

DOCUMENT RESUME

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[Analysis of Domestic Oil Production Possibilities for Meeting National Energy Goals]. EMD-78-5; E-178205. October 14, 1977. 2 pp. + 2 enclosures (6 pp.).

Report to the Congress; by Elmer B. Staats, Comptroller General.

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One of the goals of the Administration's National Energy Plan (NEP) was to reduce oil imports to 6 million barrels per day (MMB/D) by 1985. In a previous report, GAO concluded that oil imports would more likely be about 10.3 MMB/D in 1985 because of overly optimistic Administration projections of energy supplies from other sources. The Administration also projected 10.6 MMB/D for domestic oil production.

Findings/Conclusions: Analysis of domestic oil production possibilities indicates that an estimate in the range of 8 to 9 MMB/D seems more realistic than the Administration estimate. In spite of the beginning of petroleum output from Prudhoe Bay, Alaska, most of the U.S. output by 1985 will come from the lower 48 States. The NEP estimate that 8.6 MMB/D will come from the lower States would require finding new fields at almost twice the rate ever experienced since 1946. Since 1973, additions to reserves have fallen steadily and this trend will probably not soon be reversed. The level of production estimated by GAO would result in a shortfall of from 1.6 to 2.6 MMB/D which would mean that up to 12.9 MMB/D would have to be imported to meet domestic demand. Although the overall objectives of NEP are desirable, the specific program goals are unrealistic. Recommendations: Congress should focus the energy debate on national energy goals and the strategy to achieve them. After an assessment of our energy future and its options, the Congress could establish realistic goals and enact programs to meet them, establishing milestones to assess progress. Standby measures should also be adopted for use if satisfactory progress is not indicated. (HTW)

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COMPTROLLER GENERAL OF THE UNITED STATES  
WASHINGTON, D.C. 20548

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B-178205

To the President of the Senate and the  
Speaker of the House of Representatives

In July we issued a report which included our observations on the Administration's National Energy Plan (EMD-77-48; 7/25/77). That report compared the specific initiatives in the National Energy Plan with the conclusions and findings of previous GAO work on related issues.

One of our observations at that time was that the Plan, as designed by the Administration, was not strong enough to meet the Administration's proposed National Energy Goals. We felt that it was incongruous to submit a plan which is not designed to meet stated goals. We agreed with the concept of establishing such goals and recommended that the Congress not only approve a set of clearly defined National Energy Goals, but that it approve a program which is designed to meet those goals. Obviously, such a program would not only need to contain stronger measures than proposed by the Administration, but would also need to contain milestones in order to chart progress towards the goals, as well as standby measures in the event that satisfactory progress is not being made.

For example, one of the Administration's goals was to reduce oil imports to 6 million barrels per day (MMB/D) by 1985. We concluded in our July report that oil imports would more likely be about 10.3 MMB/D in 1985 because of what we believe to be overly optimistic Administration projections of energy supplies from other sources, particularly coal. We did not take issue with the Administration's projections for domestic oil production of 10.6 MMB/D in our July report, except to note that it appeared to be on the high side. We have now done additional analysis on domestic oil production possibilities and have concluded that crude oil production in the range of 8 to 9 MMB/D is a more realistic estimate.

Future oil production estimates are, of course, open to considerable speculation and there is no "right" estimate. However, we believe that our analysis demonstrates that production above 8-9 MMB/D is sufficiently unlikely that it should not be used for National planning purposes. A summary of the analysis supporting our conclusion is in Attachment I. This means that oil imports are more

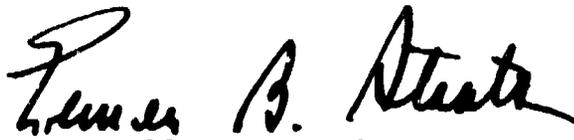
likely to be in the range of 12-13 MMB/D by 1985 instead of the 6 MMB/D which is the Administration's goal. These figures are outlined more clearly in Attachment II.

### National Energy Goals

The Congress has taken some specific steps in dealing with the energy problem and has passed significant energy legislation in 1974, 1975, and 1976. It is about to pass even more significant legislation in 1977. However, we urge that the Congress focus the energy debate on the national energy goals and an overall strategy to achieve those goals. The debate should focus on the questions of how much energy should be consumed in the future, in what form, and where it will come from. The related economic, environmental, international and social implications should be analyzed. The appropriate time schedule should be addressed in relation to how long we can expect to be relying on insecure imports, the burning of coal, and using conventional nuclear power before we will be moving to a renewable energy base.

After such an assessment of our energy future and its options, the Congress could then establish realistic national energy goals. It could also enact additional programs which may be necessary in order to meet those goals. It is also important that milestones be established so that it is clear, over time, whether we are making satisfactory progress toward meeting those goals. We also urge the adoption of a set of standby measures which might have to be used if the milestones indicate that we are not making satisfactory progress toward the goals. The existence of a well-publicized set of stand-by strategies could be helpful in strengthening the programs already in operation.

The overall objectives, which were presented in the National Energy Plan, make sense to us. The more specific program goals in the Plan, as reproduced on page 12 of H.R. 8444, however, seem highly unrealistic in the light of our continuing analysis. Further, the program which is emerging appears to us to be incapable of achieving them.

  
Comptroller General  
of the United States

## ATTACHMENT I

### Oil Production Estimates

Despite the beginning of petroleum output from Prudhoe Bay, Alaska, the preponderant share of U.S. output by 1985 will come from the lower 48 states. The National Energy Plan (NEP) estimates that total domestic petroleum output in 1985 will be 10.6 million barrels of oil (MMB/D) a day, of which about 8.6 MMB/D a day will be from the lower 48 states. However, our analysis shows that such a lower 48 states output in 1985 would require finding new fields at almost twice the rate we have ever experienced since 1946. Based on this past experience we have serious doubts whether domestic output in 1985 can achieve a level as called for in NEP.

Domestic crude output is strongly linked to reserve levels. During the 1950's and 1960's, when the Nation experienced increasing crude output, there were large additions made to reserves. Between 1955 and 1960 crude reserve additions in the lower 48 states averaged 2.9 billion barrels a year, and from 1961 to 1966 they averaged 2.6 billion barrels a year. During these periods, reserve additions generally exceeded production.

However, since 1967, reserve additions have been less than production. As a result lower 48 crude output continued to increase only until 1970 when it peaked at 3.2 billion barrels. In 1976 it had fallen to 2.8 billion barrels, a decline of 2.2 percent a year.

Since 1971, lower 48 reserve additions have averaged only 1.7 billion barrels a year. In fact, since 1973 reserve additions have steadily fallen from 2.1 billion barrels (1973) to 1.3 billion barrels (1976). These reserve additions, particularly since 1973, indicate that it would be problematic that the downward trend in lower 48 production could be soon reversed.

Reserve additions are comprised of 4 components: revisions and extensions to existing reserves, new finds in existing fields and new finds in new fields. The average reserve additions for selected periods from 1946 through 1976 are shown on the following page.

Lower 48 Crude Reserve Additions  
(Average per year in billions of barrels)

<u>Period</u>	<u>Revisions</u>	<u>Extensions</u>	<u>New Finds</u>		<u>Total</u>
			<u>New Fields</u>	<u>Old Fields</u>	
1946 - 1954	1.1	1.5		.5 a/	3.1
1955 - 1960	.9	1.6	.2	.2	2.9
1961 - 1966	1.2	1.0	.1	.2	2.6
1967 - 1970	1.6	.7	.1	.2	2.6
1971 - 1976	1.1	.4	.1	.1	1.7

a/Data not available separately for new fields and old.

Source: American Petroleum Institute

The table shows that the major source of the decrease in total reserve additions is the steep decline in extensions, which over the 30-year period from 1946 to 1976 have declined from 1.5 billion barrels to .4 billion barrels.

Revisions have shown a small rise (.9 to 1.1) from the late 1950's to 1971-76. This rise is due in large part to an increasing use of secondary and tertiary (enhanced) recovery methods in oil production. However, a recent study by the Office of Technology Assessment indicated that the contribution of enhanced recovery may be at a maximum and more probably about to decline unless there are some technological breakthroughs and much higher prices paid for such oil. This possible reduction in enhanced recovery is borne out by the fact that from 1973 to 1976 there have been steep declines in revisions (from 1.6 to .7 billion barrels).

New finds, both in existing and new fields, have exhibited a similar decline; however, their share of total reserve additions has only averaged about 14 percent since 1946. Thus, even if the United States were to return to its best period of new finds, (1946 to 1954) this would only add about an additional .3 billion barrels to the current level of lower 48 reserve additions.

Because the major source of the decline in U.S. reserve additions has come in revisions and extensions to existing reserves, and since our current reserve inventory is low,

any increase in lower 48 reserve additions must come as a result of new finds. Our analysis indicates that only if many new large fields on the order of 1 billion barrels or more of cumulative productive capacity were found, could new finds be expected to be able to reverse or slow the decline in U.S. production over the next 10 years. Since 1945 only one field with cumulative productive capacity greater than 1 billion barrels has been found in the lower 48 states, the Kelly-Snyder field, Texas in 1948.

We conclude that a reasonable base planning estimate would be that new reserve additions would continue to average .2 billion barrels a year as they have from 1971 to 1976. While new initiatives such as enhanced Outer Continental Shelf leasing and higher prices might serve to increase the rate of new finds, we do not believe it would be prudent to plan on these new finds exceeding .5 billion barrels a year, the highest sustained level of new finds which the Nation has experienced since 1946. Only if very large fields were discovered could higher levels be attained and we believe this is too uncertain for planning purposes.

Extensions to existing reserves are a function of previous discoveries, and in the absence of increased new discoveries of some size, we believe that the 1971 to 1976 average of .4 billion barrels would be a reasonable planning base for extension reserve additions. If it were possible to raise new finds to .5 billion barrels a year and there were at least one new field of 1 billion barrels or more in those new finds, then it might be possible to raise extensions to an average of 1.0 billion barrels a year--which would be the same level as achieved in 1961 to 1966. We do not believe it is reasonable to assume any higher levels of extensions because previous higher levels of extensions drew from an inventory of many billion barrel plus fields.

From 1971 to 1976 revisions averaged 1.1 billion barrels a year, but in 1975 and 1976 they have averaged slightly less than .7 billion barrels a year. Because of the increasing uncertainty in enhanced recovery contributions to reserve revisions, we believe that .7 billion barrels a year represents a prudent baseline estimate. We believe that only in the event of higher prices and technological breakthroughs in enhanced recovery could revisions return to a level of 1.1 billion barrels, the 1971 to 1976 average. We believe that a maximum level for revisions would be 1.1 billion barrels.

Our analysis indicates that lower 48 annual reserve additions between 1977 and 1985 will average between 1.3

and 2.6 billion barrels, with the higher level representing what we believe to be the reasonable physical limit. Crude output in 1985 is based on the assumption that lower 48 reserves remain at a level 7.7 times annual output.

Lease condensate production will fall according to the rate of crude decline, and natural gas liquids from processing plants according to the rate of natural gas production decline. In the lower case, Alaskan production is assumed to be 1.7 million barrels a day of which .2 million are from South Alaska; if the Trans-Alaskan pipeline operated at its maximum capacity production from Alaska could be increased to 2.2 MMB/D.

The levels of domestic petroleum production are summarized below for a base-line planning estimate (1.3 billion barrels of reserve additions) and a reasonable upper limit (2.6 billion barrels of reserve additions).

	Production Levels in MMB/D with reserve additions of:	
	<u>1.3 billion barrels</u>	<u>2.6 billion barrels</u>
<u>Lower 48</u>		
Crude	4.6	6.9
Lease condensate	.2	.3
Natural Gas liquids	1.0	1.2
<u>Alaska</u>		
Crude	1.7	2.2
Lease condensate	.1	.1
Natural Gas liquids	<u>.2</u>	<u>.2</u>
Total MMB/D	<u>7.8</u>	<u>10.9</u>

The NEP estimate of 10.6 MMB/D in 1985 is almost at the most optimistic end of the spectrum. We believe that a prudent planning estimate would be that 1985 production will be in the range of 8 to 9 MMB/D. This level of production would result in a shortfall in the level of domestic

production of from 1.6 to 2.6 MMB/D. As discussed above, this would mean that up to 12.9 MMB/D would have to be imported to meet domestic demand.

ATTACHMENT II

Estimated Oil Imports  
1985

	<u>MMB/D</u>
--Administration's goal for oil imports in 1985	6.0
--Administration's estimate of reduction due to voluntary actions	+1.0
--Our estimate of additional imports required to compensate for lower amounts of domestic production for: <u>1/</u>	
--coal	+2.3
--natural gas	+1.0
--nuclear power	+ .6
--Our estimate of reduced oil imports as a result of higher imports of liquefied natural gas <u>1/</u>	<u>- .6</u>
Sub-total; oil imports estimated in our July report	10.3
--Estimated Shortfall in domestic oil production	+1.6 to +2.6
Total estimated imports	<u>11.9 to 12.9</u>

1/ See GAO Report EMD-77-48 for details.