts of oil to be shipped through the trans-Alaska Pipeline System would be as follows:

	<i>Barrels per day</i>
1976-78 -----	600, 000
1978-83 -----	1, 200, 000
1983- -----	2, 000, 000

Using even the most conservative domestic supply and demand estimates for the West Coast, makes it clear that there would be a market for the entire TAPS throughput. Demand on the West Coast is increasing at the same time West Coast production is declining thus increasing the supply gap. For example, in 1970 demand on the West Coast was 2 million barrels per day which was satisfied by domestic supply of 1.5 million barrels per day and reliance on imports for .5 million barrels per day to make up the deficit. By 1976, the West Coast deficit will exceed 1.2 million barrels per day even assuming an unrealistically low demand and high production. The Economic and Security Analysis prepared by the Department of the Interior in conjunction with the Final Environmental Statement on the trans-Alaska pipeline analyzes supply and demand projections by several authoritative government and industry sources. For 1975, the lowest deficit which is forecast for PAD V (West Coast market) is contained in an analysis by the Bureau of Mines.<sup>1</sup> That estimated low deficit figure is 1,348,000 barrels per day. Even if this were reduced by 20 percent, a shortage of over 1 million barrels per day would exist on the West Coast in 1975.

By 1980, the lowest possible deficit forecast by any of the many projections analyzed would be 1,580,000 barrels per day, while the median is well over 2 million barrels per day.<sup>2</sup>

The stark fact that emerges is that there is a market place for the oil to be shipped to the West Coast by the TAPS system at every stage of its projected maximum throughput. This should not be surprising. Private industry would not commit to a \$3 billion investment without reasonable assurance that the product of that investment has a home in the market place.

It should be recognized that the foregoing discussion is based upon the lowest possible estimates of West Coast crude oil deficits. Such deficits are unrealistic if history is to provide any guidance. As stated by Dr. Richard L. Gordon, in his "Analysis of Future Demand for Crude Oil",<sup>3</sup> in discussing the ability of oil to maintain its market position in light of a general acceleration of energy consumption growth: "Earlier forecasts had expected only 3.0-3.5 average increase

<sup>1</sup> Analysis of Future Demand and Domestic Supply of Crude Oil, by Petroleum Administration for Defense (PAD) District, Volume II, Appendix L, Part 3, Economic and Security Aspects of the Trans-Alaska Pipeline, Department of the Interior, December 1971.

<sup>2</sup> Analysis of Transportation Alternative, Volume I, Appendix C, Figure C-3, Economic and Security Aspects of the Trans-Alaska Pipeline, Department of the Interior, December 1971.

<sup>3</sup> Volume II, Appendix L, Part 1, Economic and Security Aspects of the Trans-Alaska Pipeline, Department of the Interior, December 1971.

in oil use from 1965 to 1980. Actual growth from 1965 to 1970 was at a five percent rate."

To make the case for an oversupply on the West Coast, the trans-Canada proponents estimate demand on the low side, production on the high side, and fill in the deficit with undiscovered or unavailable supplies principally from Ecuador, Peru, off-shore California, and the Gulf of Alaska. This method of projecting the supply/demand situation on the West Coast is interesting and unique. So far as can be determined it finds no support from the multitude of studies which have been and are being conducted by the recognized experts in government and industry. It is merely one more obvious attempt to present the strongest arguments against TAPS and the very best side of those in favor of a trans-Canada line without regard to the tensile strength of either plausibility or credulity. Neither industry nor government would or should make significant decisions affecting the supply of national energy needs on such speculation.

#### IV

Mr. Nehring goes to great lengths to dispute the opinion of the Council of Economic Advisors that the resource cost to the nation of delays resulting from building a trans-Canada line instead of a trans-Alaskan line would be over \$1 billion for each year of delay. He concludes that the costs would be significantly less and that they would be offset by other savings if there were only a one to two year delay involved. Even Mr. Nehring admits that if the delay were more than three years, "TAPS would be more advantageous under nearly all reasonable projections."<sup>4</sup> Since Mr. Nehring was clearly mistaken in assuming a delay factor of less than three years, it serves no purpose to examine the relative weight of his opinion in contrast to that of the Council of Economic Advisors. Actually, neither the CEA estimates of resource savings (Economic and Security Analysis, Volume II, Appendix K-3) or the Treasury Department estimates of the substantial favorable impact which development of North Slope oil would have on U.S. balance of payments took into account the recent agreement to increase payments to Persian Gulf countries as a result of the dollar devaluation. That agreement makes the TAPS system more attractive because it makes delay even more costly.

#### V

One of the more elaborate arguments put forth by trans-Canada supporters is based upon the hypothesis that a second oil line will be built from Alaska's North Slope to transport additional crude oil to the lower 48. It is even assumed that this hypothetical second line will begin construction in 1978 and that it would be owned by the same entity that builds the first line from Prudhoe Bay.<sup>5</sup>

The hypothesis is then used to link the economics of this second line to a trans-Canada line and TAPS so as to support a conclusion that it is better to build a trans-Canada line first since the second oil line will go the same route. Such speculation borders on fantasy and reveals the absence of even a casual inquiry into the facts.

It is assumed that this phantom second oil line will be required for basically three reasons: (1) Extensions to the Prudhoe Bay field; (2) Increases from secondary recovery in the Prudhoe Bay field; and (3) New finds through continued exploration.

To date, 75 developmental wells, excluding dry holes, have been drilled in the Prudhoe Bay field. The balance of the drilling required to fully develop the field will be within the perimeter of the field which has been well defined. The developmental program to date precludes any significant field extension and has substantiated the previously estimated 9.6 billion barrels of recoverable oil.

The estimated primary recovery of the Prudhoe Bay field oil is 40 per cent which represents the best engineering thinking even though fluid injection may be required to reach that recovery level. Secondary recovery has its greatest application in reservoirs recovering only 15 to 20 per cent of the original oil in place. To the extent that recovery by natural reservoir energy exceeds 20 per cent, the potential recovery by fluid injection is diminished.

Statements of Atlantic Richfield Company officials of "hoping" to recover "ultimately" 65 to 70 per cent of the oil in place have been cited to support the sec-

<sup>4</sup> Nehring, *Future Developments of Arctic Oil and Gas: An Analysis of the Economic Implications of the Possibilities and Alternatives*, May 10, 1972.

<sup>5</sup> Nehring, *op. cit. supra*, at 15-17.

ondary recovery theory. While recovery at this higher level is a remote possibility, it must be recognized that an increase in recovery factor through secondary means does not represent a corresponding increase in recovery rate. It is more likely to result in a longer field life, not faster recovery.

As to discovery of additional fields through continued exploration, it should be noted that to date no proven commercial oil fields other than Prudhoe Bay have been found, and exploration drilling has either eliminated or revised downward the potential of a number of once exciting projects. However, future discoveries are contemplated and, as pointed out above, the ultimate capacity of the TAPS line cannot be utilized unless they are made.

Of course, exploration activity has come to a standstill as a result of the uncertainties of when and how any oil will be transported to market. Obviously, there will be no resumption of drilling until it is known for certain that a pipeline system will be built which has sufficient capacity to handle additional discoveries. A trans-Canada line which would be shared with Canadian oil would do little to encourage resumption of exploratory activity in Alaska. Incidentally, the economic costs resulting from the stagnation of exploration and development activity appear not to have been considered by the TAPS opponents.

## VI

The assumptions which have been used as a basis for the argument that a trans-Canada line is preferable to a trans-Alaska line indicate a non-objectivity in approach. Many significant economic factors have been ignored or brushed aside. Other "facts" are relied upon which are simply not supportable. Consider the following examples:

(a) In considering a Canadian alternative it must be recognized that in the "Northern Tier" of states generally encompassing the Great Lakes Refining Centers there is only 1,800,000 barrels per day refining capacity which would have access to the Alaskan crude. These refineries, designed for relatively high quality Gulf Coast, mid-continent and Canadian crude, could not run 100 per cent Alaskan crude. In fact, very substantial investments in most of the plants would be required to approach the ability to run up to 75 per cent of Alaskan crude. The approximate cost of modifying a typical refinery to handle 75 per cent Prudhoe Crude would be in the range of \$50 million for a 100,000 barrel a day plant. Total expenditures could involve as much as \$1 billion. West Coast refineries, on the other hand, were designed for the relatively poor quality California crude oil and could easily handle Alaskan crude without additional investment.

(b) Seven major pipeline systems presently supply crude oil to the Great Lakes Refinery Centers. A trans-Canada line could result in shutting down these systems with resulting layoffs, write-offs and general supply disruption in the Southwest. To our knowledge no new refineries are on the drawing boards anywhere in the Great Lakes Region. Reversal of one or more of the existing pipelines could carry excess Alaskan crude away from the Great Lakes region, but this would be sending it in the wrong direction. To move it to the East Coast where it could be used would require substantial investment in additional pipeline installation.

(c) It has been suggested that West Coast crude oil deficits during the period of delay resulting from a trans-Canada option could be compensated by additional Canadian imports of 300,000 to 400,000 barrels per day. Aside from the fact that these amounts would be insubstantial in the light of the length of delay that would occur and the size of the West Coast deficit, there is no reason to believe that such additional imports are available. The demand for Western Canadian oil production is already at near full capacity (See Attachment B).

(d) The trans-Canada proponents continue to raise the spectre of adverse environmental consequences of the TAPS system, principally because of alleged seismic and marine transportation risks. No credit is given to the stringent governmental stipulations which will be imposed. In fact, the alleged seismic risk has been designed out of TAPS. The seismic design criteria imposed by the Department of the Interior have the effect of incorporating in TAPS' structures the highest factor of safety ever in a man-made structure. It is significant that no modern electrically welded steel pipeline in oil service has yet been ruptured by a seismic event.

With respect to marine transportation, it is true that no tankers would be involved in the trans-Canada route, but in fact the likelihood of significant oil spills from tankers in the run from Valdez is minute. Moreover, the transportation

of oil by tanker to the West Coast will not be any less by reason of a trans-Canada line. Since the West Coast must receive ever increasing supplies of oil by tanker, the only question is whether the tankers will be American-built, delivering Alaskan oil, or whether they will be foreign-built, delivering oil from insecure foreign sources. When it is recognized that the Valdez to West Coast traffic would consist of modern, American-built tankers traversing areas of low traffic density in deep water with no substantial navigation hazards that choice seems the obviously preferable alternative. Inasmuch as the safety record of U.S. tankers is better than that of foreign tankers, the choice of the Canadian pipeline route over the Alaskan route could well increase marine sensitivity while depriving the U.S. merchant marine and U.S. shipbuilding industries of badly needed economic rejuvenation.

The fear expressed by Canadian interests concerning possible oil pollution resulting from tanker traffic between Alaska and the West Coast is somewhat ironic when one considers

That the Canadian government has leased 2.7 million acres offshore of British Columbia for oil exploration. (Commons Debates, p. 798-99, March 14, 1972.)

That about 500,000 B/D of imported oil is landed at Portland, Maine, for movement to Montreal through a pipeline which is largely in U.S. territory.

That Canada is planning to construct a new super-tanker port on the St. Lawrence River near Quebec City. (See Attachment C.)

That only one ship each five days will enter Puget Sound from the trans-Alaska pipeline.

Clearly, the need for a transportation system to bring crude oil from Alaska's North Slope to markets in the United States has been established. We continue firm in our belief that an objective, thorough examination of the facts will show the proposed trans-Alaska pipeline to be a reasoned and responsible means to that end. No project of private industry has ever been more thoroughly researched and designed to insure the protection of the interests of all Americans. Construction of the system should begin without further delay.

Very truly yours,

E. L. PATTON, *President.*

Attachments (3).

#### ATTACHMENT A

#### BASE ASSUMPTIONS ON CONSTRUCTION

#### CANADA ROUTE

1150 miles of pipeline in continuous or discontinuous Permafrost=Build @ 50 miles per Spread Season.

600 miles in bad terrain-Muskeg, etc.: Build @ 75 miles per Spread Season.

1600 miles near normal terrain: Build @ 100 miles per Spread Season.

Stations & Terminal will be built within time span of pipeline construction.

From above:

$$\frac{1150}{50} + \frac{600}{75} + \frac{1600}{100} = 47 \text{ Spread Seasons.}$$

Given the ability to set-up and maintain 10 Spreads, working concurrently, this gives say 5 years of pipeline construction.

NOTE: This means laying 650 miles of pipe each year.

#### ALASKA ROUTE

700 miles of pipeline in continuous or discontinuous Permafrost=Build at 50 miles per Spread Season.

100 miles near normal terrain but mountainous and undulating. Build at 75 miles per Spread Season.

Stations & Terminal will be built within time span of pipeline construction.

From above:

$$\frac{700}{50} + \frac{100}{75} = 14 + 1.33 \\ = 15.33 \text{ Spread Seasons}$$

Given the restraint to pipeline construction north of the Yukon and therefore a probable limit of say 6 Spreads in concurrent operation, this gives say, 2½ years of pipeline construction.

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ATTACHMENT B

[From The Oil Daily, June 2, 1972]

ALBERTA OUTPUT BASED ON HIGH CRUDE DEMAND

CALGARY—Alberta set June crude oil production from provincial fields at 1,024,667 barrels a day, complying with record level of demand for the time of the year from refinery purchasers in Canadian and export markets.

Many output of oil was initially set at 1,015,446 b/d but revisions later in the month because of refinery "turnarounds" and high inventories, was reduced to 987,128 b/d.

Total oil production this month will be 31,764,680 barrels, while pentane plus will total 4,542,000 barrels or 146,500 b/d.

In the same month of last year, Alberta producers were permitted under the provincial system of prorated production to pump 27,421,290 barrels of oil or 926,072 b/d. Byproducts in that month, for which the American market is providing growing outlets, totaled 3,444,000 barrels. In June 1970, Alberta produced 25,870,180 barrels of oil and 3,105,000 barrels of byproducts.

Alberta oil production set an all time record last January when the province produced 37,390,823 barrels or 1,206,156 b/d.

Besides gradually easing entry of Canadian exports to the U.S. markets east of the Rocky Mountains, Alberta's oil production is on the increase because depleting fields in Saskatchewan, and to a smaller extent Manitoba and British Columbia can not meet increasing oil demands from Canadian and export buyers. The three other western provinces have never been substantial oil producers but their proximity to the export and the Ontario markets permitted producers there to pump at full capacity for years.

Current oil exports are nudging 800,000 b/d with some 260,000 b/d going to the U.S. West Coast. Total western Canadian oil and byproducts output is at 1.6 million b/d.

Alberta that has a theoretical production capacity of up to 2.2 million b/d but that top level is now unlikely to be realized, particularly because of lack of new discoveries here and the reluctance of producers and transmission companies to invest in additional field and pipeline capacity, in view of uncertainty over markets and provincial taxation on oil reserves that will be in effect on the 7 billion barrels of Alberta oil reserves from next January.

Experts believe that Alberta oil production will reach some sustained level of around 1.3 million b/d by 1973 and top production will be achieved at around 1.5 million b/d by 1975 when the prorationing system is expected to end and provincial reserves enter an accelerated period of decline.

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ATTACHMENT C

[From The Oil Daily, June 5, 1972]

NEW SUPERTANKER PORT PLANNED NEAR QUEBEC

CALGARY—Plans will be announced this month for a supertanker port by the Quebec and Canadian federal governments at Ile Verte downstream in the St. Lawrence River from Quebec City, to serve as a terminal for offshore crude oil shipments and as a possible port of entry for oil from the arctic and east coast offshore regions.

The project, to cost between \$500-\$700 million, will also include additional refinery facilities onshore, besides providing feedstock for existing installations both in Quebec and bordering U.S. states.

An alternative site further downstream on Ile Du Bic has also been picked in the event definite engineering and marine studies now nearing completion should recommend the secondary location for navigational reasons.

Completion of the project at either location is set by 1975. It would be owned and operated by a Quebec government corporation, it was learned.

According to industry sources in Calgary, the port is the opening bid by the Quebec government to channel frontier oil from the arctic and eastern offshore areas of Canada, where discoveries have already been made into the province to give a new lease on life to its ailing petrochemical industry as well as to redress its precarious oil supply situation which at present makes it entirely dependent on overseas imports.

The port would be receiving offshore crude from overseas sources until arctic and east coast supplies are phased in growing volumes, possibly, after 1978. The port would also be designed to handle ships transporting liquified natural gas, again from overseas sources, at first, yielding to arctic fuel later in the decade.

Quebec energy chief Real Boucher has recently gone on record here advocating that Canada's possible arctic and offshore oil and gas supplies should serve energy-short Quebec and eastern Canada before exports of the fuels to the U.S. is permitted.

The eastern seaboard has only a few suitable harbors or waterways to accommodate supertankers in excess of 250,000 dwt. The location near Quebec City would also require icebreaker assistance during winter months.

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BP ALASKA, INC.,  
Washington, D.C., June 19, 1972.

Hon. WILLIAM PROXMIRE,  
Chairman, Joint Economic Committee,  
Washington, D.C.

DEAR SENATOR PROXMIRE: My letter is in response to the testimony June 9, of Charles Cicchetti before the Joint Economic Committee on the proposed trans-Alaska pipeline and its Canadian alternative. This is a subject of national importance and, needless to say, of critical importance to my company.

The economics of oil transportation is complex and sophisticated. Notable economists, both within and without the industry, have devoted their careers to the analysis of oil movement. Their testimony would be of great value to the Committee. Unfortunately Mr. Cicchetti's previous work on the quantification of recreation days at Hell's Canyon does not qualify him as an expert witness and, regrettably, the major errors of fact in his short paper must throw the gravest doubts upon his conclusions.

Following are my comments on several of Mr. Cicchetti's more obvious misinterpretations. I would appreciate your courtesy in making this letter a part of the hearing record so that Members of the Committee will be aware of the misleading nature of his statements.

1. This company has no intention whatever of selling Alaska oil to Japan. It makes no sense in terms of economics or U.S. security of supply. Should any company have plans for such a sale of Alaska crude, it would probably find the sale blocked by U.S. policy and would certainly, under present conditions, lose its shirt.

2. On page 8 of his statement, Mr. Cicchetti details a "plan" to use foreign built tankers to ship Alaska crude through Central American pipelines to the Virgin Islands for refining. This company has no plans nor any illusions about avoidance of the Jones Act requirements for the U.S. coastal trade. Whether Alaska oil is shipped through Central American pipelines or not, the Jones Act must apply if the oil is to be considered domestic crude for the purposes of the mandatory oil quota program. It is nonsense to talk about oil company efforts to avoid U.S. merchant marine laws. Tankers, built in the U.S. for the Alaska trade, at sea and under construction, offer ample proof the companies intend to ship their domestic Alaska crude in domestic bottoms to domestic ports.

Mr. Cicchetti is also in error when he says that "after refining, this domestic crude could then be shipped to the east coast of the U.S. outside the Mandatory Oil Import Program." Products refined from crude delivered to the Virgin Islands on foreign tankers and shipped to the east coast *would* be controlled under the Import Program.

3. BP does indeed have a merger agreement with SOHIO by which BP's holdings in SOHIO will increase as Alaska oil comes on line according to formula. BP's ultimate SOHIO holdings will be determined by the pipeline throughput as of January 1, 1978—not 1976 as stated by Cicchetti. Further, the merger agreement has provision for the disposition of BP/SOHIO Alaska oil coming on line after that date which fully protects the interests of the two com-

panies. We do wish to take our oil to market promptly, but not in order to consummate a secret takeover scheme as implied by Cicchetti.

4. We have every economic reason for wishing to get our oil to market quickly. We wish to develop the largest oil field in North America and maximize our profits to the extent market and other conditions allow. The Joint Economic Committee will understand that to do otherwise would be an inefficient utilization of the nation's resources; the road to bankruptcy and stockholder's suits; and contrary to the principles by which a free economy functions. Our decision to ship our oil to the West Coast was not lightly or quickly taken. It was made over three years ago. Three years of review, events, and further study confirm us in our conviction that our decision was the right one.

5. On page 6 of his statement, Mr. Cicchetti predicts that "it is likely that there will be an excess supply of oil on the west coast if TAPS is built, which may average as much as a million barrels of oil per day at late as 1985-90 if import restrictions similar to the rest of the nation are imposed on the west coast." (emphasis added). This is both meaningless and misleading. The quota system used east of the Rockies (Districts I-IV) will *never* be imposed on the west coast (District V). The very reason that the West Coast is treated differently is that it was crude short when quotas were first imposed, and its deficit has grown ever since. The west coast is crude short now; it will be extraordinarily crude short in the late 1980's and 1990's.

6. I would like to assure the Committee that every study I have seen convinces me that the Alaska route can be built more quickly, and economically, than the Canadian alternative; that it is not, in part or in whole, environmentally inferior to the Canada route; that, in fact, the Alaska line, entirely under American jurisdiction, is guaranteed constant supervision to ensure the maintenance of high environmental standards.

A Canadian alternative would be laid across three times as much virgin wilderness. It would take at least three years simply to develop the amount of environmental knowledge we have now on the Alaska route. The Canadian government has yet to indicate to anyone in industry or the U.S. Government what price and further delays it would exact in the granting of a trans-Canadian permit. Without such information—information that the Canadian government has failed to supply—no one, Canadian, oilman, or Cicchetti, can put an accurate price on the cost of such a line and the delays its construction would engender. Our company believes, on the basis of its estimates, that both would be substantially greater than Cicchetti supposes.

In conclusion, Mr. Chairman, I believe it is generally agreed that the development of the Alaska oil field is a matter of economic, environmental, and security supply importance to the United States. It is, of course, a perfectly proper subject of inquiry for the Joint Economic Committee. I cannot, however, but regret that the Committee, in its study, should have received a paper such as Mr. Cicchetti's. As a piece of propaganda it may have its value; as analysis of an important matter it has no value. It is, in fact, mischievous.

Sincerely,

H. G. GALLAGHER.

ATLANTIC RICHFIELD Co.,  
New York, N.Y., June 22, 1972.

HON. WILLIAM PROXMIRE,  
Chairman, Joint Economic Committee,  
U.S. Senate, Washington, D.C.

DEAR SENATOR PROXMIRE: I have read the testimony given to your committee on June 9th by critics of the proposed Trans Alaska Pipeline System. While I note that you have asked the Secretary of Interior to appear in response to some of the questions raised, it seems appropriate for me to provide a few comments on the critical testimony. I hope that you will include these comments in the record of the hearing.

As you know, Atlantic Richfield made the initial discovery of oil in the Prudhoe Bay oil field on the North Slope of Alaska in January 1968. Other companies have made subsequent discoveries, and the total proved reserves in that field are about 9.6 billion barrels. Transportation of this was a major undertaking which none of the companies individually could finance and construct. All interested parties sought to develop together the quickest, the most reliable and the most economically efficient transportation system. We considered and tested an all-sea route, using ice-breaking tankers; we considered the trans-Canada land alterna-

tive; we considered various trans-Alaskan alternatives. As reflected in the Environmental Impact Statement prepared by the Department of Interior, efforts resulted in a project by seven companies to build a pipeline across Alaska to the port of Valdez.

An application to the Department of Interior for a permit to build the line was filed in June 1969. The National Environmental Policy Act became effective in January 1970, and the preparation of an environmental impact statement required by the Act took over two years. Litigation challenging the validity of the Secretary's decision will probably not be concluded before mid-1973, which will be four years from the original application.

When constructed, the trans-Alaska line will be by far the best engineered and safest oil pipeline in the world. The technical and environmental stipulations established by the Department of Interior must be met and every stage of construction and operation will be under governmental supervision.

Nevertheless, during the past sixteen months there has been an intensified effort to convince the Congress, the Administration and the American people that Alaskan oil should be brought to the lower 48 States through a trans-Canada pipeline.

I believe that the real purpose of some of the Canadian interests who oppose the trans-Alaskan line is to obtain an oil pipeline for Canadian oil, financed by the United States' companies.

Although a good neighbor, Canada is a separate sovereign nation with separate national aspirations. The Canadian economic interest is not necessarily always compatible with the interests of the American companies who would have to pay for and operate a trans-Canada oil pipeline, or, more importantly, for United States public policy makers, with the public interest of the United States.

Atlantic Richfield Company submitted a full discussion of this issue to the Department of the Interior in September 1971. It is referenced in the Department's Environmental Impact Statement and relevant portions are attached as Appendix A. A supplementary summary statement was filed in May 1972. A copy of relevant portions are attached as Appendix B.

It is important to remember that the Canadian Government is not alone in pressing construction of the trans-Canada line. Although private Canadian oil companies have maintained a low profile, they need the trans-Canada line to assist them in exploration for and development of oil resources believed to exist in Canada's far Northwest territory, including the Arctic Islands. To this extent, their interests and the interests of the Canadian Government are identical.

In early March 1971 the Honorable J. C. Chretien, the Canadian Minister of Indian Affairs and Northern Development, said to the Society of Petroleum Engineers at Dallas, Texas:

At the present time, we have insufficient reserves in the Canadian north to warrant a natural gas pipeline to southern markets. However, if we maintain our discovery success in the Arctic Islands we may have enough gas in the near future to make it feasible to construct a pipeline due south from this region.

To develop the great potential of the North, to overcome the great technical challenge of exploration, production, and transportation, we are going to need help, we are going to need skills, we are going to need capital.

Such projects (a gas and oil pipeline) would have great benefits for Canada. We will benefit from the construction phase; we will benefit from the manner in which it will help to open up our north; we will benefit from the job opportunities that will be made available to northern peoples; we will benefit from the further incentive pipelines running through our territory will give to the exploration for gas and oil.

At the same time, Mr. Chretien expressed confidence that a Canadian oil line would eventually be built in addition to a trans-Alaskan line. He said:

In my judgment, however, it was advisable to let Canadians and Americans know "that the north is there." Pipelines will be built. If the Americans do not build a pipeline from Alaska I will not be too upset, because I know that we will find enough oil in the future in Canada to justify an oil pipeline. Perhaps it will take two or three years more, but there will be an oil pipeline.

Cost estimates for a trans-Canada pipeline demonstrate why the Canadians need United States capital. Mr. Chretien is reported to have estimated the cost of an oil and gas pipeline system at 8 billion dollars in 1971. This estimate is only a guess; there can be no hard estimates because of the effect of inflation due to delay and the unknown cost of environmental features which Canada may demand. But debates covering the Canadian oil pipeline in the House of Commons

on March 12, 1971, recognize that the sum seems beyond Canadian resources. Member of the House Mr. Woolliams said:

The Minister admits we do not have enough money in Canada to finance these pipeline projects. I agree, and I am glad to hear him say this. I am glad there is one Minister in the cabinet who tells the truth. The truth is, we have no choice but to tell the Americans and other foreigners that we need their capital.

As shown by Appendix A, Canadian laws, regulations and policy would require that a trans-Canada line from Alaska must be subject to Canadian control and subject to an option allowing Canadian oil companies to insert Canadian oil in that line. These are reflected by the statements of the Canadian Minister of Energy, Mines and Resources to the Canadian House of Commons in March 1971.

Most important of all will be the right of entry to Canadian resources into this pipeline. It is not good enough that this be merely a bridge to transport United States resources to United States markets and that we have the boom that would go with construction, but no downstream benefit.

So the most important guideline, under the conditions referred to, is that Canadian resources must have a right of entry into that method of transportation.

These policies were clearly repeated in conversations between representatives of the Canadian Government and United States oil companies. In March 1971 Secretary Morton suggested that representatives of the companies owning Alyeska meet with appropriate Canadian officials to explore the feasibility of a trans-Canada pipeline to transport Alaskan oil to the United States. He suggested that such discussions were appropriate because the companies, not the United States Government, would have to obtain permits for, finance and construct any trans-Canada line. The discussions were, however, relevant to his consideration of our application for permits to construct a pipeline across Alaska from Prudhoe Bay to Valdez. The Secretary requested a report to him after the discussions were held.

A meeting was held by representatives of five owner companies with Ministers Greene, Sharp, Chretien and others in March 1971. This was after the debates in the Canadian House of Commons and other statements which I have quoted above. The Canadian views expressed at our discussions were wholly consistent with the previous official expressions to which I have referred. In summary, they were as follows:

The line would have to be a joint project between United States companies and Canada investors, probably with substantial amount of eventual Canadian ownership.

The right of entry into the pipeline for a significant amount of Canadian oil on a priority basis would be a *sine qua non* for a permit.

Construction of an oil pipeline would require modification of United States-Canadian trade agreements respecting oil imports from Canada.

Negotiations prior to construction would require as much as two years. Construction would probably take a year or eighteen months longer than the three-year estimated construction time for the trans-Alaskan line.

The cost would be four or five billion.

The necessary Canadian ecological studies had not been made.

Construction would have to utilize maximum possible Canadian material and labor.

We reported these discussions to the Secretary of Interior with our view that:

The time estimates indicated by the Canadians for solution of international problems, ecological studies, permits, financing and construction were optimistic.

The Canadian cost estimates were too low. Real costs would present impossible financing requirements for our owner companies.

It was highly undesirable to build a line subject to Canadian control, with priority for Canadian input.

In late April 1971, I held another meeting with a different group of Canadian representatives, including the Chairman, National Energy Board, and the Deputy Minister, Indian Affairs and Northern Development.

The Canadian suggestions concentrated on the economics and timing respecting a joint-interest Canadian oil pipeline.

Positions in general developed as follows:

There was strong Canadian interest in the availability to Canada of United States ecological and environmental information which would be useful respecting a Canadian line.

As of this time Canadian environmental standards had not been developed and no one would predict when they would be.

A Canadian corporation would be required to operate a trans-Canada line, although it was suggested that since there was no immediate supply of Canadian oil, the Canadian interest might be in the form of an option to enter at a later date.

In turn, our views were that :

We were willing to exchange environmental information with Canada. The complete technical and environmental description of our proposed trans-Alaskan line was made available to the Canadians in July 1971. I should note that we have received no such information from the Canadian Government although they have advised us it would be made available when fully developed.

At the present discovery rate in the Prudhoe Bay area, there is no need for a Canadian line, since all Prudhoe Bay oil is needed on the United States West Coast.

The Canadian proposal that United States Companies build a trans-Canada line with options to Canada for later acquisition of interest and throughput could not be financed. It would backout United States oil and provide uncertainties not compatible with financing.

United States companies could not provide initial financing for a Canadian line in any event, because the cost would be too great. For example, ARCO interest alone would require over \$1.5 billion, which is far beyond our resources.

After these discussions, it was and still is quite plain that the present Canadian interest is not consistent with our present obligations as responsible Company executives. Nor do I think it is compatible with the public interest of the United States.

Construction of a pipeline to transport Alaskan oil across Canada at the present time could create needless points of conflict between the United States and Canadian economic interests. It would also create delays and problems of unknown but certainly serious magnitude. Routing through Canada would delay even further the advent of North Slope oil and gas needed to reduce the critical United States energy shortage. All projection indicates the United States needs Alaskan energy sources as soon as they can be made available, consistent with sound environmental safeguards.

Direct and immediate economic conflicts with Canada have arisen in the past and could arise in the future in such matters as preliminary trade negotiations, especially over oil import quotas. The question of Canadian oil displacing American oil in the pipeline could be a subject of continued bargaining, affected by the rate of discovery of oil and gas reserves in the Canadian and Alaskan Arctic regions. Also, the presence of the pipeline in Canada will constitute a potential pressure point in many unrelated questions of international concern. To some extent this is exemplified by Mr. David Anderson's testimony before your Committee. He sought very clearly to convince the Committee that unless the United States oil pipeline was constructed across Canada, the Canadian Government would not approve a projected gas line across Canada to provide badly needed gas supply to the mid-continent United States. While he hastened to say that this was not a threat, it seemed clearly so intended. In my view, it is fortunate that he does not speak for the Canadian Government.

Actually, if it is in the economic interest of Canada to have a gas pipeline across Canada, then Canada will welcome its construction, and since a gas line will assist development of Canadian gas resources, there is no question that Canada will want it to be built regardless of the trans-Alaska oil pipeline.

The uncertainties respecting construction of a Canadian oil line are quite real, and the uninformed speculation on this subject by several witnesses before your Committee should not be taken seriously. As stated to the Secretary of Interior, an oil line through Canada could not be financed by the companies involved. Even if some alternative form of financing were available, the relocation of the proposed trans-Alaskan line would involve a reorganization of the group of participating owner companies before an application could be filed. Also as a preliminary each participating United States company would have to arrange financing, and this could not be done until terms of Canadian control, participation and oil input options had been settled. These uncertainties could not be settled short of many months.

Canadian regulations require that an application be accompanied by an extensive analysis outlining financial, technical and ecological aspects of the project. The time needed to comply with this requirement is wholly unknown. It took

three years to develop the material for the Project Description of the trans-Alaskan line for the Secretary of Interior, and some argue that even this voluminous study is inadequate.

After an application is filed, Canadian due process provides that the National Energy Board provide notices, hold hearings, and consider the objections of interested parties. As reflected by the attached Appendix A (page 33), a number of existing Canadian environmental Acts must be complied with and other broader environmental legislation is pending in Parliament. While one witness glibly stated that Canada does not have a National Environmental Policy Act, it should be remembered that there was no such Act in the United States until after application for a permit for the trans-Alaskan line had been filed. Canadian environmentalists are becoming very active, and opposition to a trans-Canada oil line is already being organized. There is no basis for prediction that litigation will not delay construction of a Canadian line, or the duration of such a delay. Canada's Northern Natives are seeking to establish their rights to land, and a key element of this drive is opposition to Government approval of a Mackenzie Valley Pipeline. They have now raised land right issues that the United States has taken 15 years to resolve.

Against these obstacles, it is in my judgment utter folly to predict that a Canadian oil pipeline could be completed within two years of the projected completion for the trans-Alaskan line. I do not know how much longer would be required, and neither does anyone else. But a five-year estimate is more likely to prove correct than two; and since the production of gas on the North Slope cannot begin until after the start of oil production, this could mean a 7-year delay in production and delivery of gas to United States consumers from the Alaskan North Slope.

While arguments are being advanced that the tanker leg of the trans-Alaskan pipeline system will result in oil spills and consequent damage to the coast of British Columbia, it is clear that those who make such arguments do not have the same ecological concern when Canadian rather than American economic interests are involved. Oil refineries have been constructed on Canada's West Coast, at Vancouver, from which oil is transported every day by tanker. Canada has licensed exploration for offshore oil on its East and West Coasts, refining and tanker facilities in Nova Scotia, New Brunswick, Newfoundland and Quebec which are rapidly expanding. Plans for a wholly new refinery and port facility project in Quebec bordering the United States, costing between \$600 and \$700 million, have just been reported. It would be owned and operated by a Quebec Government Corporation and designed to accommodate super tankers. Thus, Canada is quite willing to accept risks of oil and operations when its own interests benefit.

Moreover, Americans are accepting the risk of oil tanker operations on the coast of Maine to provide Venezuelan and Mideastern crude oil for the pipeline which runs from Portland to Montreal. In 1970 this risk involved delivery of approximately 150 million barrels of oil to Canada through Portland in 886 tankers, as against 80 tankers per year forecast for delivery of Alaskan oil to Puget Sound.

I should add that the 80 tankers per year for the Puget Sound refinery are not dependent upon construction of the Alaskan pipeline. The need of the citizens of the Pacific Northwest for this oil exists and must be met. It is being partially supplied by tankers now, and the issue is whether tankers continue to carry foreign oil or will in the future carry Alaskan oil. Alaskan oil will be carried by United States ships with attendant environmental and economic benefits.

Member of Parliament David Anderson asserted to your Committee that Atlantic Richfield "deliberately chose a site (for its refinery at Cherry Point in the State of Washington) in which currents would take the oil northward out of American jurisdiction where presumably political criticism and comment would be less damaging to their interests." This we believe is a wholly unsupported and irresponsible statement. Such statements do not aid in rational determination of the Trans-Alaskan pipeline problem. I suggest Mr. Anderson knows little about the reasons for the location of this refinery. A great variety of considerations entered into the choice of the site, but the one he suggests was not among them.

Attempts made by Mr. Anderson, and others, to portray a decision not to build a United States line for United States oil across Canada as an implication of an unfriendly attitude toward Canada seems a gross disservice to American-Canadian

relations. The United States and Canada have always enjoyed friendly relations, and an unnecessary point of international economic conflict and pressure, which a trans-Canada line for Alaskan oil at this time might well be, should not be created. The international disagreements which have arisen throughout the world respecting oil pipelines are too numerous to be ignored, and the continuation of such disagreements is too probable to be discounted. The decision of Secretary Morton on this point is a wise one.

Much of the critical testimony before your Committee is largely a repetition of views previously expressed during the past year, which have been answered repeatedly and which are based upon unsupported assumptions respecting United States demand, United States and world oil prices, and pipeline construction costs and time schedules. The Department of Interior's Environmental Impact Statement clearly shows that the views of Mr. Cicchetti for example received thorough consideration. They were not ignored; they were considered unsound.

His suggestion to your Committee that the oil companies involved in the trans-Alaskan pipeline project, including Atlantic Richfield, intend to sell Alaskan oil abroad rather than on the U.S. West Coast is demonstrative of uninformed speculation. Speaking for my Company, I can categorically state that we have every intention of using our full share of the total Alaskan oil, on the U.S. West Coast and that we have no intention whatsoever of selling any of it in foreign markets.

While Alaskan oil could be used in the Midwest, it is clear from our estimates and those of the Department of Interior that it is needed on the West Coast. In this circumstance simple logic seems to indicate that we avoid the political problems which a trans-Canada line will generate by building the first transportation system for United States owned oil from the Arctic as a wholly United States owned and United States controlled system.

Logic similarly indicates that if, as the Canadians hope, adequate additional reserves are discovered in Canada or in Alaska, or in both, to justify a second pipeline, then great consideration must be given to a trans-Canada pipeline to the U.S. Midwest. I do not subscribe to any suggestion that all Arctic gas and oil should be moved through a common land corridor across Canada. As a United States citizen, as well as the President of Atlantic Richfield, I would regard any such decision as a serious mistake.

Very truly yours,

THORNTON F. BRADSHAW.

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LABORERS' INTERNATIONAL UNION OF NORTH AMERICA,  
Washington, D.C., June 26, 1972.

Hon. WILLIAM PROXMIRE,  
Chairman, Joint Economic Committee,  
New Senate Office Building, Washington, D.C.

DEAR MR. CHAIRMAN: As indicated in our telegram, I am enclosing copy of official letter signed by General President, Peter Fosco, Laborers' International Union of North America, AFL-CIO, and resolution adopted unanimously at our Convention in September of 1971. I would appreciate very much your making the letter and resolution a part of the official record of hearings before your Joint Committee.

Sincerely yours,

JACK CURRAN,  
Legislative Director.

Enclosures.

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LABORERS' INTERNATIONAL UNION OF NORTH AMERICA,  
Washington, D.C., June 23, 1972.

Hon. WILLIAM PROXMIRE,  
Chairman, Joint Economic Committee,  
New Senate Office Building, Washington, D.C.

DEAR MR. CHAIRMAN: On behalf of the Laborers' International Union of North America, I want to urge you and the other members of the Joint Economic Committee to support the issuance of a permit to construct the trans-Alaska pipeline at the earliest possible time.

We believe construction of the pipeline is of vital importance, for assuring our country an adequate and continuing supply of petroleum, for bolstering the economy of Alaska and of the nation as a whole, and for creating thousands of badly-needed jobs.

A resolution calling for construction of the pipeline was adopted unanimously by delegates of our International Union's Convention last September. A copy of that document is attached herewith.

The United States today faces a serious shortage of energy resources, as evidenced by our growing dependence on foreign countries to supply our needs. We believe this dependence constitutes a grave threat to the security of this Country, particularly in view of the tenuous political situation in the Middle East. Our national security demands that our supply of crucial energy fuels cannot be interrupted in times of international crisis. The Alaska pipeline would guarantee a continuing domestic supply of petroleum, thus bolstering the defense posture of the United States.

The pipeline would be a boon to the economy by reducing the balance of payments outflow and by stimulating employment in the construction, shipbuilding, seafaring and related industries. As you know, unemployment continues to be one of our countries most serious domestic problems. Thousands of new jobs would be created for the construction and maintenance of the pipeline itself and in the construction and operation of new tankers that will be required to carry the oil from Port Valdez to the "lower 48" states.

We are confident that the Department of the Interior has studied very thoroughly the consequences of the pipeline regarding the natural environment and that the safeguards which will govern construction of the pipeline and the transportation of the oil to the continental United States will minimize the risk of environmental pollution and destruction of wildlife.

For these reasons, we urge your firm support for this important undertaking.

We request that this statement be included in the official record of the Committee's deliberations on this matter.

Thank you.

Sincerely yours,

PETER FOSCO,  
*General President.*

RESOLUTION NO. 35

Whereas Alaska is currently experiencing one of the highest unemployment rates in its history; and

Whereas the human resource programs of Alaska, especially in the areas of health, education, and welfare will suffer greatly if the state is unable to fund programs in an amount able to assure the continuing development of the state's most precious resource—the citizens of Alaska; and

Whereas The United States is rapidly approaching the point of facing a critical shortage of energy resources; and

Whereas further delay in the commencement of construction and operation of the proposed trans-Alaska pipeline would have a disastrous effect on all Alaskans and could mean that the Nation as a whole might be faced with a critical energy source at some future time; and

Whereas it is our firm belief that the State of Alaska has and is continuing forward in a positive manner to ensure the ultimate protection of its great land, be it

*Resolved, By Laborers' International Union of North America, in convention assembled* that it urges the Department of the Interior to issue the permit needed before construction of the trans-Alaska pipeline can begin at the earliest possible time, said permit to provide all necessary safeguards to prevent environmental degradation.

Submitted by: /s/ Ed Orbeck, Local Union 942, Fairbanks, Alaska and for Local Unions 341 and 1331.

Unanimously approved by Convention 9/23/71.

UNITED ASSOCIATION OF JOURNEYMEN AND APPRENTICES  
OF THE PLUMBING AND PIPE FITTING INDUSTRY  
OF THE UNITED STATES AND CANADA,  
Washington, D.C., June 21, 1972.

Hon. WILLIAM PROXMIRE,  
*Chairman, Joint Economic Committee, Congress of the United States, Washington, D.C.*

DEAR SENATOR PROXMIRE: It is my understanding that the Joint Economic Committee is currently holding hearings in connection with the recent Interior Department decision to grant the long delayed permit for construction of the trans-Alaska pipeline, designed to transport oil from the North Slope of Alaska to the port of Valdez.

The 323,000 members of the United Association of Plumbers and Pipefitters went on record in support of the trans-Alaska pipeline during our national convention last year. You will find enclosed a copy of the resolution that was unanimously approved by the 3,000 delegates to that convention. I would very much like to have both the resolution and this letter made a part of the official record of the hearings.

Four years have passed since the discovery of the estimated 20 billion barrel oil deposits at Prudhoe Bay. During all those years, those who have opposed construction of the pipeline and the related plan to ship the oil by sea to the "lower 48" have had ample opportunity to have their opinions tested in Congress, the courts, administrative agencies and a wide variety of media. Surely it is time to come to a decision.

Back in 1969, during debate leading to enactment of the National Environmental Policy Act, the AFL-CIO endorsed the Act as a "means of achieving a sound and sane balance between resource utilization and misuse that would produce adverse environmental effects."

Nowhere has this struggle for a reasonable balance between our concern for the environment and our urgent need for new sources of energy been more evident than in the controversy over the best way to utilize the oil riches of Prudhoe Bay. The voluminous Interior Department report to EPA indicates the intensive study of environmental issues that has been conducted by both public and private agencies. There is no longer any reason to doubt that the Alaskan environment can be protected from serious damage during construction of the pipeline and operation of the completed transportation system.

It has been reported that more environmental planning has gone into the pipeline than into any other construction project in history. The Interior Department study is estimated to have cost \$9 million, and the oil companies have spent more than \$35 million.

Mr. Chairman, the 800-mile trans-Alaska pipeline will be largely constructed by the highly skilled members of the United Association. I can assure you that they are deeply conscious of the need to protect the environment and maintain the quality of life for all those areas affected by such construction activity. They are prepared to get on with the job. For the last several years unemployment in the pipeline construction industry has been at its highest levels in history. The Alaska project would mean steady work for thousands of our members, including our Alaska members who have also been hard-hit by rising joblessness in that state.

Furthermore, many of our members are employed in the shipbuilding industry on the West Coast. Construction of the new super-tankers to carry the oil from Port Valdez would reduce their out-of-work total dramatically. Also, thousands of manhours of work would be created in the construction of oil refineries and in other construction projects needed to support and operate the new oil transportation system.

Testifying before the House Interior and Insular Affairs Committee two months ago, the Secretary of the Interior said, "We are facing a fuel and power crisis. Its implications for our economy, our environment, security, foreign policy and national life style are broad and pervasive . . . We must convince the public of the imminent crisis and the urgent need to take action now."

Mr. Chairman, let us get started on this project without further delay. It is essential that this nation seize this opportunity to reduce its dependence on foreign oil production.

Sincerely yours,

MARTIN J. WARD,  
*General President, U.A.*

Enclosures.

## R-46

By Local Union No. 367,  
Anchorage, Alaska.

Whereas, The 800-mile Trans Alaska pipeline is of a vital economic nature to provide jobs and generate a vast source of energy to our great nation; and

Whereas, The ecology and conservation groups, who are a very small minority, are creating a tremendous pressure impact to delay the construction of the 800-mile Trans Alaska pipeline as long as they possibly can; therefore be it

Resolved, That all delegates, Officers, members, friends, of this great United Association, Plumbers and Steamfitters, Welders and Metal Trades, join in a national effort to help promote issuance of the Trans Alaska pipeline permit, by our Honorable President Richard M. Nixon and Honorable Rogers C. B. Morton, Secretary of the Interior. A coordinated letter writing campaign to the President and Secretary of the Interior by all members, friends and Locals will serve an effective purpose.

## R-110

By Local Union No. 798,  
Tulsa, Oklahoma.

Whereas, The United States Department of the Interior has called the proposed 800 mile trans-Alaska pipeline "essential" to the security of the United States; and

Whereas, Construction of the pipeline has been interminably delayed by a combination of forces and events largely beyond the control of the builder, the Alaska Pipeline Service Company; and

Whereas, These obstructions include the failure of Congress to settle the land claims of Alaska's 55,000 natives and also the irresponsible charges and court injunctions promoted by overzealous conservation organizations; and

Whereas, It is clear that the pipeline can be so engineered and designed as to get the job done and, at the same time, minimize the supposed threat to Alaska's ecological balance; and

Whereas, Employment generated by the crude oil extraction and the pipeline construction will produce enormous and lasting economic advantages for Alaska's citizens; and

Whereas, The entire 800 miles of 48-inch-diameter pipe has already been delivered to Alaska; therefore be it

*Resolved*, That this great international union, whose members stand ready to apply their skills to the task of actually constructing this vital pipeline, formally calls upon the Congress of the United States to settle forthwith the land claims question; and calls also upon the Interior Department to recognize obstructionist tactics for what they are and to issue the pipeline construction permit without further delay.

Committee Secretary BERTONEAU. These resolutions concerning the installation of the 800-mile Trans-Alaska Pipeline, were introduced by Local 367 of Anchorage, Alaska, and Pipeliners Local 798. The Department of Interior and President Nixon presently have before them the request for the permit to build the pipeline. A small number of conservation groups and ecologists have opposed the construction of this 800-mile pipeline and the resolutions request all delegates, officers and members of local unions to join a national effort to help promote the issuance of a permit for the installation of this Trans-Alaska pipeline. The resolutions point out that the ecology of Alaska will not be injured by the installation of this pipeline and it will immeasurably enhance the future economic growth of Alaska by providing jobs and generating a vast source of energy for our national resources. Your Committee recommends concurrence in these resolutions and urges all local unions to write to President Richard M. Nixon and Roger C. B. Morton, Secretary of the Interior, requiring the issuance of the permit.

Mr. Chairman, your committee moves for the adoption of the Committee report.

General President (Elect) WARD. The motion is on the adoption of the Committee's report in regard to all of the delegates and locals and members of the United Association supporting the construction of the Alaska Pipeline. Is there any discussion on the motion? Hearing none, the motion is passed.

. . . The recommendation of the Committee was adopted.

STATEMENT OF JESSE M. CALHOON, PRESIDENT, NATIONAL MARINE ENGINEERS'  
BENEFICIAL ASSOCIATION

The National Marine Engineers Beneficial Association supports the proposal to construct an oil pipeline—and subsequently a natural gas pipeline—from Prudhoe Bay on the North Slope to Port Valdez on the south coast.

In reaching this decision we have considered all socioeconomic implications, the importance of reliability and security, the need for a strengthened U.S. merchant marine, and environmental dangers. After analyzing and weighing all the factors which must enter into making such an important decision, we can only conclude that the proposed Prudhoe Bay to Port Valdez pipeline is, on balance, the best of the alternatives available.

#### ECONOMIC FACTORS

This Nation—including the State of Alaska—is faced with a serious unemployment problem. This construction, operation and maintenance of Alaskan pipelines, pumping stations, port facilities, and oil and LNG tankers would employ thousands of American citizens in good-paying jobs. These jobs would be only the direct benefit of such an undertaking. Indirectly many more thousands would be employed to produce materials and products used in the construction of a U.S. pipeline and tanker transport system and provide necessary support services.

On the other hand, the construction and operation of a pipeline across Canada would be a stimulant to the employment of Canadian construction and industrial workers but provide relatively few prospects for employment opportunities for American workers.

American workers employed in the construction and maintenance of pipelines, port facilities and U.S. tankers, and American crewmen aboard U.S. tankers will purchase U.S. goods and services, while Canadian workers will tend to purchase Canadian products. Other U.S. industries and the U.S. economy as a whole will benefit from the proposed Alaskan pipelines, but will derive a much smaller impetus from the construction of a Canadian pipeline.

Moreover, while the investment of U.S. dollars in American pipelines and American tankers will provide a stimulant to the U.S. economy, in contrast, the investment of U.S. dollars in Canadian pipelines will contribute to the rapidly growing deficit in the U.S. balance of payments.

It should also be pointed out that the Alaskan pipeline and related tanker fleet would be cheaper than the Canadian pipeline—for oil, it would be only three-fourths as much.

#### ENVIRONMENTAL CONSIDERATIONS

In examining the potential environmental implications of different pipeline systems for moving Alaskan oil and gas to the lower 48 states, the "Final Environmental Impact Statement, Proposed Trans-Alaska Pipeline," prepared by a Special Interagency Task Force for the Federal Task Force on Alaskan Oil Development, concludes that "No single generalized route appears to be superior in all respects to any other."

As inconclusive as this statement appears to be, the use of American tankers manned by American crewmen was not given adequate consideration in making the comparative analyses. The experience with oil spills involving the importation of oil using foreign tankers and crews is not indicative of the potential using American tankers and seamen. The quality of American ships and the American merchant marine is far superior to that of foreign ships and sailors and as a result the danger of leakage or spills would tend to be much smaller than assumed. American seamen are much more concerned about protecting American waters from pollution than are foreign crews.

In addition U.S. government regulations governing the construction, operation, and maintenance of pipelines and maritime transportation from Port Valdez to the lower 48 States will minimize the risk of pollution resulting from the use of such an oil and gas transport system.

#### STRENGTHENING THE U.S. MARITIME INDUSTRIES

Currently, practically all waterborne shipments of oil to the U.S. are carried in foreign tankers. U.S. tankers are limited to intra-coastal shipments of oil, principally from the Gulf to the East Coast. This movement of oil is being drastically

reduced as the result of expanding use of pipelines within the continental U.S. and the growth in foreign imports directly to the East Coast.

The result has been a precipitous drop in the number of U.S. tankers at the same time the world fleet has grown tremendously. In 1970 the U.S. had only 5% of the world's total tanker capacity measured in T-2 equivalents. Moreover the U.S. fleet is the oldest fleet among the major flags—more than twice as old as the world average.

The movement of oil from Alaska to the lower 48 states, together with the extension of the Cargo Preference Act of 1954 to oil imports, would rejuvenate the badly depleted U.S. tanker fleet.

The movement of LNG in U.S. tankers between Alaska and the mainland would also help revitalize the United States' maritime industries. The construction of LNG tankers—because of the extremely sophisticated technology involved—offers the U.S. shipbuilding industry the best opportunity to more effectively compete with foreign yards.

#### RELIABILITY AND SECURITY

The oil and gas resting in Alaska's North Slope represent a vital energy source for this country for many, many years to come. This is not a short-term answer to a short-term problem. It must be a long range reliable response to a need that will be with us well into the next century.

Historically over many years the United States and Canada have enjoyed the friendliest of relationships. We hope and expect this warm friendship to continue indefinitely. However, we must recognize there is a spreading strong feeling of nationalism in Canada and a growing resentment over large U.S. capital investment in that country. Now, an additional larger U.S. investment in oil and gas pipelines which would bisect Canada may well aggravate the tension already created.

These rising feelings of nationalism and resentment to U.S. ownership may erupt into actions which could obstruct or disrupt the flow of vitally needed oil and gas into this country. While the prospects for such occurrences do not seem very great now, who can predict the future? We simply cannot afford to gamble and depend on another country, no matter how friendly, to give the transfusion of Alaskan energy into our Nation's veins.

Secondly, the length of the Canadian pipelines would be many times as long as the Alaskan pipelines. This offers greater opportunity for sabotage if such an act should be attempted by anyone desirous of cutting off an important source of United States' energy supply.

From every standpoint, pipeline transport of oil and gas from Prudhoe Bay to Port Valdez and subsequent tanker movement to the lower 48 states is undoubtedly the best of the available alternatives.

Mr. Chairman, I respectfully request that this statement be placed in the record and considered as the official comments of the National Marine Engineers' Beneficial Association.

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NATIONAL ASSOCIATION OF MANUFACTURERS,  
New York, N.Y., June 28, 1972.

HON. WILLIAM PROXMIRE,  
*Chairman, Joint Economic Committee,  
New Senate Office Building, Washington, D.C.*

DEAR MR. CHAIRMAN: We have noted with great interest the testimony before your Committee relating to the Trans-Alaska Pipeline, and wish to go on record in support of this private enterprise project.

Inadequate fuel and energy resources could well become the major disruptive factor in the United States economy. We may have just begun to glimpse the consequences of short-sighted policies in this field. The experience of England during its recent coal strike was a vivid illustration of the hardship which could result from shortages of fuel and energy.

Here in the United States manufacturers are becoming increasingly concerned about future fuel and energy supplies if they are to continue to produce the manufactured goods required by the consuming public and insure our national defense. During the past two winters, some manufacturing plants have been forced to close down during cold periods due to interruption of the supply of natural gas which was diverted to space heating purposes. Such shutdowns are extremely costly. In addition, some natural gas utility companies are declining

to assume the responsibility of serving new customers. This could adversely affect industrial development and employment in some areas of the nation.

It is clear that early availability of the vast oil and gas reserves in the State of Alaska is absolutely essential to a strong domestic energy industry, a strong domestic manufacturing industry, and a high level of employment. Equally obvious from a national security standpoint is the desirability of having this pipeline contained within the boundaries of the United States.

Therefore, we wish to express our support for the Trans-Alaska Pipeline as recently approved by Secretary of the Interior Rogers C. B. Morton, including strong environmental safeguards.

We respectfully request that this letter be included in the record of the Joint Economic Committee's hearings on this subject.

Sincerely,

W. P. GULLANDER, *President.*

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INTERNATIONAL BROTHERHOOD OF TEAMSTERS,  
CHAUFFEURS, WAREHOUSEMEN AND HELPERS OF AMERICA,  
*Washington, D.C., June 21, 1972.*

HON. WILLIAM PROXMIRE,  
*Chairman, Joint Economic Committee,  
New Senate Office Building, Washington, D.C.*

DEAR CHAIRMAN PROXMIRE: I am aware that the Joint Economic Committee is now holding hearings on the proposed trans-Alaska pipeline.

I wish to go on record strongly supporting the Administration's proposed legislation, and I request that this letter be made a part of the report on these hearings.

The International Brotherhood of Teamsters views this legislation and the tremendous benefit it portends as one of the most important and vital programs to be before the Congress in recent times.

Such benefits cut clear across the fabric of American life:

A source of fuel within our own control so vitally needed as we look ahead toward serious energy shortages.

The unmistakable dependency of future growth of our economy upon reliable and adequate energy sources.

The tenuous nature of supplies of energy fuels from the near East.

The boon this project would have on developing the Alaska interior.

The "shot in the arm" of so great a project on the construction industry, the opportunity it presents to provide jobs for returning servicemen as well as new occupations for native Alaskans.

The tremendous and positive step toward rebuilding our maritime capabilities and the much-needed upswing in this nation's shipbuilding program.

The lasting effects of creating jobs to service and operate the system.

I am not unaware nor is the Teamsters' International Union insensitive to the concerns that have been expressed by numerous individuals and organizations relative to environmental and ecological considerations attendant to the project. It is my understanding, however, that the most demanding construction standards possible have been developed and will be incorporated into specifications for constructing the pipeline. These standards are reportedly based upon numerous studies covering every conceivable contingency.

Finally, while we are an international organization with numerous members in our good neighbor country to the North, we believe maximum interest of our nation could best be served by constructing the pipeline across Alaska. (Perhaps some statement could be made relative to an accommodation of integrating Canadian workers into the workforce as needed if that is necessary or appropriate.)

I hope and trust that the Committee members and the Congress as a body will react favorably to this important legislation and that immediate action can be taken to get this vital program underway.

Sincerely yours,

FRANK E. FITZSIMMONS,  
*General President.*

CONGRESS OF THE UNITED STATES,  
HOUSE OF REPRESENTATIVES,  
Washington, D.C., June 21, 1972.

Mr. PAUL HALL,  
President, Seafarers International Union,  
Washington, D.C.

DEAR MR. HALL: Thank you for your telegram expressing your concern about the current hearings being conducted by the Joint Economic Committee on the trans-Alaskan pipeline.

You may be sure that I appreciate having the benefit of your thinking on this important matter and I have also taken the liberty of conveying your concern to Chairman Proxmire.

With every good wish,  
Sincerely yours,

WILLIAM S. MOORHEAD.

[Telegram]

Washington, D.C., June 7, 1972.

HON. WILLIAM S. MOORHEAD,  
House of Representatives,  
Washington, D.C.

The Seafarers International Union is deeply concerned that the current hearings by the Joint Economic Committee on the Trans-Alaskan Pipeline (TAPS) may produce a record that would support a Trans-Canadian Pipeline as an alternative to TAPS.

This alternative has been strongly opposed by Secretary of the Interior Rogers Morton and other Government officials. Not only would a Canadian route seriously delay completion of the pipeline and the delivery of vitally needed oil supplies to the United States but it would also have an extremely harmful effect on U.S. employment, both on shore and at sea.

In particular, a Trans-Canadian pipeline would eliminate the tanker route for North Slope oil, between Alaska and the U.S. west coast. This would mean the 33 new U.S. tankers needed for this trade would not be built, thus further depressing already under-utilized U.S. shipyards. This would eliminate an employment opportunity for at least 500 seafarers to man these vessels.

In U.S. shipyards, 73,480 man years of employment would be lost, not to mention the 770 man years of labor involved in the maintenance of vessels serving this oil trade.

Finally, at the present time almost 700,000 tons of U.S.-flag ships, many of them of the most modern design, are now laid up for lack of work. Many of these were built in expectation of the Alaskan pipeline being finished. Thus, the continued delays in completing the line are extremely costly to U.S. shipowners, and many face extreme financial hardships if the TAPS line is not completed.

The United States also must face the danger that if this line is not built, and if new petroleum cargoes are not provided for the U.S. tanker fleet, this segment of the American Merchant Marine is in danger of virtual extinction, leaving the United States at the mercy of foreign fuel sources and foreign tankers.

The Canadian alternative route for the TAPS pipeline has been repeatedly downgraded by responsible Government officials. I feel that further hearings on the Alaska pipeline serve only to delay the day when vitally needed fuels from Alaska will reach the mainland United States, while at the same time endangering the employment opportunities of thousands of Americans.

I urge your strong support of the TAPS pipeline and I hope that the hearings by the Joint Economic Committee can be speedily and favorably concluded.

PAUL HALL,  
President, Seafarers International Union  
and AFL-CIO Maritime Trades Department.

THE CONSERVATION FOUNDATION,  
Washington, D.C., June 13, 1972.

HON. WRIGHT PATMAN,  
Rayburn House Office Building,  
Washington, D.C.

DEAR CONGRESSMAN PATMAN: As a member of the Joint Economic Committee, you are aware that the current hearings on natural gas regulation and the trans-Alaska pipeline are of major importance to the American public. With regard to the recent pipeline decision, we have spoken out previously in favor of a more thorough examination of a Canadian route. Recent testimony before your committee, especially that of Mr. S. David Freeman, underscores our concern that the Canadian alternative has not been given sufficient consideration.

The testimonies of Mr. Freeman and others raise these most important questions:

(1) Since a natural gas shortage is with us *now*, whereas oil shortages may occur in the future, why has the federal government approved the oil pipeline without any action regarding the natural gas which is part of the North Slope petroleum resource?

(2) Why have we shown such little interest in the Canadian government's overtures to cooperate on an energy corridor across Canada for *both* oil and natural gas?

(3) It is widely agreed that a Canadian route would provide the incentive and means for marketing the vast oil and natural gas resources of the Canadian North, as well as those in Alaska, and that the official U.S. government position is that Canadian oil is "secure." What, then, is Secretary Morton's justification for defending the Alaskan route on a "national security" basis?

(4) Since the Administration has insisted that only small amounts of Alaskan oil would be exported if the pipeline were built across Alaska, why has Interior not suggested imposing a limitation on the amount of oil which can be exported?

A full public airing of the Interior Department's answers to these and other questions raised by those in favor of a Canadian route is vitally important. We therefore urge you to pursue these questions most vigorously with Secretary Morton when he testifies before you on June 22.

Sincerely yours,

ARTHUR A. DAVIS,  
Vice President, Operations.

Enclosure.

THE CONSERVATION FOUNDATION,  
Washington, D.C., May 19, 1972.

HON. ROGERS C. B. MORTON,  
Secretary, U.S. Department of the Interior,  
Interior Building, Washington, D.C.

DEAR MR. SECRETARY: Perhaps it goes without saying that we must view your recent approval of the Trans-Alaska Pipeline as having been made without adequate opportunity for public comment on the final environmental impact statement and without aggressive appraisal of alternative pipeline routing through Canada. We certainly do not accept the Trans-Alaska Pipeline as a fait accompli.

On the basis of projected petroleum energy demand, as compared to the supply that the North Slope would produce, we cannot share your conclusion that this new source is "vitaly needed" as soon as it can be realized. Moreover, we believe it is important that the Department of the Interior now assert its sensitivity to the Nation's interest and its independence from the petroleum industry.

The Administration, by favoring the pipeline despite its damaging environmental impacts, faces an immediate obligation to take additional action. We urge you to pursue new federal initiatives to restrain petroleum demand. The basis for such action would be your finding that the Nation can no longer tolerate the environmental losses entailed in production *and use* of petroleum to serve unrestricted demands. The first and primary target should be wasteful consumption.

You are no doubt fully aware of various proposals for economic incentives and regulatory actions to implement such a policy. These might encompass horsepower or gasoline taxation, building-insulation requirements, expanded federal assistance to mass transit, waste-oil reclamation, prevention of petroleum export, and other measures. Certainly, many public interest groups are prepared

to contribute to the determination of specific, workable procedures for controlling petroleum demand, in a comprehensive energy policy context.

Indeed, the petroleum industry itself has indicated that it will promote voluntary reduction of wasteful use of its products. However, we find it difficult to accept the proposition that public-spirited consumers could or should bear the burden of restraint.

I earnestly hope for your strong action in this regard.

Sincerely,

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 SYDNEY HOWE, *President.*

## TIME TO SOUND TAPS FOR TAPS

(By the Sierra Club)

The environmental impact statement on the trans-Alaska pipeline system (TAPS) has been released by the Department of the Interior. It lists in great detail the magnitude of the certain and threatened harm to Alaska that would result from the construction and operation of the pipeline and road, the further development of the Prudhoe Bay oil field, necessary marine transport systems from Valdez to other west coast ports, and a probable gas pipeline from Prudhoe Bay through Canada.

These are the problems environmentalists have been hammering away at for three years. Finally, the Interior Department and the Alyeska Pipeline Service Company agree they exist. In contrast to an earlier draft environmental impact statement, the final version is much more comprehensive. However, basic information on many problems is still lacking. While attempts are made to quantify the impact the pipeline would have on the environment, this process has not been carried to completion. Potential future uses of threatened resources are not adequately evaluated. Endangered resources are not weighed with reference to what is happening to similar assets elsewhere.

The adverse impacts of this project are many and complex. The most significant admitted by the impact statement itself are:

1. The largest remaining wilderness in the United States would be cut in half and its character forever changed.

2. Public access to northern Alaska would be considerably accelerated, both as a direct and indirect result of pipeline construction and operation. This would threaten the wilderness qualities of this area and render difficult the orderly and sensitive growth of potentially valuable developments that could benefit the state for a long time to come.

3. The construction and operation of the pipeline and its associated road, construction pad, and oil field in this permafrost-laden area will be difficult and expensive, and would result in considerable erosion, sliding, drainage pattern change and siltation.

4. Pipeline construction will have a detrimental effect on the vegetation, destroying over 61 square miles of surface cover. Revegetation proves to be exceedingly difficult in the Arctic.

5. Pipeline construction will have a negative effect on freshwater life and on fisheries because of unavoidable siltation.

6. The extensive requirements for construction materials (83 million cubic yards) will place a heavy burden on gravel deposits near the construction right-of-way.

7. Despite all precautions, heat loss from the pipeline would cause significant changes over a wide area, particularly in drainage patterns.

8. The noise and activity of construction would reduce the size of the habitat for several species of large mammals and would indirectly and significantly increase the hunting pressure upon them. Aerial transportation for pipeline operation, maintenance and surveillance would cause continuing disruption.

9. The pipeline itself, elevated for over 50% of its length to avoid problems with permafrost, would create a virtually uncrossable barrier to the migrations of several species of large mammals.

10. Oil terminal operations at Valdez and recipient ports on the west coast would contribute to the degradation of the marine environment, for a series of large and small oil spills are inevitable, as well as water contamination by ballast containing oil. This would be particularly hard on the relatively unspoiled marine environment and valuable fisheries of Prince William Sound.

11. The pipeline and associated systems would directly commit a total of 602,000 acres of Alaskan land to development.

12. There would always remain the threat of inevitable oil spills from the pipeline rupture due to earthquakes, landslides, differential land settlement in unstable soils, various permafrost effects and stream erosion.

13. The siting of several of the pump stations remains in question because of soil instability. Pump station operations would cause industrial-level noise, with unknown effects on wildlife, and they would also emit from 15 to 150 pounds of hydrocarbons per hour into the air to the detriment of delicate Arctic lichens.

14. The pipeline and oil development would be no panacea to the Alaskan economy. The result would be further inflation and continuing unemployment, in spite of the new jobs available in construction, and it would result in a surge in unemployment when pipeline construction is completed. The increased demand for goods and services would place heavy burdens on the Alaskan economy and on the state government in advance of any revenues from oil production.

#### THE CANADIAN ROUTE

It is clear from the environmental impact statement that *one* route through Canada would be better than the trans-Alaskan route, particularly when a gas route through Canada is part of the plan. However, the Sierra Club believes that neither route would be as desirable as halting North Slope development. A Canadian route would bring North Slope oil closer to where it is most needed, the areas of the country most dependent on outside petroleum sources. It would also be safer from both environmental and physical security points of view, avoiding risky marine transport and the earthquake belt of southern Alaska.

A Canadian route is already under serious consideration by oil consortia and by the Canadian government in connection with oil and gas transport from the Canadian arctic and gas transport from the North Slope. (In reality, a Canadian route is an alternative to two routes—one through Alaska plus one through Canada!)

#### OIL AND ENERGY

It is a mistake to maintain that an increase in energy consumption is equivalent to improving our well-being. The principles of ecology tell us that unlimited growth in anything is impossible—be it population or energy. We are already straining our energy resources, and we have begun to borrow against an uncertain future. We are depleting our non-renewable energy resources at an alarming rate. We also easily forget that all energy pollutes, and that the more energy we use, the more pollution we create. We are already paying a heavy price in lost land, and dirty air and water.

*We need new public policies immediately that call for:*

1. using less energy in the future, and using it less wastefully now;
2. developing new, better sources of energy;
3. halting the destruction taking place for the sake of energy—strip mining, loss of wilderness, oil contamination of the marine environment, thermal and air pollution from refineries and power generating plants; and
4. conservation of our dwindling non-renewable energy resources.

(The environmental impact statement assumes unlimited growth in energy consumption. However, now is an appropriate time to begin educating the public toward changing their attitudes. At maximum capacity in the 1980s, the pipeline system would be able to deliver only two million barrels of oil per day to the "lower 48" states, yielding only about 4% of our total energy requirement and about 9% of our oil requirement. In the decade until then, we can make up for this amount by developing alternate energy sources and by curtailing growth rates in energy use. Reducing the demand for energy is not going to be easy. A major public commitment to find ways to be less wasteful of energy will be required.)

The impact statement also claims that no other energy source can fill our needs as cheaply and as well as oil. This reasoning does not take into account the fact that oil is both a polluting and a non-renewable resource. In the past, the cost of oil did not include the cost of pollution caused by the oil from the time it is pumped from the ground to the time it is used. And because oil is a non-renewable resource, we must include the social cost of having less oil available for the future and the resulting cost of developing substitutes. These environmental costs—pollution and depletion—when added to the price of oil, make us realize that we pay

more than we may think. And if we do not take these costs into account, we undersell other energy sources as well.

We are already running short of natural gas. In spite of the fact that peak production is now occurring, natural gas is not available to everyone who would like to use it, and prices are rising. When the peak in oil production is reached, probably within 50 years, it will be accompanied by similar restrictions. Now is an appropriate time to change public policies on oil.

Moreover, the choice is not to find a single, simple substitute for North Slope oil, as the environmental impact statement implies. Rather, the choice is to find a combination of policies and substitutes that will get us beyond our present impasse. There is no single substitute, but we can find the correct combination of policy changes and alternatives. The four billion dollars that would be spent on the pipeline would be better spent in research with more far-reaching and long-term results.

Coal gasification and liquefaction, and nuclear and geothermal power offer short-term alternatives. Nuclear breeder reactors, nuclear fusion, and solar energy offer the prospect of significant amounts of power farther in the future. Processes such as topping cycles and magnetohydrodynamics will allow us to make more efficient use of fossil fuels. Technological advances will allow us to extract more oil from existing fields.

We cannot afford to wait until we run out of oil to develop new, less polluting alternatives. We must make a major commitment now instead of trying to postpone the inevitable by taking needless risks with our environment in an effort to drain what remains of the earth's oil supply.

We take this opportunity to call upon the President to establish a Commission on Energy and the American Future to examine the energy growth of our country and to recommend policies that will carry us not only for decades, but for centuries. Large-scale energy development, like that on Alaska's North Slope, should await the outcome of opportunities to achieve a broader consensus of our society.

#### IN THE NAME OF NATIONAL SECURITY

Our national security, according to the environmental impact statement, calls for the immediate development of North Slope oil. This argument assumes that it is in the best interest of our country to be as self-dependent as possible, as quickly as possible, in case of the sudden unavailability of oil from the eastern hemisphere. For this reason, the United States has a restrictive oil import policy designed to promote domestic oil development.

We believe this argument is questionable. First, it does not take into account the long-term cost to our national security of a depleted and no longer available domestic oil resource. Second, even at maximum capacity of two million barrels per day, North Slope oil would not make much difference in our dependence upon insecure eastern hemisphere oil which would still amount to about one-third of all oil consumed. Finally, the parts of our country most dependent upon eastern hemisphere oil—the east and the midwest—would benefit only indirectly from Alaskan oil, unless a pipeline through Canada were selected.

Moreover, there are better solutions to the problem of "insecure" foreign sources of oil as well. These include: (1) a federal program of oil exploration, placing new discoveries in reserve until needed; (2) federal purchase of domestic oil fields; and (3) storage of oil in salt domes and previously depleted oil fields until needed. Storage could be accomplished with less expensive foreign oil, allowing us to remove restrictive oil import quotas. Such reserves could also "buy time" to develop North Slope and offshore fields if we really got into trouble.

#### WHAT CAN BE DONE

The plan has changed. We know much more. Our view of what constitutes relevant environmental considerations has changed. The basic research carried out by the Department of the Interior and the Alyeska Company will ultimately be of great benefit to business, government, and all citizens. We must compliment them for the amount of time and effort that has gone into these studies. It is true that some environmental problems have been overcome. It is true that everyone has now agreed to take care of the Alaskan environment and to do their best to minimize the harm that would take place. But care and minimization are not enough.

"A country that runs on oil can't afford to run short" says an American Petroleum Institute advertisement. We agree: oil does run America. That worries us. We cannot afford to run short. That also worries us. We have come to depend on oil, but we can lessen that dependence before it is too late. We will run out of oil sooner or later—and the Sierra Club believes it should be later. The use of a non-renewable resource should be difficult. The less that remains, the more difficult it should be to use it. The time has come to end our self-delusion about oil.

The Sierra Club reiterates its demand for a five-year moratorium on pipeline construction. This time should be used for fuller consideration of the alternatives presented in the environmental impact statement.

In the meantime, it is urgently important that concerned citizens write to President Nixon and Secretary of Interior Rogers Morton asking that they delay issuance of the permit until adequate solutions to the environmental problems are found, and to schedule hearings to permit citizen comment on the impact statement. Write or wire: President Richard M. Nixon, The White House, Washington, D.C. 20500; Secretary of Interior Rogers C. B. Morton, Interior Building, Washington, D.C. 20240.

Emphasize the following points in your letter:

1. We cannot fail to recognize the magnitude of the damage that would occur to Alaska and the marine environment as the result of a pipeline through Alaska.
2. We must not under-rate the benefits of delay in using North Slope oil, and the advantages of constructing a pipeline through Canada instead of through Alaska, if a pipeline must be constructed at all.
3. We must not over-estimate our energy need for North Slope oil, nor should we under-estimate our ability to change public policies and actions in order to reduce our need for energy.
4. We should not over-estimate the immediate need for North Slope oil for purposes of national security.

