NATIONAL PETROLEUM COUNCIL

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GENERAL MEETING

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JUNE 21, 1984

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The Council met in the Corcoran Ballroom, Four Seasons Hotel, 2800 Pennsylvania Avenue, N.W., Washington, D.C., 20007, at 9:30 a.m., Robert A. Mosbacher, Chairman, presiding.

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PRESENT:

ROBERT A. MOSBACHER	CHAIRMAN
RALPH E. BAILEY	VICE CHAIRMAN
THEODORE A. BURTIS	MEMBER (SPEAKER)
WILLIAM C. DOUCE	MEMBER (SPEAKER)
A. V. JONES, JR.	MEMBER (SPEAKER)
JOHN G. PHILLIPS	MEMBER (SPEAKER)
ROBERT O. ANDERSON	MEMBER (SPEAKER)

ALSO PRESENT:

DONALD P. HODEL	SECRETARY OF ENERGY
WILLIAM VAUGHAN	ASSISTANT SECRETARY
MARSHALL NICHOLS	EXECUTIVE DIRECTOR

I N D E X

P R O C E E D I N G S

(9:37 a.m.)

CHAIRMAN MOSBACHER: Good morning. The 87th meeting of the National Petroleum Council will please come to order.

We have an excellent turnout, I'm very gratified to see, as usual. And we would like to dispense with the calling of the roll. We hope that each member has checked in outside before the meeting in lieu of a roll call.

If you have not checked in, please do so immediately following adjournment.

I would like now to introduce the people at the head table. To my far left is Bill Douce, Chairman of the Committee on Strategic Petroleum Reserves. Next to Bill is the Honorable William Vaughan, Assistant Secretary, Fossil Energy.

On the far right is Marshall Nichols, our excellent Executive Director of the Council. And he didn't write that part.

Next is Ted Burtis, Chairman of the Committee on Petroleum Inventories and Storage Capacity. Next to Ted is Ralph Bailey, Vice Chairman of the Council, and Chairman of the Committee on Enhanced Oil Recovery.

On my far right -- I mean on my immediate right is a gentleman familiar to all of us, respected by all of

us, I'm sure, as the most knowledgeable and articulate Secretary of Energy.

We are delighted to have the Honorable Donald Paul Hodel. And we appreciate your being here with us at your busy time.

Thank you.

SECRETARY HODEL: Thank you, Bob.

(Applause.)

SECRETARY HODEL: In case you're wondering why I first started there and then came over here, we had a discussion about where I was supposed to stand this morning, and I'm told that somebody had taken the trouble to set up the microphone so they could tape my remarks. And rather than cause them the problem of trying to retape over there, I've come over here. So, in case you wonder why all this rigmarole, a very formal process.

I very much appreciate the opportunity to be with you today. First of all, I wanted to express my thanks to many of you with whom I have had conversations or meetings during the course of this intervening year since I think I last talked to this group, because I really sense a community of interest as we approach the problems that confront this industry. And I welcome the opportunity to come and be with you this morning.

And what I thought I would do is kind of bring

you up-to-date on what I have been saying about a number of things. Some of you will have heard this and it will be familiar, not all of it. I hope it's a little different. The numbers are the same, I hope.

But some things do bear repeating, also. As somebody said to me not long ago, -- he said, gee, I'm glad you decided you were going to use the strategic petroleum reserve early,and finally made that announcement, in the event of some kind of disruption.

I said, I have been saying that for the last ten months.

And he got this kind of blank on his face. And he said, well, some things bear repeating.

(Laughter.)

SECRETARY HODEL: It may be partly a function of my style, which, as you know, is, I try to keep a low profile. And some people have asked me why do you try to keep such a low profile. And my answer is, if you'd spent twenty-one months as the Under Secretary of Interior to Jim Watts, you'd want a low profile, too.

(Laughter.)

SECRETARY HODEL: In some ways -- in some ways, what I'm going to say today, some of the things I talk about today, are really preaching to the choir. And I sometimes get told that. Gee, Hodel, you're just preaching

to the choir.

But, you know, I was reminded that sometimes if you don't preach to the choir, the choir doesn't sing. And so I think it's just as important for us to talk to ourselves once in a while and reach accord on what we think the issues are and what we think needs to be done.

And we don't always agree on everything, I've noticed. And, as I result, I think it's a very worthwhile undertaking.

I first would like to start off by introducing the sixteen new members of the National Petroleum Council. And four people have been unable to attend. But the balance are here, out of the sixteen.

First is Fred Ackman, who is Chairman of the Board, President and CEO of Superior Oil Company. He's been with Superior since 1981, and was formerly Executive Vice President of Exxon. Fred Ackman, are you here? Fred.

Dr. John Baden, who's the Director of Political Economy Research Center, has taught at Montana State University, and has written extensively on environmental, natural resources, and land management issues. Here we are. Baden.

MR. BADEN: Baden.

SECRETARY HODEL: Baden. Let's get -- as in

Baden-Baden.

MR. BADEN: Right.

SECRETARY HODEL: John, sorry. John and I have corresponded. But, as you can tell, we've not talked a lot.

(Laughter.)

SECRETARY HODEL: J. B. Coffman, who's President and CEO of Aminoil Oil, Inc., succeeds George Trimble, who was a former NPC member.

Here we are.

Mark Copeland, of Copeland, Landye, Bennett, and Wolf. He's a member of the Alaska Support Industry Alliance, and his firm represents several Alaskan native corporations. Mark.

Thomas H. Cruikshank, President and CEO of Haliburton Company, recently successed former NPC member John P. Harbin as President of Halliburton.

Ron Erickson, Chairman, Executive Committee of Erickson Petroleum Corporation, is a past president of the Independent Refiners Association of America. I hesitated for just a moment because I -- I think you came into the room a little late, and I wasn't sure you were here yet, Ron.

Mrs. Terry Hoffman, Commissioner, Minnesota Public Utilities Commission. Mrs. Hoffman has served in

several posts in Minnesota State Government, including the Pollution Control Agency and the Department of Transportation.

Jon Rex Jones. Oh, good, John. I didn't know whether you were here yet. He's President of the Independent Petroleum Association of America. And the Association represents some fifteen thousand independent oil and gas producers.

Frank McPherson, Chairman and CEO of Kerr-McGee Corporation, succeeding retiring member, Mr. McGee.

Not present is Joseph Misbrener, President, Oil, Chemical, and Atomic Workers International Union, who replaces Robert Goss, the retiring President of the union.

Next, Robert L. Monaghan, President of Cal-Mon Oil Company, founded the Cal-Mon Oil Company in 1956 and has served as its president since that time. Over here.

Next, not attending today, Richard Morrow, Chairman of the Board, Standard Oil of Indiana, succeeding John Swearingen.

Not present is William B. Packer, Chairman of the Board of Seaview Petroleum Company.

Not present is William A. Stevenson, President of Imperial Resources, Inc., engaged in independent oil and gas exploration.

Present is C. R. Palmer, Chairman of the Board

and Presidnet of Rowan Companies, Inc., a past president of the International Association of Drilling Contractors.

And John P. Thompson, Chairman of the Board and Chief Executive Officer of the Southland Corporation, representing one of the largest marketers in the country.

I think it's appropriate for us to welcome these new members. I certainly appreciate their willingness to serve in this august body. And I think it would be appropriate for us to applaud.

(Applause.)

SECRETARY HODEL; I regret that I wasn't with you last night at the reception, because I understand that you presented John Bookout with a watch or a large clock. And I'm told that in view of his success at attempting to put it goether, the quails don't need to be too worried for awhile.

So, I'll -- for those of you who weren't here last night, I'm told that the clock turned out to be a shotgun. And John had a little trouble putting it together.

Let me talk about a few issues, just some of the things I've been talking about as I travel around the country and speak to various groups about energy issues.

First of all, you've been following the Persian Gulf. Certainly we have. We need to be concerned. But

the message I keep trying to get out is that this nation is not as dependent as it was in 1973, certainly, and even as in 1979. Our oil consumption is down about ten percent since 1980. Our imports are down about a third. Our suppliers are no longer as heavily from the Persian Gulf area. About three percent of our oil's been coming through the Strait, as distinguished from higher percentages earlier.

And the strategic petroleum reserve, in the last day or so, topped four hundred and eight million barrels, nearly four times what it was when the President took office.

So there have been some improvements. And I keep saying what we need to be is -- we can approach the future with increasing confidence. We cannot afford to be complacement, because the events that are taking place there certainly could rock the world oil scene.

I appreciate the enthusiasm with which you have approached the request for a study of the strategic petroleum reserve distribution. I am informed that the industry participation has been outstanding both in resources and quality of the effort that you put forth.

That is a very important study. It will be an ongoing problem.

You would also be interested, I think, to know

that the report, the minimum operating levels report, which you presented at the last meeting, which I attended, has come in very handy as we have been dealing in the international arena. It has helped us make the point about what minimum operating levels ought to be in other countries as well. And I'm told that the adoption of the definitions and your methdology either is the case or is likely to be the case among other countries in the international energy arena.

I think that's extremely important and will help us get a further handle on just how well prepared we are in case there's some kind of disruption.

The point I keep making is that while the United States is better off than we were, the fact is we've got allies who, incidentally, are also better off than they were, but are still extremely dependent upon oil which comes out of the Gulf. I suggest to people that the world oil market is a little bit like a giant swimming pool, and the United States may be at that part of it which is a long way away from the drain, but if somebody pulls the plug, the level is going down for all of us, and we need to be continuingly concerned about what happens over there.

I've requested and I look forward to the same enthusiasm that you've shown in these prior studies as

you undertake a study of the deomestic refinery trends, 1985- to 1990. I think that that information would prove extremely helpful in forecasting product supply capability and distribution.

Now, in October of '83, we submitted to the Congress a national energy policy plan. And everywhere I go -- and some of you have heard this. I look around the room, some of you will have heard this several times. But I'm going to say it again anyway.

We submitted to Congress a national energy policy plan, which has proven to be a very useful working document for this Department. And the reason it's a useful working document is that it sets forth a goal and some strategies for achieving that goal, and the programs then flow from the goal and the strategy.

The goal is very simple, very simple, straight forward. An adequate supply at reason costs is what we're seeking to achieve. You can define adequate in short-term, long-term, it can be in emergency, in normal times, and the like. You can define reasonable costs to mean different things to different consumers.

Industries need to be able to buy fuel they need and remain competitive, and remain competitive in the international market.

Household consumers need to be able to buy the

energy they need without having drastically to change their life styles in order to acquire the energy they require.

So, an adequate supply at reasonable costs. And the reason I lean on that as hard as I do is that economists, particularly, but sophisticated people, I think, feel it should have been a little more erudite than that.

But it's worked because I think it's right. I think it's what our predecessors ultimately were seeking to achieve with an energy policy. It's what other nations in this world are seeking to achieve.

Our strategies differ markedly, however, from our predecessors and from many other countries in the world. First of all, our first strategy is, we seek to minimize the Federal intervention and control in the marketplace, recognizing health, safety, and environmental responsibilities will remain with the Government. We seek to minimize that intervention and control.

We think that we can show and document that the Government intervention in the marketplace has been one of the major causes of dislocations of markets in past shortages. That is not an easy job to maintain that position. And there are people who are geared up today and who are working hard to try to force on us standby allocation and price control authorities so that in the instant that there's a problem the Government can dive in,

in their view, to solve the problem, in our view, to complicate it beyond correction.

We need continued effort to make the point the only good allocator of supplies in a shortage is the price mechanism.

Now, we think it's ironic that with the situation that's going on in the Gulf today that we are facing efforts within this country to curtail our ability to be responsive to the energy requirements of this countries. OCS and natural gas are two good examples. On the outer continental shelf of the United States, today, we have leased only twenty million acres in the last -- well, since 1953, over the twenty years.

Congress, in the last three years, has placed over fifty-two million acres in moratoria. So, two and a half times as much acreage has been forbidden to exploration as has been leased. And now there are efforts to add more.

I think it's incredible when you realize the the forecasts indicate that perhaps as much as eighty-five percent of the oil to be found in the United States will come from Federal lands, and sixty-six percent of that may come from the outer continental shelf. At the very time we're trying to improve our energy nondependence as a nation, the Congress of the United States seems heckbent

on closing the opportunities on the outer continental shelf.

Natural gas is a similar story. We think that what happened on the decontrol of the price of oil ought to be instructive. But some things bear repeating. We decontrolled the price of oil amidst predictions that the price of oil would rise to two dollars a gallon at the gas pumps by December.

Now, the same people are telling us -- and, of course, it didn't quite go there. And I know some in this room are regretful of that. But the fact is, our economy, our national security, and many people in the world have benefitted from that reduced price.

We think it's intriguing that the same people who made those predictions about increased gasoline prices are now telling us that if we were to decontrol the price of natural gas we'd have the same problem, and, instead of that, are now proposing, through what is called the Sharpe bill, a rollback and price freeze, which, in my estimation, is one of the worst anticonsumer and anti-elderly proposals that the Congress has had before it.

The effect of that, in our estimation, will be to increase the price of natural gas, to decrease the supply, the increase our imports from Canada, and to increase our imports of oil to displace natural gas because

of the price.

I'm not alone in that view. Organizations who deal with consumers and deal with the elderly have also added their weight in oppostion to that bill. But there is a great concern -- and some of you and I have had conversations about this -- a great concern that that bill, that I've just described, will suddenly begin moving in the House of Representatives, and it will be a very severe problem for us to try to head it off.

That's our first strategy. We'd like to minimize, not increase, the Federal intervention and control in that marketplace.

Our second strategy is that we want a balanced and mixed energy supply. It's hard to keep a conservation ethic alive when people believe that we have a glut of oil, and of natural gas, and of coal, and of electricity based on those. And that's where many people believe we are today.

I keep trying to tell people that energy is like a pipeline. Energy is not an event. You don't solve the energy problem once and for all. Like the kid who came in to his father. He said, Dad, you've always told me that a job well cone need never be done again.

The father said, that's right, son.

And the son said, well, then I never have to cut

the lawn again.

Some things are a continuum. And energy is a process. It's like a pipeline. And right now we've got a lot coming out of the mouth, we appear to be in pretty good shape, and the potential is enormous. But there are things happening in that pipeline which jeopardize the reliability and the availability of that supply. And you're aware of that, and I am. And we need to remain vigilant to keep that up.

And in this process, I'm trying to sell Americans on the idea we must continue to move in the direction, keep the momentum for conservation and renewable resources. We're making progress in solar and wind. We're trying to do something about nuclear licensing reform. We need coal, both at home and abroad. I sometimes say we're the Saudi Arabia of coal.

But we seem determined, as a nation, to find ways to curtail the use of that resource also. And that's not desirable. We need to find ways to make it possible.

I'm struggling as -- with the Administration to try to find a way to revive life in the Synthetic Fuels Corporation. I was quoted in the paper of saying it was deader than a door nail. I don't like the sound of that, so I've recently used the words "it is moribund." I kind of liked it. But --

And until we do something about adding people to that Board of Directors, the Synthetic Fuels Corporation cannot act. And it is our desire -- I don't know what you may have read or what your belief may be. Let me assert today, it is our objective to restore life to the Synthetic Fuels Corporation. In order to do that, we think it's necessary to reduce the amount of dollars available to the Synthetic Fuels Corporation in order to get sufficient support in Congress to carry forward with a somewhat reduced program, and see that the two contracts that Syn Fuels has executed and the Great Plains Coal Gasification Project, which is imminently ready to go into production, at least get an opportunity to operate.

There would then be, under our proposal, additional monies which the Board of Directors could evaluate other projects and allocate that money if they found those that they thought were appropriate.

It's not clear whether Congress will act in that fashion. We are, in the meantime, moving ahead aggressively to try to find nominees for the position and work them through the nominating process and be able to send those names to the Hill.

Finally, I've been saying a lot of things about technology in recent times. I think the last time I was here I mentioned to you that one day I was sitting in my

conference room, and I lot of the scientific types from the Department of Energy there. And I musingly said, -- not amusingly, I thought -- but musingly, thoughtfully, very thoughtfully said, you know, I guess I really believe that in my lifetime there'll be a breakthrough of some kind, science, technology, which will change the way energy is produced, or consumed, or priced, that we just now can't even conceive of.

And these are pretty smart people. And it turned out that what I had said was amusing to them. And, so, I kind of -- you know, I got to thinking about that. And I realized we have a tendency to think everything we know today is about all we're ever going to know. Human arrogance says, we've gone about as far as can go, like the song in "Oklahoma" from Kansas City.

But the fact is I think it takes a greater leap of faith to believe that science and technology has come to its peak right now in our lifetime and that there are no great gains still to be made out there, a greater leap of faith to believe that then to believe that somewhere, somebody, today, in his backyard, or his garage, or in a national laboratory, or in a laboratory some place, is working on something or some group of things that when they finally mesh will change the way in which we use of view energy.

And it seems to me that's one of the reasons this Department has got to continue its emphasis on a whole array of research activities through all of the resources that are available to this country.

The Lord has blessed this nation with resources beyond compare. And we need to find ways to make them available and useable, cleanly, satisfactorily, and at prices that people can afford.

I sometimes say, what I see us trying to do is what I think this nation has done in the past. The West was opened by exploration. Many of the exploratory expeditions were Federal, they were Government going out to find out what was out there. That was a different era. We wanted to know what we had. Whereas, now, for some reason, we don't want to know. But, in that era, we wanted to know what this nation consisted of, what were the resources.

But when the Government found the vast resources of the West, we didn't create a Federal railroad corporation to put railroads across the country. And we didn't create a Federal farming corporation or communes to farm the West. We created a Homestead Act. We created incentives. You know, we -- under the Honestead Act, we offered people free -- quote, free, unquote land, if they would simply go devote themselves for three years to the

incredibly difficult task of making that land bloom and grow crops. And many did it. Some failed, many more succeeded. But the West was opened and agriculture developed.

And I like to think that what we're doing by investing our money in research across the board is that we are attempting to push that energy frontier, expand it in such a ways that we can identify opportunities. And then we've got to excite the energy, and the imagination, and the inventiveness, and the innovation of our citizens to go forth and homestead that energy frontier.

It is a great opportunity for us to do. And I think, under the view that the President has taken of an optimistic, a hopeful future, instead of the view that was so prevalent in the '70's that we were going to have to learn to live with less, this was a declining situation, the energy potential was limited, restricted, the world's future was grim, we have, I think, turned the nation. The nation has turned itself. And the President certainly is a strong proponent of the view that we have a hopeful future.

And as I look at energy, I feel exactly the same way. The potential out there is enormous. In fact, I think one of the problems we have in this country is we think we have so many options that we think we have the

privilege and the luxury of shutting off resources that any other country of the world would desparately be trying to recover because of their usefulness in the system. We think we have the luxury of being able to try to turn them off.

If we're successful in our efforts, we can have a tremendous impact not only on what is going on in this country, but in the whole world. There are nations today, many of them, whose population are facing declining standards of living.

My personel view is that the availability of energy at prices they can afford to pay is a crucial component of that declining standard of living.

If we are successful here, we can also make great contributions to those people. And I think that is a significant human cause that we should undertake.

So, as I look out, I say we're better off than we've been. We've got enormous challenges in the future. And I want to thank all of you for being here today and for being members of this National Petroleum Council, which has made significant contributions to the ability of this country to continue the kind of work that we're doing. And I think we're going to be successful.

Thank you very much.

(Applause.)

SECRETARY HODEL: I think I'm supposed to stay here to try to respond to questions.

Bob, you'll tell me when I should stop taking questions?

CHAIRMAN MOSBACHER: I won't say when the questions are over, sir.

Are there any members who would like to ask the Secretary any questions?

(No response.)

SECRETARY HODEL: That is super. This is the kind of audience I really like.

I just want to say, in case you get any complaints about the Department of Energy, and the size of our budget, and so forth, -- some of you have heard me say this -- I want to give you some ammunition to defend me with. You just tell them, you be thankful you're not getting all the Government you pay for.

(Applause.)

CHAIRMAN MOSBACHER: Well, Mr. Secretary, thank you for those very cogent remarks. Thank you for participating with us, for being such a viable and important part of the process. And, as you know, we not only appreciate working on these projects, about which you will hear in a moment, but we appreciate the opportunity to serve you and, through you, our nation.

SECRETARY HODEL: Thank you, Bob.

CHAIRMAN MOSBACHER: We now have, Mr. Secretary, in accordance with your request, completed two studies. And we now have under consideration draft reports. These are called draft reports until they are approved, which we hope and suspect they may be today, and at which time they will be forwarded to you as reports of the National Petroleum Council.

The two reports, as you well know, are the Enhanced Oil Recovery study and the study on Petroleum Inventories and Storage Capacity.

Mr. Ralph Bailey has ably chaired the Committee on Enhanced Oil Recovery, and we now would appreciate hearing your report. Ralph.

VICE CHAIRMAN BAILEY: Well, I'm more pleased than I can tell you to be here this morning to present the results of the EOR study that was conducted under the guidance of the committee that was appointed.

This study was conducted in response to the Secretary's request that the NPC update its 1976 report on Enhanced Oil Recovery.

A proposed final report was approved by the committee on May 18th, and mailed to you on May 30th for your review. The purpose of the study was not only to evaluate domestic enhanced oil recovery, based on present

conditions, but also to project additional oil which might be recovered due to advances in technology and improved economics.

I should point out, for some of the members in the audience, that primary recovery methods rely on natural reservoir energy to drive the oil through reservoir rock and to the production wells.

Conventional secondary recovery methods introduce additional energy by injecting water or gas to assist in the producing the oil. Historically, water flooding has been a very successful secondary recovery method. However, enhanced oil recovery, as defined in our study, is oil recovered by using processes other than gas injections or water flooding.

The three general methods of enhanced oil recovery covered in the report are chemical, miscible, and thermal.

There is a large target for these enhanced oil recovery methods. Of the four hundred and eighty-one billion barrels of U.S. crude oil discovered to date, twenty-seven percent has been produced. Approximately twenty-eight billion barrels more, or six percent, will be produced under existing technology and economics. Now, this then leaves three hundred and twenty-three billion barrels, or sixty-seven percent, as a target for

enhanced oil recovery.

Application of EOR is presently underway, although its contribution to daily U.S. production is small. U.S. production in 1982 was about 8.6 million barrels per day, of which only six percent was produced by EOR methods.

Since the 1976 study, numerous changes have occurred and are identified in Chapter Two of the present study. One of the most dramatic changes was an inflation adjusted one hundred percent rise in oil prices.

To increase U.S. production, the Federal Government instituted a tertiary recovery incentive program from 1979 to 1981, when it was terminated. The cost recoupment provision of this program was a definite stimulus to enhanced oil recovery.

Other changes were decontrol of crude oil prices in 1981, with the concurrent institution of the windfull profits tax, and, finally, the passage of stricter air emission and other environmental controls that impacted tertiary recovery costs.

Although oil prices peaked in 1981, and have since declined, these higher prices spurred continued, evolutionary improvements in EOR technology.

Chemical technology showed a slow but steady improvement. Miscible technology became much more proven due to the start up of pilot tests and the beginning of

several full field projects. The thermal processes benefitted from application of hydraulic fracturing techniques and improved steam generation equipment.

And, finally, much progress was made in the technology for determining reservoir parameters, monitoring EOR projects, and predicting project results.

Early in the course of our study, the coordinating subcommittee identified these key study components. First, it was necessary to develop and verify a representative data base of reservoirs in the United States. Second, screening criteria had to be defined in order to determine which reservoirs might be amenable to each process. And, next, process models to estimate potential producing rates and economics for each reservoir had to be developed and calibrated. And this, of course, required the derivation of realistic cost and economic parameters.

Procedures then had to be develop to combine additional reservoir results in order to make overall projections of recovery and producing rates.

Finally, it was necessary to combine all findings into a comprehensive report.

Developing the data base proved to be a formidible task in itself. We subjected data from the Department of Energy, the University of Oklahoma, and other sources to rigorous industry review and enhancement,

resulting in a data base of over twenty-five hundred reservoirs containing three hundred and thirty-five billion barrels of oil originally in place. This represents over seventy percent of the 1980 API estimate of four hundred and sixty billion barrels of discovered oil in the U.S.

This slide shows the geographical distribution of the DOE-NPC data base reservoirs. The yellow peaks represent the NPC data base, while the green represents the 1980 API oil in place reserves in the same areas.

This very large data base compilation provided an excellent foundation from which to make EOR projections.

We also discovered, through a reservoir size distribution study, that by eliminating reservoirs containing less than fifty million barrels of oil originally in place, we could eliminate sixty-five percent of the reservoirs to be studies, but only lose eight percent of the oil originally in place. Therefore, it was decided to examine in detail only those reservoirs larger than fifty million barrels. The smaller reservoirs may, however, be desirable targets for EOR application, especially by smaller operators.

The resulting eight hundred and eighty-nine reservoirs contain about three hundred and nine billion barrels, or sixty-seven percent, of the oil reported in the 1980 API estimate.

Since technology is obviously such a major factor in enhanced oil recovery, we defined two basic technology cases. One was an implemented technology case, which includes recover using technology currently implemented in the field. A second, the advanced technology case, includes recovery not only from currently implemented technology, but also from technology improvements that appear feasible over the thirty-year time frame of the study.

These cases were examined for constant crude oil sales prices varying from twenty dollars to fifty dollars per barrel, and three minimum discounted cash flow rates of return of zero, ten, and twenty percent.

These were the principal steps in the study.

I've already discussed how the data base was developed. And using the appropriate physical screening criteria, each reservoir was then assigned to any processes which appeared feasible.

Process economic models predicted performance and calculated economics. Reservoirs were then assigned to that process which was economic and recovered the most oil. Results were combined by calendar year in the projections of rate and ultimate recovery for the various technology cases, prices, and the rates of return that I've already outlined.

And, finally, results were analyzed, reviewed,

and, where necessary, redetermined.

Before presenting the numerical results of the study, I would like to mention the fact that the 1984 study addresses environmental concerns to a greater degree than was done in 1976. Factors considered are land areas required for EOR projects and their extended use in time, possible problems with air emissions, water supply and pollution, toxic chemicals, solid waste, and heat and sound emissions.

The study conclusion is that all of these can be satisfactorily addressed with present industry practice under existing environmental regulations.

Having shown you the background and the steps of the study, I would now like to present the results. In considering these, please remember that they are projections and not forecasts. They show what could happen under the specified technological and economic assumptions. Quantitative results of the study are expressed in terms of ultimate recovery and projected producing rates.

This slide shows the ultimate recovery from each of the main processes for both implemented and advanced technology cases, at nominal crude oil prices from twenty to fifty dollars per barrel. And these are calculated using constant 1983 dollars, and economics are based on a ten percent minimum rate of return.

Total recovery varies from about seven billion barrels, for the twenty dollars per barrel implemented case technology case, up to thirty-four billion, for the fifty dollar advanced case.

And you can see that the present crude price recovery from the application of chemical processes is much less than that of miscible and thermal.

The role of advanced technology is very evident. It almost doubles expected recovery at each price level.

The chemical processes benefit very significantly from advanced technology.

At thirty dollars per barrel, the producing rate under implemented technology is projected to rise to about 1.2 million barrels per day between 1995 and 2000. The total producing rate could exceed one million barrels per day for almost twenty years.

As you can see, rates for the major processes show quite different patterns. The thermal process rate peaks and declines much sooner than miscible and chemical.

The chemical process shows a very slow rate build up, and, in fact, does not peak within the study period, which ends in 2013.

The corresponding advanced technology case could have a peak rate of over two million barrels per day. Now, much of this gain would be due to the chemical

processes, although there are also increases in the miscible and thermal processes.

As expected, producing rates are very sensitive to assumed crude oil prices. The implemented technology case rate could rise to 1.8 million barrels per day, at fifty dollars per barrel. On the other hand, if the price dropped to twenty dollars per barrel, new projects would not be started, and the rate would rise to only slightly above its present six hundred thousand barrels per day.

For advanced technology, the rate at fifty dollars per barrel could rise to 2.8 million barrels per day, as shown here.

This slide illustrates the potential which could be gained through improvements in technology. The advanced technology peak rate is over two million barrels per day, compared to 1.2 million for the implemented technology case. And please note that both of these are based on a crude oil price of thirty dollars per barrel and a ten percent minimum rate of return.

We gave a great deal of thought to defining the certainty or perhaps the uncertainty of study results. In the report, we express uncertainty as a range around the implemented technology case and in terms of four major factors, price, technology, success assumption, and extrapolation.

The range of uncertainty due to price is defined by the recovery at price levels of twenty dollars and fifty dollars per barrel. Similarly, the effect of technology is based on the difference between the implemented and advanced technology cases.

Possible overstatement of results due to the fact that all projects were considered successful is estimated by using the twenty percent minimum rate of return cutoff, which is indicated by the bottom of the success assumption bar.

Finally, the possible error due to not extrapolating EOR application to the entire U.S. oil in place base is evaluated and quantified. Shown here are results for the chemical methods, which has an implemented technology case recovery of two and a half million barrels, which is the heavy horizontal line.

And, as you can see, the technology is the main uncertainty factor, reflecting the fact that this is a relatively immature method. But it also shows the tremendous potential, which might be achieved for this process from advance technology.

Price and the success assumption have significant down-side uncertainty.

For miscible flooding, technology has little effect, with the main uncertainty being due to price.

With thermal recovery, technology is again the major uncertainty, although it is not as significant as in the chemical methods.

These summary results are expanded upon in the report and are accompanied by results for each process, the rate of return, and technology case.

The study participants also examined the contribution of EOR potential relative to other energy sources. In 1983, the Department of Energy made this projection of U.S. energy consumption according to source. And it shows that petroleum liquids are expected to fulfill a significant part of total U.S. energy requirements through the year 2010.

Looking at only petroleum liquids, our EOR projections are seen to be significant, but certainly not a complete solution to our petroleum liquid needs. The potential rates from EOR, at our current economic conditions, and the two technology cases, are shown here.

The maximum rate is about fourteen percent of the 1982 petroleum liquids consumption, or twenty-four percent of the current U.S. domestic crude oil production of about 8.6 million barrels per day.

The reports lists several results which have Government policy implications. Application of enhanced oil recovery should have little negative environmental

impact due to expansion and extended duration of land use. Potential pollution problems are minimal and can certainly be controlled under present regulations.

On the other hand, there are significant social benefits from enhanced oil recovery. It will result in less future dependence on imported oil. It has signficant industrial benefits, both for oil producers and related industry. And it will help to extend the transition time required to implement alternate energy sources. And it will also provide added Government revenues.

It is imperative that Federal and State Governments strive for stable, uniform tax policies to reduce the perceived risk of EOR projects, if enhanced recovery is to contribute on the scale that is projected in this study. The Governments, we feel, should consider reducing the severance tax and royalty on marginal properties to extend field life and encourage implementation of EOR projects.

Further, the Federal Government should continue to support the present tax credits for research and development, which are due to expire in 1985.

The overall conclusions of the study are, that EOR could significantly increase domestic crude oil supply. A forty percent increase in current recoverable reserves could be achieved using presently available EOR technology.

The technical uncertainties vary widely among EOR processes, with chemical being the most uncertain.

EOR ultimate recovery and projected producing rates are highly sensitive to crude oil price, as shown by the various figures that you have seen.

And, finally, EOR will meet only a fraction of the nation's expected demand. It is certainly not a complete solution to our energy problems.

Now, although not a part of the report, we made a comparison between the 1984 and the 1976 study results. This slide presents a comparison of EOR from the 1976 study with that of the 1984 implemented and advanced technology cases, using equivalent oil prices and rates of return. The 1976 study assumed some advance technology, although not the degree in the 1984 advanced technology case.

And you can see that the total recovery predicted in 1976 falls between our implemented and advanced technology recoveries, lying much closer to the implemented technology case.

The distribution of recoveries among the three methods is signficant. Recovery from the miscible process remains about the same. However, compared to 1976, the chemical processes are seen to be much more sensitive to technology, and, in fact, can increase significantly under

advanced technology.

Projected recovery for the thermal method is greater, both for the implemented and advanced technology cases.

The 1976 predicted rate for total EOR peaks much earlier and lies between that of the 1984 advanced and implemented technology cases. And you will note that the 1976 projections extended only to the year 2000, which was the end date of that study.

The 1976 report projected that chemical projects would come on stream much earlier than now estimated. Although the advanced technology case chemical recovery is estimated to be more than the 1976 study, it is not expected to contribute substantially until after the year 2000.

The 1976 miscible rate projection anticipated a significant increase after 1995. And we now believe there will be a much more gradual increase. However, this rate will be sustained past the decline that's shown in the 1976 study.

The 1984 rate projections for the thermal method are significantly higher than those show in 1976 and extend much further in time.

Overall, the 1984 results are similar in total recovery to those in 1976, but the distribution among the

processes of this recovery is significantly different, as are the producing rate projections for each process. These comparisons are certainly not meant to be a reflection on the quality of the 1976 study. It was an excellent one and very helpful in our present study. The differences reflect the experience gained in the last eight years and the changes that have occurred in our business environment.

I believe that this study provided us with an important opportunity to reflect upon our knowledge of enhanced oil recovery and to document the contribution it can make to the nation's energy future. And as you examine the report you will find that all of the results and conclusions are fully supported in the chapters and in the appendices.

And before addressing any of your questions or comments, I would like to have the lights come on and recognize members of the EOR Coordinating Subcommittee who had leadership roles in the study. Several are here today. And I would like to have them rise as I call their names.

First, the big chief of the subcommittee, who really has done a yeoman's job in this report, Buck Curtis and his two helpers from Conoco, John Bohanon -- John's back of the room -- and also Bill Stewart.

And we have with us this morning John Mim, who was Chairman of the Chemical Task Force from Phillips.

Where's John? Over here.

And also Frank Roehle. This study took so long to complete that O. E. Van Meter, from Mobil, who was in charge of the Miscible Replacement Task Force, retired, and Frank Roehle replaced him as a member of the group.

There are a few others that are not present that had very key roles that I would certainly like to recognize. J. M. Tharp, who was Chairman of the Thermal Task Group, from Getty. Billy Burke, who was Chairman of the Cost and Economics Task Group, from Occidental. Hal Scott, who was a member of the coordinating subcommittees and headed the Environmental Working Group. He's President Emeritus of the Florida Audubon Society. Joe King, who was Assistant to the Chairman of the Thermal Task Group, from Getty. And Peter Dole, Assistant to the Chairman of the Chemical Task Group, from Phillips.

I also want to express my appreciation to all of these individuals and their organizations. As a matter of fact, I asked this group to tell me just about how much time was involved in putting this study together. And its my understanding that they estimate it took about forty-five manyears of effort to do the job. And, so, you can see why I'm most appreciative of all the effort that's been put into the work by these gentlemen, their companies, and also members of the Department.

We were privileged to have Bill Vaughan serve as the Committee's Government Co-Chairman, and Keith Frye, who was the Government Subcommittee Co-Chairman. And we want to thank them, and also the Secretary, for all of the help that we received from the staff.

So, Mr. Chairman, the Committee believes that the proposed report is excellent and is a suitable response to the Secretary's request. The Committee recommends that the report, with its transmittal letter, be approved by the NPC, subject to final editing, and I so move.

CHAIRMAN MOSBACHER: Thank you, Ralph.

Do we have a second to that motion?

COUNCIL MEMBER: Second.

CHAIRMAN MOSBACHER: Before we vote on this or have any further discussion, I think not only is the duty but the pleasure of the Chair to thank you, your Committee, Subcommittee, the Task Forces. Forty-five man years is a staggering number. But I think the results that are going to be, I think, a mark to shoot at in any further report in a long. long time justify this effort.

We thank each and every one of you for a magnificent effort or for a report that I think will go down in the annals of this organization, and for the Secretary, and for the nation.

And I think the rest of us, before we even vote,

can applaud all of you for the work. Thank you.

(Applause.)

VICE CHAIRMAN BAILEY: Bob, I would like to point out that it is our belief that with the data base that's now being -- has been assembled, and with the way these fellows have structured the work, that it will be very much easier, now, to update this report at future times. All you have to do is crank in the new parameters and it can be updated relatively simple, in a simple fashion.

CHAIRMAN MOSBACHER: Well, thank you.

We have a motion and we have a second. Is there any discussion of this?

(No response.)

CHAIRMAN MOSBACHER: If not, may we have a vote on the acceptance of the report on Enhanced Oil Recovery? All in favor, please signify by saying aye.

(Chorus of ayes.)

CHAIRMAN MOSBACHER: And those opposed by saying nay.

(No response.)

CHAIRMAN MOSBACHER: The ayes have it. We thank you again.

Now, we have another very important report of the Committee on Petroleum Inventories and Storage

Capacity, ably headed by Mr. Ted Burtis.

Ted.

MR. BURTIS: Thank you, Mr. Chairman.

Ladies and gentlemen, this study began with the request, on November 3rd, of '82, of the Secretary of Energy that the Council update its report on Petroleum Storage and Transportation Capacities, which had last been done in 1979.

Last year, at the end of the year, this Committee and the NP -- our Committee and the NPC approved an interim report that provided the Secretary with data on the primary distribution system. And the information which was in that primary report is also a part of the final report.

This is the tenth in a series on the primary system that the Council has prepared for the Government since 1948.

I would like to point out that in the document that you now have there have been some editorial changes in the text from the interim report, principally to ease the integration of the new data into the final volume. And also, since the interim report used EIA preliminary data, some of the figures have changed slightly to reflect final EIA data. But these changes do not affect the conclusions of the interim report.

We are here today to review the final report,

which is the most comprehensive examination of the country's petroleum storage and inventory capacities that the Council has ever undertaken.

We'll look briefly at the organization of the study and, as background, the major findings of the interim report on the primary system before discussing the new material, which is the secondary and tertiary segments.

First, to refresh your memory, to assist the Committee with this assignment, the Chairman appointed a Coordinating Subcommittee and a Task Group. Now, the Task Group, which included representatives of the major oil companies, as well as independent refiners, marketers, gasoline and distillate jobbers, manufacturing companies, academia, examined the secondary and the tertiary system.

The Coordinating Subcommittee, which had roughly the same kind of representation, prepared the primary system analysis and was responsible for overseeing the Task Group's work.

Department of Energy appointed J. Eric Everid, Administrator of EIA; Jimmy L. Peterson, Director of the Office of Oil and Gas of EIA; and James Diehl, Director of the Data Quality Section of EIA's Petroleum Supply Division, to be the Government Co-chairmen of the Committee, the Coordinating Subcommittee, and the Task Force, respectively.

The Committee agreed to these three principal objectives for the study of the primary system. And that is to estimate minimum operating inventory levels for crude and principal refined products; to analyze the volumes of inventory that the system held on two selected dates, September 30th, '82, March 31st, '83; and to determine the amount of storage capacity in the system.

Now, briefly, on the primary system. Is that in focus? Yeah. This slide shows the results of the re-examination of the minimum operating inventory levels estimated by the Council in '79 and in '83. Now, minimum operating inventory is defined as the inventory level below which operating problems and shortages would begin to appear in a defined operating system. And I add parenthetically it does not mean that below this point would come apart, but we would begin to see problems.

The 1983 operating inventory estimates are lower than in 1979, primarily because refineries and pipelines and associated tankage have been taken out of the distribution system over that period of time, principally in response to lower demand.

As in the two previous NPC estimates of minimum operating inventory levels, the '83 estimates were developed by a decision-making process in which individual judgements were applied, based on operating experience and

a considerable amount of relevant statistical data.

In addition to the historical inventory data, the Subcommittee considered the sum of individual company minimum operating inventories and industry-wide estimates of minimum levels. These data were collected by a survey as a part of the '83 survey of all holders of primary inventories.

The other two objectives of the primary system analysis were to analyze actual inventories and to determine storage capacity. Those data were reported extensively in the interim report, and I don't think we need to present them separately today.

In the interim report, the Committee recommended and the NPC accepted and approved the recommendation that the day's supply of inventory calculations be based on inventory above minimum operating levels, instead of as traditionally, in the past, on total inventories, as shown in this next slide.

Now, obviously -- well, this procedure results in what appears to be a drastically reduced number and days of supply. It is, in fact, a better measure of available supply and more useful for emergency preparedness planning purposes. This apparently low number of days of supply of minimum should not be of concern in times of normal operation. And I would add parenthetically I think

you might look at these as rather boundary cases, in that the traditional way of figuring supply on total inventory is a kind of going-out-of-business case, in as much as those inventories could not be realized without shutting down the system.

On the other hand, the smaller number of days simple represents the way a very complex but tightly managed system actually functions. And dipping below that level, again I would emphasize, would be the signal of some disruption, but local disruptions and not the collapse. And we do believe that the second method is a better representation of what truly happens.

Well, other topics were discussed in the interim report and included in the final draft: our refinery utilization, the availability of naptha type jet fuel, the impact of the strategic petroleum reserve on private inventory levels, and consideration of the petroleum futures market.

The study sought to quantify the changes in stock levels attributible to spare refinery capacity, which allows refiners more flexibility to change product yields seasonally. The results really were inadequate to quantify the impact of spare refining capacity on inventory levels. But the report states, as we believe, that the spare refining capacity is a factor in the observed

decrease in petroleum product inventory levels.

Because of the strategic nature of naptha type jet fuel, stocks normally in storage and stocks of components that would be immediately made available as naptha type jet fuels were surveyed. And the survey results show that on March 31, 1983, the normal stocks of naptha type jet fuel could have been increased by more than half by blending jet fuel components in storage into finished jet fuel.

Now, based on a fixed crude run, of course, if nothing else happened, this increase in the production of jet fuel would cause a reduction in the availability of a number of other products.

The survey also asked if the existence of the SPR contributed to a decrease in private stock levels. And, with only one exception from the respondents, the response was that the SPR did not impact private company decisions on level of inventories to be held.

And, finally, a concern had been expressed that in the event of a supply shortage some companies might rely on the futures market for supply only to find that the wet barrels might not be available. The survey results suggest that, at least at this time, petroleum futures do not have a significant effect on the level of inventories which are held at the primary level.

That, in essence, is quick thumbnail of what was in the interim report which you accepted. And now I'd like to move on to the new material, which is the secondary and the tertiary storage segment.

This is the first time that these two systems have been studied in very great detail by NPC. The methodologies used in the study are described in detail in Appendices K and L, I think it is, of the report. The data reported are estimates based on the use of questionnaires, a large number of interviews, the use of large amounts of published data, judgement by the people who are in the business, and review by a large number of trade associations. And while the results are described as estimates, they are the only system-wide information available. And we believe that they are -- make a significant contribution to better understanding of the functioning of the petroleum distribution system.

The analyses of the secondary distribution system and tertiary storage segment present, for the first time, estimates of both storage capacity and inventory. And these capacities and inventories are estimated for March 31, 1983, to be consistent with the time horizon of the primary system.

The secondary system is composed of two segments, the bulk plants and retail motor fuel outlets. For the

bulk plants, the storage capacity and inventory were determined by a survey of a stratified random sample of all the bulk plants in the United States. The primary source for the survey sample was EIA's extensive list of bulk plant operators. And the survey responses were forwarded to Price, Waterhouse for tabulation in order to maintain the confidentiality of individual company data.

The survey was designed to determine four things. First, the total capacity for selected products in bulk plants on the March 31st date. Second, the amount of motor gasoline and distillate storage that was switchable between the two products. Third, the total level of inventory of selected refined products in bulk plants, as of the same date. And, finally, again, the impact, if any, of the futures market on inventories and storage capacities in the bulk plants.

The products covered by the survey were motor gasoline, kerosene, distillate fuel oil, and residual fuel.

The survey covered fifty States and the District of Columbia, but excluded all U.S. Territories and Possessions and the Hawaiian Foreign Trade Zone. And storage of motor gasoline at retail outlets was excluded from the survey.

There were two thousand and eighty-eight companies surveyed, and we had a fifty-five percent

response.

Now, the results of the survey indicated that there are eighteen thousand bulk plant operators in the U.S., with a total storage capacity of sixty-eight-and-a-half million barrels, and inventories, as of that date, of twenty million barrels of product on hand.

As in the primary system, the bulk plant operators were also asked about their participation in the futures markets. And the respondents indicated that, again, at this time, the petroleum futures do not significantly affect their level of inventories.

The retail system. The number of retail outlets was determined by using several sources, both public and private, and the estimate, finally, is a result of a consensus of looking at these various sources. First of all, the telephone survey of representatives of the industry and trade associations was conducted. And this included contact with some two hundred and eleven firms or associations. This survey formed the basis of estimates of total retail outlets in four categories, major metropolitan and rural area service stations, convenience stores, and other small outlets, such as, automobile agencies or implement dealers.

And the results of that survey indicated that there are a total of two hundred and seven thousand, six

hundred retail outlets in the U.S., with a total storage capacity of eighty-six million barrels.

Now, in September of '83, Lundberg Associates published the results of a study they had conducted to determine the total '82 retail outlet count. And their study indicated that there were two hundred and eleven thousand retail outlets, but did not address the issue of storage capacity.

And there was also examined -- was a study conducted by Marketing Corporations of America. And this study was based on a lot of interviews with oil company representatives, reports prepared by tank manufacturers, research on a lot of published articles, and review of Federal and State data.

Putting them altogether, after looking at them, three sets of data developed by individual methods, and the judgement was reached that there are approximately two hundred and ten thousand U.S. motor fuel retail outlets at year end in 1982.

The average storage capacity per outlet was estimated to be sixteen thousand, eight hundred gallons per retail outlet.

Based on the estimated number of retail outlets, we concluded that the total storage capacity at retail motor fuel outlets was about eighty-four million barrels

on March 31. And this is very close to the eighty-six million, obviously, from the original survey.

The average inventory contained in retail outlets in the United States was estimated to be thirty-three percent of available storage capacity, or about, as shown here, twenty-eight million barrels. This estimate is based on the telephone survey, on the conversations with a number of company representatives on the Coordinating Subcommittee, which indicated that normal inventories vary through a range of approximately thirty to forty-five percent.

Now, diesel fuel and kerosene occupy some part of a motor fuel outlet's storage. It is believed that the amount dedicated to kerosene is quite insignificant. But diesel fuel storage is greater, and is estimated to occupy approximately six percent of the retail outlet's storage capacity.

So, we add up the bulk plants and the retail outlets. We have a total storage capacity in the secondary system of a hundred and fifty-three million barrels, and inventories in place on March 31 of forty-eight million.

Now, the next slide restates these totals in terms of the major fuel products in the secondary system. And, as one would expect, motor gasoline is the principal product.

Now, to move on to the tertiary segment. In order

to determine total storage and inventories in the tertiary segment, seven sectors were defined, and different specific methodologies were developed for each of them. And these are the seven sectors.

For each one of them, published data were used, where they were available. If the data were insufficient, estimates of storage capacity were made by using a variety of inventories, and judgements, and discussions with people in the business, with the sector representatives.

I'll go on, now, to review the results of the study by sector and highlight, and highlight the changes that have occurred since the Council's last inventory and storage study of '79, where this issue was dealt with, but not in such detail. And you can look for the methodologies in the book.

The agricultural sector is defined to include all farms, and ranches, and similar entities in the United States. Petroleum storage for this sector includes motor gasoline and disel fuel used in vehicles and equipment; distillate fuel for residential heating on the farms is included in the residential sector analysis.

Over a long period of time there has been a trend toward fewer, though higher, acreage farms in the country. Between 1978 and '82, however, the number of farms and the total acreage devoted to agriculture has remained

pretty constant.

Between '78 and '82, the number of farms remained at approximately 2.4 million. The average farm size was about four hundred and thirty acres.

Now, larger farms have lower petroleum storage capacity per acre than the smaller farms, and, therefore, the long-term trend toward fewer and larger farms would suggest a reduction in storage. However, because of the 1973 and '79 supply disruptions, this trend has flattened, and farmers appear to have increased storage. Consequently, storage capacity is not perceived to have changed significantly since '78.

Consumption of petroleum by the agricultural sector tends, understandly, to be lower in the winter and higher during the planting and harvesting seasons, and agricultural inventories reflect this.

Storage capacity and inventories in the agricultural sector are estimated, in the report, to be about forty-one million barrels and fourteen million barrels, respectively.

Now, the commercial sector is defined to include the storage capacity and the inventory necessary for heating requirements of commercial establishments, such as office buildings, nursing homes, banks, shopping centers, real estate offices, whatever, and apartment complexes with

more than four residential units. It excludes commercial transportation, residential heating, industrial manufacturing facilities, and public schools, which are covered in other sectors.

Between '78 and '83, the commercial sector has been affected by a great many different trends, certainly by the six percent increase in the real GNP over that period of time, the increase in the number of large shopping centers, and the trend away from oil heating. However, it is estimated that the tankage capacity and the oil inventory exhibited no significant change over the period.

So, the storage capacities and inventories in the commercial section are estimated to be thirty-seven million barrels and eight million, respectively.

The next sector is the electric utility, which is defined to include storage capacity and inventory of distillates and residual fuel at electric utility plants. Fuel switching in the utility industry has reduced that sector's oil demand by sixty percent from 1978 to 1982. But oil inventories at electric utilities have not dropped over that period of time. Many utilities have continued to maintain large inventories as a supplement to their prime supply or to meet peak shaving demands.

Accordingly, it is concluded that the storage

capacity has remained essentially the same since 1978, and that very little tankage has been taken out of service.

So, the storage capacities and inventories in the utility industry are estimated to be two hundred and thirteen million barrels of capacity and ninety-one million in place.

The next sector, the industrial sector, includes plants and factories, but excludes retail and service enterprises, which are in the commercial sector.

For this study's purpose, petroleum refiners and electric utilities are not included in the industrial sector, since fuel for refinery use is part of the primary system, and we've already talked about the electric utility.

Industries maintain storage and inventory for space or process heating, to power machinery, and, in some cases, most notably in the chemical industry, of course, to provide raw materials for manufacturing. The products covered in this study, motor gasoline, kerosene, distillate fuel, and residual, account for approximately twenty percent, on a BTU basis, of total industrial petroleum use.

The remaining eighty percent includes such non-fuel products as petrochemical feed stocks, LPG, asphalt, and lube oils.

It should be pointed out that an increase in demand for these feed stocks will work its way through as a reduction in the availability of blending components for other oil products.

Of the products in the study, kerosene, and distiallate, and residual oils account for ninety-nine percent of the industrial storage capacity and inventory. Small amounts of gasoline are held for such purposes as fueling small machinery and generators.

In the industrial sector there is a great deal of storage capacity relative to current demand. Industrial petroleum demand declined from '78 to '82. And while some of this decrease stems from plant closings in energy intensive industry, much is the result of intensive conservation efforts and fuel switching.

However, additional tankage was installed during this period, as a result, during those times, as a concern over security of supply. And, so, because of these off-setting factors, here, again, it's indicated that the actual storage capacity has not changed significantly since '78.

In the short run, inventories exhibit a close relationship to demand. And reduced petroleum demand in the industrial sector, together with the perception of relative security of petroleum supply, supports the

conclusion that the stocks are lower than in '78. And, so, accordingly, in the industrial sector, the capacity and inventories are estimated to be sixty-one million barrels and seventeen million barrels, respectively.

The next segment, military and government, includes Federal, State, and local governments, and all branch of the U.S. military located in the United States.

It's estimated that there are fifty-six million barrels of storage capacity in this sector and that inventories total twenty-three million barrels. Thirty-nine million barrels of the capacity is held by the U.S. military. And this reported capacity includes storage held by both the Defense Fuel Supply Center and the Armed Forces, branches of the Armed Forces themselves.

The trend in U.S. military storage represents a reduction of about five percent, or two million barrels, between '78 and '83. And mainly this reduction reflects the closing of some military establishments.

Of the remaining military-government storage, twelve million barrels represents local government capacity for heating schools and municipal buildings, and for fueling police cars and other vehicles. State and Federal Government storage capacity is four million barrels for heating fuel and two million for transportation fuels.

Based on the '83 analysis, there appears not to

have been any substantial change in storage capacity during the last five years.

The residential sector, the storage includes tankage for single family homes, including farm houses; multi-family dwellings of up to four units. Storage for the large apartments, you'll recall, is included in the commercial sector.

Total residential fuel consumption has declined between '78 and '82. A number of factors are a part of this. Conservation by consumers, conversion from oil to gas or other energy sources are the most significant factors. More efficient burners, added insulation, lowered thermostat, and supplementary fuel sources, such as, wood stoves or the non-vented kerosene heaters, have all contributed to reduced oil consumption.

As of March 31, '83, an estimated 15.4 million barrels -- million household units were heated with oil, and about two million use oil as a supplement to some other system, as, for example, a heat pump.

It's estimated that there are approximately twelve million fuel storage tanks in the residential sector. Now, the apparent inconsistency with the estimate of 15.4 million household units being heated is due to the fact that the small, multi-family units included in this sector, four units or less, many of these units share a

single fuel oil tank.

Residential storage tanks range anywhere from fifty-five gallon drums to two thousand gallon tanks. But most of them are in the traditional two hundred and fifty to eight hundred gallon range.

As of March 31, '83, the average was three hundred and sixty gallons per tank. And this is essentially the same, I think, as the '79 estimate, which was three hundred and ninety.

So, putting it all together, the storage capacity and inventories in the residential section are estimated to be a hundred million barrels and fifty-five million barrels of inventory in place.

The last segment in the tertiary sector, transportation, includes fixed storage for railroad, bus, truck, aviation, marine, and taxicab fleets, as well as on board storage for fuel consumed in these vehicles and private automobiles.

Now, for this study, the payload storage capacity of vehicles that transport petroleum, such as, tank trucks, or tank cars, or barges, is excluded, because these are transportation media and do not really constitute storage for end use by the transportation sector.

Each element of the transporation sector is senstitive to overall economic conditions. In common with

most tertiary storage sectors, the transportation sector has tended to increase its fixed storage, as a response to the supply uncertainties over the last decade. And while concern over security has eased in recent years, the tank capacity has not been taken out of service.

On board storage in tanks, in cars, and trucks, which was estimated to be seventy-seven million barrels in the '79 study, increased to ninety million barrels in '83. The increase is primarily the result in the total -- increase in the total number of vehicles, and particularly medium-sized trucks.

The total of storage capacity in the transportation sector is estimated to be a hundred and thirty-four million barrels, total inventory of sixty-one million.

Summing them all up, we each a total estimated storage capacity in this tertiary segment of six hundred and forty-two million barrels, and an inventory extimate in place of two hundred and sixty-nine million barrels.

The next slide, then, restates these same figures by product. I won't comment further. You can draw your conclusions there. But the obvious thing is that the fuels, the distillate fuel and the resid-- seem to constitute the largest storage capacity and really the largest in place inventories.

A section in the report entitled "Systems

Dynamics" summarizes the estimated total storage capacities and inventories, and also looks into the interrelationship between the primary, the secondary, and the tertiary sectors.

And this next slide summarizes the storage capacity and inventories by product and by system. And here we wrap up the entire set of data. It's a busy slide, and I won't go through all of it. But I would call your attention to the differences between capacities and inventories. Particularly note, on the top line, the figures for gasoline, because I'm going to use gasoline as an example in the following discussion.

The secondary and tertiary segments act as a buffer between the principal inventories and the end users. And under normal conditions these inventories represent a substantial safety cushion for each product, in addition to that provided by the primary inventories.

The cushion is difficult to quantify, though, because it was really not possible to determine minimum operating inventories for the secondary and the tertiary systems. The concept of minimum operating inventories as applied to the tertiary is somewhat different from that as applied to the secondary or the primary system.

Nevertheless, some minimum volume of inventory is necessary to keep the tertiary segment operating. Each

of you make a minimum operating inventory decision every time you step into your automobile. And that's what this is, in part, dealing with.

It is believed that the minimum operating inventory for a given product in the secondary and tertiary system is a smaller fraction of capacity than in the primary because there is less unavailable inventory, as, for example, pipeline fill, and, also, the size of the receipts and deliveries of the product is considerably smaller than in the primary system.

Now, for an example, to demonstrate the dynamic nature of the system, this illustration has been developed and it is just an illustration, using motor gasline.

In this illustration, the minimum operating inventories for gasoline in the secondary retail fuel and the tertiary sections are assumed to be about twenty percent of capacity. The figures show an additional cushion of fifteen million barrels of gasoline in the secondary system and twenty-two million barrels of gasoline in the tertiary, additional to that in the primary system.

In this example, the combined secondary and tertiary inventories above the minimum are greater than the twenty-three million barrels of cushion provided, if you'll recall, in the primary system.

Now, it ought to be recognized that there is

less flexibility in the secondary and tertiary systems to redirect products to other consumers or other geographic areas.

Normally, inventories in the secondary system and the tertiary respresent additional volumes that can be used to maintain a continuous supply of products. That's why they're there.

However, circumstances such as the expectation of a large price increase or crude oil shortage can cause very rapid increases in call for product and, therefore, have the potential for disrupting the distrubtion system.

Using the gasoline data in this illustration, a rapid increase in product call by the tertiary segment to fill it's sixty-one million barrels of unused capacity could drain both the secondary system of its fifteen million barrels of stocks above the minimum and the primary system of its twenty-three million.

Now, obviously, a surge in call by the secondary system could also then drain the primary system of its supply.

Well, this is not a scare scenario. In considering the implications, several factors ought to be kept in mind, which would tend to mitigate this kind of situation. First of all, demand surge, if that were to occur, is not a consumption surge. It would simply be a transfer

of products from the primary system to the secondary and/or to the tertiary. And, secondly, holders of secondary and tertiary inventories would not necessarily or even likely experience a demand surge for all products in all geographic areas and all at the same time.

For example, seasonality of product demand would probably -- well, logically result in less of a demand surge for heating oil in the spring than if it occurred in the fall.

Many electric utilities and industrial users have oil storage, but burn natural gas, and would not necessarily want to fill their storage tanks as long as gas was available.

And, third, of course, refiners continue to replinish the system. In addition, spare refining capacity, estimated at about one to two million barrels a day, is there. And that, together with yield flexibility, makes it possible, in may cases, rather quickly to increase production of finished products in response to a demand surge.

The crude oil cushion above minimum operating inventory in the primary suggests a capacity for rapid response of this capacity.

And, finally, space must be reserved for tank tops, and safety allowances, and operating flexibility,

which do vary by sector. So, therefore, filling the entire shell capacity is impossible, and the unused capacity would have to be discounted by some amount.

The data resulting from this study define the inventories and the storage capacities as of a specific date, March 31, '83. Inventories, doubtless, have changed and will continue to do so as the system reacts to variations in supply and demand, prices, and, of course, there is a seasonal variation. And this should be considered as one evaluates the study.

The petroleum distribution systems are complex, integrated network of production, refining, storage, transportation facilities that supply products all across the country. The systems are flexible and dynamic. They change to meet different supply situations and demand requires.

And as has been demonstrated over many years, this capability has enabled the industry to minimize the effects of supply disruption.

Much more detail regarding many of these findings and conclusions is found in the draft.

On behalf of the Committee, I would like to recognize the extremely dedicated efforts of the Coordinating Subcommittee and the Task Force. I didn't have the courage to ask Warren how many manyears were in here, as

Ralph did, and maybe I don't want to know. But I do know that many hours of analysis and lots of hard work have been distilled into this draft report that's in front of you.

I want also to pay -- make particular mention and thank the EAI representatives, who were very much a part of the process and made a major contribution.

Mr. Chairman, this concludes my presentation. And I would like to move the adoption of this report by the National Petroleum Council.

CHAIRMAN MOSBACHER: We have the motion. May we have a second.

COUNCIL MEMBER: Second.

CHAIRMAN MOSBACHER: Ted, once again, our thanks to you for an excellent job, to your Committee, Subcommittee, and your Task Force. It's, as you well know, not only a superb report, but one that is particularly timely now with the emergency preparedness, the Middle East problems, and the national security involved.

So we have a motion. It's been seconded. Is there any discussion?

(No response.)

CHAIRMAN MOSBACHER: All those in favor of accepting this report please designate by saying aye.

(Chorus of ayes.)

CHAIRMAN MOSBACHER: Those opposed by saying

not.

(No response.)

CHAIRMAN MOSBACHER: Thank you.

Mr. Secretary, I believe, if you would, you had a comment you'd like to make at this point.

SECRETARY HODEL: I asked Bob if I could just have a moment because I wanted to express my appreciation, having watched these two reports, to Ralph, and to Ted, and to all of the people for these studies which are going to serve as benchmarks in a whole host of ways. And it illustrates that volunteerism is not dead in America, that there's a tremendous ability in the nation, with the professional expertise and talent that we have, to develop reports which I don't think the Federal Government could ever develop.

And I wanted to point out to people that the data that was obtained here was obtained voluntarily without Government coersion. And if you happen to be talking to your Senators or Congressmen, don't hesitate to make that point. We need to keep pressing that point. There's a tremendous ability of this system to work, if we'll permit it to work.

To me, the report that Ted just finished evidences that the most serious problem we will face in the early days following some kind of perceived

interruption of supply is panic. If consumers panic, it doesn't take a slide rule or a calculator to tell you that there's plenty of tertiary capacity to absorb all of the secondary capacity in a few hours. But if we can get that message across to Americans, so that we do not react in a panicky fashion.

What this also suggests to me is that there's an enormous resource base there which is available to continue an adequate supply for a considerable period of time.

Once again, I just wanted to take this opportunity to thank all of you in the National Petroleum Council, and particularly those who have worked so diligently on these two very important studies. I thank you not only for me, but I thank you for all Americans and people all over the world who will benefit from the work you've just adopted here today.

Thank you very, very much.

(Applause.)

CHAIRMAN MOSBACHER: Thank you, Mr. Secretary. And I think perhaps you already know, Mr. Secretary, that these reports, and particularly the new tertiary report that had never been attempted in this area before, could not have been done without the cooperation of you, and your staff, and the many people at DOE who worked very hard, with the industry, to make this possible. So we

thank you.

We now have come to the new area on progress. And I am delighted that we have the Strategic Petroleum Reserve study underway, Mr. Secretary.

And, Mr. Bill Douce, if you will give us a progess report on this, as Chairman, please.

MR. DOUCE: Thank you, Mr. Chairman.

Ladies and gentlemen, late last year, Secretary of Energy Don Hodel requested the National Petroleum Council to study various aspects of the strategic petroleum reserve. In a separate request, the Secretary also asked the Council to examine worldwide tanker trends in the time frame from the present to the year 1990.

As you may recall, this second request asked special consideration of the availability of tankers for any possible draw down and distribution of SPR stocks.

The Council agree, at the last meeting, to consider these topics jointly and undertake a study of the strategic petroleum reserve.

Areas of concern expressed by the Secretary included the types of crude that are stored in the SPR, the capabilities to transport the oil from the SPR stoarage sites to refineries, and long-term availability and movement patterns of tankers worldwide, with particular interest in the availability of tankers for

movements of SPR oil.

In addition, the Secretary asked the Council to look at any other aspects of the government-industry relationship wherein the Council believes changes in our current plans for SPR distribution and composition would be warranted.

In order to assist the Council in responding to the Secretary's request, Chairman Mosbacher, on March 9th, 1984, appointed tye Committee on Strategic Petroleum Reserve. Our Committee is charged with conducting a study that will result in a comprehensive report examining the physical and logistical aspects of the SPR and its distribution during an emergency.

At our first meeting, we established the following organizational structure to assist in conducting the study: A Coordinating Subcommittee and four Task Groups to cover the major categories of the study effort. The Task Groups are: an SPR Facilities Task Group, a Distribution Task Group, a Marine Task Group, and a Refineries Task Group.

I'm pleased to note the outstanding support we have received from the other Council members as we have staffed these study groups.

In defining the scope of the study, the Committee determined that it was necessary to examine, one, the

operational capability of the SPR facilities; secondly, the ability of the overland and marine distribution systems to deliver SPR crude; and, last, the capability of the refining system to process SPR crude oil into products, given the projected crudes available from the SPR.

The Committee decided that regulatory and policy implications will be examined only as they directly impact the distribution of SPR oil.

The Coordinating Committee is directing the work of the four Task Groups and will integrate the results into a draft report. Each Task Group will consider a number of factors in dealing with its assignment.

The SPR Facilities Task Group has the responsibility for identifying the capabilities and reliability of individual sites and the system as a whole to deliver crude oil in the event of an emergency. The Task Group will also examine the batching flexibility and metering requirements of the system as well as security requirements.

The Distribution Task Group is responsible for assessing the overland crude transportation systems that could be used for SPR oil distribution, including the identification of capacities, current through-puts and flexibility of these systems.

Additional areas of responsibility include an

examination of the standard sales positions and the role of exchange agreements in the distribution of SPR oil.

The Marine Task Group is charged with assessing the supply of available U.S. and foreign flag bottoms, identifying current and projected trade routes, volumes, and associated vessel requirements, and examining docking, berthing, and deballasting facilities.

The Task Group will also identify any regulatory changes which might be required during an emergency for the distribution of SPR oil.

The Refineries Task Group is responsible for grouping refineries into geographical crude demand centers, determining current and project crude mixes, refinery capabilities, and product slates, and analyzing the suitability of SPR crudes to meet projected demand.

I'm pleased to report that since the initial meeting of the Committee a great deal of progress has been made by the study groups.

As the basis for our analysis, the Coordinating Subcommittee has identified two distinct disruption scenarios. They are, one, a disruption of crude and product imports into PADD's one through four, with a static situation in PADD five; and, secondly, a disruption of Alaskan crude supply with continued crude and product imports to all PADD's.

The scenarios will be examined for 1990, as it represents the year in which the planned maximum SPR fill and draw down capabilities will be achieved.

The system will be tested for the maximum projected drawn down capability of four and a half million barrels per day. Other sensitivity cases will be examined as needed.

The SPR Facilities Task Group has inspected all of the SPR sites in order to assess their maintenance and operational practices.

The other Task Groups have developed methodologies for for assessing both the SPR and industry's capabilities of meeting demand during an emergency.

A coordinated data base establishing current crude and product logistics and supply-demand balances is being developed. Projections will be made for a 1990 non-disrupted case from which the disruption sceanrios will be developed and the SPR system tested.

An ambitious study schedule, thanks to the whip of our slave-driver Chairman over here, has been proposed. It provides for completion of our study by the end of the year. The schedule calls for various meetings and work sessions of the Subcommittee and Task Groups throughout the summer and fall of this year. The Committee will meet as necessary during this time to review the progress of the

study groups, and will then meet in November to consider a final report for submission to the National Petroleum Council.

Mr. Chairman, that concludes my Committee's progress report. And I'll be glad to try to answer any questions that the group might have.

CHAIRMAN MOSBACHER: Well, you're obviously off to an excellent start, and done a lot of hard work, despite the fact that I've had a totally laissez-faire attitude about this. You've taken the ball beautifully, Bill. Thank you.

There's no formal motion required on this. But, as Bill Douce has said, he'd be glad to hear either now or, I assume, at a later date thoughts or questions. So, are there any?

(No response.)

CHAIRMAN MOSBACHER: Thank you very much, Bill. And we appreciate your efforts, and what you have done, and what you are doing, and what you continue to do. In line with this and the fact that we expected this probably will be completed in November, we should now, perhaps, plan for our next meeting. And having checked with the Secretary and some others, we will tenatively call for the next meeting of the National Petroleum Council to be on December 12th. So, if you'll mark that in your

calendars, we'd appreciate it.

We will, of course, confirm this with you later in the year.

Now, we turn to the administrative matters. And the first report is a report of the Agenda Committee, ably chaired by Mr. A.V. Jones.

A.V., may we have your report, please?

MR. JONES: Thank you, Mr. Chairman.

Ladies and gentlement of the National Petroleum Council, as he stated earlier this morning, Secretary Hodel has requested that the National Petroleum Council advise a recommendation on factors affecting the domestic refining in the 1985-1990 time frame. A copy of his request letter, dated June 20th, 1984, is in the Council member information packets that you have this morning. Additional copies of this request will be made available outside the room following the meeting.

The Secretary requests the Council to update previous Council refining studies and evaluate future refining operation and the industry's ability to meet demand for petroleum products. Specifically, the letter requests the Council to address the following issues: Refining capacity changes reflecting announced refinery closing, various bottlenecks, and additions. Refinery input changes, including projected domestic and imported

crude oil mixes. Refinery flexibility to meet the changes in refined products mix. The projected role of the small regional refineries, and related environmental and regulatory issues.

Pursuant to Section 7-1 of the articles of organization of the Council, this request was referred to the Agenda Committee for consideration as to whether the request is proper, and advisable, and for the Committee to undertake.

In consideration of this request, the Agenda Committeee made the following observations. The Council had conducted a number of refining studies in the past, with the most recent one being completed in 1980. That study, entitled "Refinery Flexibility," was based primarily on 1978 data. Since then there has been a significant change in both the domestic and foreign refining industires.

Mr. Chairman, the Agenda Committee finds that this request was proper and advisable for the Council consideration and recommends that the Council agree to undertake the study of U.S. refining trends.

This is the report of the Agenda Committee. And I move that it be adopted by the membership of the National Petroleum Council.

COUNCIL MEMBER: Second the motion.

CHAIRMAN MOSBACHER: Thank you.

The motion has been made and seconded. Is there any discussion?

(No response.)

CHAIRMAN MOSBACHER: If not, those in favor please signify by saying aye.

(Chorus of ayes.)

CHAIRMAN MOSBACHER: Opposed, no.

(No response.)

CHAIRMAN MOSBACHER: Thank you, A.V.

Now, we move to the report of the Finance Committee, which met yesterday also, and which points up that all of you on this Council support the National Petroleum Council efforts in two ways. One is -- you have heard and seen so eloquently presented -- is the time and efforts of the personnel of the company members and the individual members here. And the other, of course, is the fiscal help which allows these studies to be carried forward.

And our Chairman and Chairman for many years of the Finance Committee, Mr. John Phillips, would you give the report, please?

MR. PHILLIPS: The Finance Committee met yesterday to examine the financial status of the Council. At our meeting, we reviewed the calendar year 1983 financial statements with representatives of Arthur Young and Company, the Council's independent outside auditors.

I'm pleased to report that the financial position of the Council is sound, and the accounting controls and procedures received excellent marks.

We then discussed a revised budget for calendar year 1984. At out last meeting, you approved a budget of one million, nine hundred forty-five thousand dollars, which included funds to complete the two studies which you -- were submitted to you for approval today, to undertake the strategic petroleum reserve study, on which you heard a progress report, and to complete the renovation of the offices.

After reviewing 1984 expenditures to date and looking at projections for the remainder of the year, we are recommending that this budget be reduced by thirty-seven thousand dollars to one million, nine hundred eight thousand dollars.

The Committee also discussed recommended contribution levels for the fiscal year 1984-85. Over the last four years, we have held the contributions at the same level for two years, reduced them two years, ten percent each. This year, we have reluctantly concluded that in light of the uncertainty of the scope of the new study, which A.V. Jones just spoke to you about, as well as the way in which consolidation within our industry may affect our memberships, we must recommend a modest ten percent

increase for the fiscal year 1985.

Accordingly, Mr. Chairman, the Finance Committee recommends that the Council approve a revised calendar year budget for 1984 in the amount of one million, nine hundred eight thousand dollars, the member contributions be increased by ten percent, and that additional expenditures be made from the contingency fund as necessary, that Arthur Young and Company continue as our financial, independent, public accountants for the examination of the 1984 financial statements, and I so move these actions, Mr. Chairman.

COUNCIL MEMBER: Second.

CHAIRMAN MOSBACHER: Thank you.

The motion has been made and seconded. Is there any further discussion?

(No response.)

CHAIRMAN MOSBACHER: Those in favor please signify by saying aye.

(Chorus of ayes.)

CHAIRMAN MOSBACHER: Opposed, nay.

(No response.)

CHAIRMAN MOSBACHER: Thank you, John, for your continuing good work as Chairman of this Committee, and thank you, each and every one, for your agreement to continue support of the National Petroleum Council.

We now have the report of the Nominating Committee. Its Chairman is here, Mr. Bob Anderson.

Bob, may we have your report, please, sir?

MR. ANDERSON: Mr. Secretary, members of the Council, the Nominating Committee of the National Petroleum Council met yesterday and agreed on the following nominations for officers, and Chairman, and members of the Agenda and Appointment Committees of the Council.

In view of his distinguished service, we are recommending Robert A. Mosbacher to be reelected as Chairman, and Ralph Bailey, his very able Vice Chairman, also for reelection.

For the Agenda Committee, we nominate the following: Bill Carl, John Carvey, Collis Chanderl, Ed Cox, Cliff Garvin, Fred Hartley, John McKinley, Charley Murphy, Dick O'Shields, and Al Whitehouse, with A.V. Jones serving as Chairman.

For the Appointment Committee, we nominate the following: Red Burtis, David Dorn, Jim Emison, Fred Hamilton, John Haun, Jim E. Lee, Sid Petersen, Boone Pickens, and Don Simmons, with Harold Hoopman serving as Chairman.

Mr. Chairman, this completes the report of the Nominating Committee. And I move that the Council elect the foregoing slate for 1984.

CHAIRMAN MOSBACHER: And thank you, Mr. Anderson, for your support and continued good work, and promise to double both Mr. Bailey's and my salary this year --

MR. ANDERSON: We will.

CHAIRMAN MOSBACHER: And I speak for both of us when we accept with alacrity and appreciate the confidence. Thank you, sir.

Is their a second to the motion?

COUNCIL MEMBER: Second.

CHAIRMAN MOSBACHER: Any discussion?

(No response.)

CHAIRMAN MOSBACHER: Well, if there are no nominations from the floor, we will now vote. Those in favor please signify by saying aye.

(Chorus of ayes.)

CHAIRMAN MOSBACHER: Opposed, nay.

(No response.)

MR. ANDERSON: Congratulations.

CHAIRMAN MOSBACHER: Thank you. Thank you, sir. Thank you.

(Applause.)

CHAIRMAN MOSBACHER: Now, is there any further business that any member would like to bring before the Council?

(No response.)

CHAIRMAN MOSBACHER: If not, we bring to a conclusion this 87th meeting. And if there is a motion for adjournment, we would entertain that.

COUNCIL MEMBER: So moved.

COUNCIL MEMBER: Second.

CHAIRMAN MOSBACHER: All in favor.

(Chorus of ayes.)

CHAIRMAN MOSBACHER: Opposed?

(No response.)

CHAIRMAN MOSBACHER: Thank you very much. We stand adjourned.

(Whereupon,

the meeting was adjourned at 1:15 p.m.)

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C E R T I F I C A T E

This is to certify that the foregoing transcript

In the matter of: National Petroleum Council

Before: Dept. of Energy

Date: June 21, 1984

Place: Corcoran Ballroom
Four Seasons Hotel
2800 Pennsylvania Ave., N.W.
Washington, D.C.

represents the full and complete proceedings of the aforementioned matter, as reported and reduced to typewriting.

CHIP GREENWOOD