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BY THE COMPTROLLER GENERAL



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# Report To The Congress

OF THE UNITED STATES

*W. H. 78*

## Natural Gas Reserves Estimates: A Good Federal Program Emerging, But Problems And Duplications Persist

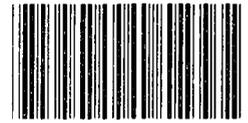
The Department of Energy is developing a national program to collect estimates of natural gas reserves to meet various Government information needs. GAO believes the approach being used is appropriate because it proposes to collect the estimates from operators-- those having the best knowledge of the reserves--and to use Federal personnel to verify the information through annual audits of the reports received.

However, GAO doubts that all the data to be collected are needed to fulfill Government functions. Also, a pilot test of the survey form is not planned and a strong validation program must still be developed.

Two other major, but less comprehensive, programs by the Federal Energy Regulatory Commission and the U.S. Geological Survey are duplicative and should be cancelled.

*AGC01452*  
*AGC00215*

A companion report, issued concurrently entitled "Policy Needed to Guide Natural Gas Regulation on Federal Lands" (EMD-78-86), reviews Federal regulation of the exploration, development, and production of natural gas in the Federal domain of the Gulf of Mexico Outer Continental Shelf.



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EMD-78-68

JUNE 15, 1979



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

B-178205

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

This report discusses improvements needed in the Government's efforts to estimate the Nation's natural gas reserves. We made this review in response to a request by 30 members of Congress, but because of general interest in this area, we are supplying this report to the whole Congress.

We made our review pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53); section 207 of the Department of Energy Organization Act (P.L. 95-91, 91 Stat. 565 (1977)); and title V of the Energy Policy and Conservation Act, 1975 (42 U.S.C. 6201).

Copies of this report are being sent to the Director, Office of Management and Budget; the Secretary of Energy; the Secretary of the Interior; and the Chairman, Federal Energy Regulatory Commission.

A handwritten signature in black ink, reading "James A. Stacks".

Comptroller General  
of the United States

COMPTROLLER GENERAL'S  
REPORT TO THE CONGRESS

NATURAL GAS RESERVES ESTIMATES:  
A GOOD FEDERAL PROGRAM EMERGING,  
BUT PROBLEMS AND DUPLICATIONS  
PERSIST

D I G E S T

The Government relies on the natural gas reserves estimates published annually by an industry trade association but the credibility of these estimates has been challenged in recent years because the data could not be independently verified. The Energy Information Administration, ~~Department of Energy~~, is developing a program with an appropriate and comprehensive approach to collect these estimates.

However, further development and improvement in the program is needed. Also, several partially duplicative Federal programs have not been ended.

Natural gas furnishes over one-fourth of all the energy the Nation uses, but industry statistics indicate that the reserves in the 48 States, with the exception of Alaska and Hawaii, have steadily declined since 1968. The Government needs estimates of gas supplies to perform various functions and to use as a basis for policy decisions.

A REASONABLE PROGRAM IS EMERGING  
BUT SOME PROBLEMS ARE NOT RESOLVED

The Energy Information Administration's program will collect national estimates of reserves and related data for natural gas, crude oil, and natural gas liquids. The approach is to obtain the information from those who have the best knowledge of the reserves--all oil and gas operators of leases on public and private lands, both onshore and off. Federal personnel would be used to verify the information by annual audits of a sample of the reports received.

However, GAO doubts that all of the data to be collected, particularly information on individual reservoirs, are needed at the time the forms are filed to fulfill Government functions. A pilot test of the survey form is not planned, and a strong data validation program must still be developed. (See pp. 13 to 27.)

#### DUPLICATIVE PROGRAMS STILL EXIST

The Energy Information Administration program was supposed to supersede duplicative Government programs, but two programs are underway which are duplicative but less comprehensive. The U.S. Geological Survey program will collect information only on leases on the Outer Continental Shelf. The Federal Energy Regulatory Commission program will collect information only on natural gas and not from companies operating exclusively in the intrastate markets. (See p. 27.)

The Commission has collected data for 1976, but the program has been suspended and is to be cancelled when the Energy Information Administration's program is fully implemented. (See pp. 27 to 29.)

The U.S. Geological Survey established its Program in 1974 to compile an inventory of oil and gas reserves on the Outer Continental Shelf. The initial inventory is to be completed in fiscal year 1979 at an estimated cost of over \$9 million. Yet, GAO found these estimates will be outdated except for those most recently completed. The Program would be continued to update the estimates each year after 1979 at a cost of about \$1.5 million per year. The Program should be ended; the one being planned by the Energy Information Administration should provide estimates of oil and natural gas reserves on the Outer Continental Shelf on a more current basis, and at a lower cost. (See pp. 29 to 39.) The U.S. Geological Survey personnel released from this program could be used to support

the Energy Information Administration program by participating in the data validation activity.

GAO fully recognizes that the Department of Interior has bona fide needs for geological and engineering data and for maps, reservoir data, and reserves estimates to carry out its responsibilities. The real question is the extent to which Interior needs to make its own independent interpretations and analyses of the raw data generated by the lease operators. GAO has concluded that Interior does have legitimate needs for such data, but not always independently prepared by Interior.

MEETING RECENT LEGISLATIVE REQUIREMENTS  
INVOLVING GOVERNMENT RESERVES ESTIMATES

The Outer Continental Shelf Lands Act Amendments of 1978 require the Secretary of the <sup>Department</sup> Interior to (1) investigate trade associations' natural gas reserves estimates on the Outer Continental Shelf and (2) provide estimates of oil and natural gas reserves to States and local governments affected by production from the Shelf. These requirements should not be used as support for a duplicative reserves estimation program, but should be met through use of the reserves estimates collected under the Energy Information Administration program. (See pp. 41 to 42.)

RECOMMENDATIONS

The Secretary of Energy should direct the Administrator, Energy Information Administration to

- (1) --Document whether all the data to be collected under the oil and gas reserves information program are needed to fulfill Government responsibilities. The potential users should be required to provide written justification for obtaining any data questioned. GAO believes that data needed on individual reservoirs can be obtained during visits to companies selected for data validation audits.

- 2) --Conduct a pilot test of the data collection form.
- 3) --Emphasize the development of a strong validation program to make sure that the data collected are accurate and complete. (See p. 46.)

In addition:

- ~~4) The Federal Energy Regulatory Commission should advise the Energy Information Administration that it does not require that the Energy Information Administration program collect data on individual reservoirs. (See p. 47.)~~
- ~~5) The Secretary of the Interior should meet the requirements for reserves estimates of oil and natural gas, contained in the Outer Continental Shelf Lands Act Amendments of 1978, through use of the reserves estimates collected by the Energy Information Administration program. (See p. 47.)~~
- ~~6) The President should eliminate the staff positions authorized for the U.S. Geological Survey's Reserves Inventory Program and add to the Energy Information Administration program the number of positions needed to fully staff its validation program. (See p. 47.)~~
- ~~7) The Congress should not appropriate any additional funds for the Reserves Inventory Program of the U.S. Geological Survey. (See p. 47.)~~

#### AGENCY COMMENTS

The Department of Energy stated that the Federal Energy Regulatory Commission was also providing comments on GAO's proposed report, as GAO requested, but none were received.

The only comments received were those of Commission staff who clearly emphasized that their comments should not be construed as representing the views of the

Commission itself or any member thereof.  
(See p. 45.)

Energy disagreed with GAO's recommendation that operators be allowed to report the combined total of the reserves estimates of all reservoirs which are in a single field. GAO believes the most accurate reserves estimates are those made reservoir-by-reservoir; however, GAO found no reason to require that the estimates for each individual reservoir be reported in a national reserves inventory program. The individual reservoir estimates are available to the Government upon request during its audits of the operators. (See pp. 45 to 46.)

Energy said that experience with previous programs obviates the need for a pilot test of the proposed Energy Information Administration form because it is so similar to the forms previously used. GAO believes there are sufficient dissimilarities to warrant pilot testing. (See pp. 22 to 23.)

Energy also said that the Energy Information Administration form would replace the Federal Energy Regulatory Commission program if litigatory delays appear remote and if the Energy Information Administration form was approved. (See p. 28.) GAO believes the Energy Information Administration program is the most appropriate and that all Government efforts should be directed toward strengthening and implementing it and that other duplicative and less desirable programs should be eliminated. (See pp. 27 to 39.)

Energy agreed that the Reserves Inventory Program should be dropped because elements of it duplicate the Energy Information Administration program, and that the personnel released from the program should be used in the Energy Information Administration program. (See p. 40.)

Interior took strong exception to GAO's proposed report, saying that its Oil and Gas Reserves Inventory Program provides indispensable information necessary to

carry out its evaluation and regulatory functions. Interior also said that the termination of that program would have a serious impact on those evaluation and regulatory functions and that the Energy Information Administration program will not provide the technical information and support required. Interior agreed to conduct the validation of offshore field reserves for the Energy Information Administration program.

GAO believes that Interior has (1) overstated the need for its Reserves Inventory Program, particularly the evaluation and regulatory functions it would support and (2) understated the amount and value of the data available from lessees and their operators, from existing U.S. Geological Survey files, and from the Energy Information Administration program. In short, the program could be eliminated without affecting Interior's ability to meet its evaluation and regulatory responsibilities. (See pp. 35 to 39.)

#### COMPANY COMMENTS

The five companies named in this report submitted comments, saying that the technical information GAO used relating to their leases was factually correct, except for two minor clarifications, which have been included in this report. (See p. 45.)

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#### ABBREVIATIONS

AGA	American Gas Association
Bcf	Billion cubic feet
DOE	Department of Energy
DOI	Department of the Interior
EIA	Energy Information Administration
ERDA	Energy Research and Development Admini- stration
FEA	Federal Energy Administration
FERC	Federal Energy Regulatory Commission
FPC	Federal Power Commission
FTC	Federal Trade Commission
GAO	General Accounting Office
OCS	Outer Continental Shelf
OMB	Office of Management and Budget
SEC	Securities and Exchange Commission
Tcf	Trillion cubic feet
USGS	United States Geological Survey

## CHAPTER 1

### INTRODUCTION

Thirty members of the U.S. House of Representatives, primarily from the Northwestern United States, requested the U.S. General Accounting Office (GAO) to inquire into various interstate natural gas issues. Because of the complexities of the issues, we are issuing two reports in response to the request. This report reviews the Government's efforts to obtain credible estimates of the Nation's natural gas reserves.

Natural gas is an important fuel source for the Nation, supplying over one-fourth of the total energy we use, but recent winter shortages of this fuel have made the adequacy of natural gas supplies a serious Federal concern. Further, industry statistics indicate that the reserves of natural gas in the lower 48 States have steadily declined since 1968. This pattern of declining reserves has influenced many energy policy issues, including gas pricing, the importation of liquefied natural gas, and the search for supplemental gas supplies.

A recurring issue being debated is the validity of the reserves figures developed by the natural gas industry. Although these data are not verified by the Government, numerous Federal agencies rely on them because no other comprehensive data exist.

Reserves are part of the broader category of resources. Resources are concentrations of naturally occurring solid, liquid, or gaseous materials in or on the earth's crust in such form that economic extraction of a commodity is currently or potentially feasible. A resource is either identified or undiscovered. An identified resource is a specific accumulation of economic resources whose quality and quantity are estimated from geologic evidence supported, in part, by engineering measurements. An undiscovered resource is a quantity of a resource estimated to exist outside of known fields on the basis of broad geologic knowledge and theory.

A reserve is defined as that portion of an identified resource which can be economically extracted. A critical element in estimating a reserve is economics (the cost to extract the fuel and the market price of the fuel).

The increasing importance of the reserves estimates to Government decisions and recent controversies over the credibility of the industry data have led to a consensus that the

estimates should be prepared by the Government. As a result, two major one-time reserves surveys were conducted by Federal agencies. Further, an annual survey is being conducted by the Federal Energy Regulatory Commission (FERC) and an annual survey is being planned by the Energy Information Administration (EIA), both components of the Department of Energy (DOE).

These similar efforts have led to two charges: a duplication of effort and excessive burden on industry. There is disagreement, as well, on how reserves estimates should be prepared and what information should be gathered. Unresolved questions are:

- What are the Government's needs for reserves estimates and which agency or agencies should collect them?
- Should the Government collect its own raw data?
- Should the Government independently prepare the estimates or rely on company estimates?
- Should the Government collect the data from the owners or the operators of leases?
- What specific data should be collected?

#### AMERICAN GAS ASSOCIATION ESTIMATES

The major source of natural gas reserves estimates is the American Gas Association (AGA), a trade association of natural gas production, transmission, and distribution companies. AGA, jointly with the American Petroleum Institute, annually publishes a report entitled "Reserves of Crude Oil, Natural Gas Liquids, and Natural Gas in the United States and Canada and United States Productive Capacity," referred to as the "Blue Book."

The Blue Book provides detailed reserves information by State and year of discovery and indicates annual changes in reserves due to production, discoveries of new fields or reservoirs, 1/ and revisions of earlier estimates. It also provides estimates of ultimate recovery.

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1/A reservoir is the smallest single discrete accumulation of oil or natural gas. A field is a combination of reservoirs which share a common underground rock formation.

AGA's contribution to the Blue Book is the work of its Committee on Natural Gas Reserves, which is composed of industry geologists and petroleum engineers knowledgeable about particular geographical areas. Individuals are assigned specific natural gas fields and obtain information from companies and other sources. Sometimes company information is confidential and may not be made available, in which case the Committee relies on other data which may not be as current or accurate. The field estimates are aggregated by State or region for Blue Book publication.

AGA's data and methodology have been criticized for various reasons, including:

- Inadequate procedures and guidelines to ensure consistency of assumptions used to calculate reserves.
- Lack of access to raw data needed to prepare reasonably sound estimates.
- Lack of a provision for or possibility of audit of reserve estimates submitted by the Committee members.
- Potential conflict of interest because the estimates could affect the gas price received by the companies employing some Committee members.

However, two major reserves studies were performed in this decade by Federal agencies, one by the Federal Energy Administration (FEA) and one by the Federal Power Commission (FPC). Although they also were controversial, the total estimates of both were reasonably close to AGA's corresponding figures, within 3 percent and 10 percent respectively. AGA does not publish field totals, so comparisons at that level with the FEA and FPC studies were not performed.

In the face of continuing controversy and increasing workload, AGA has planned to discontinue its reserves estimation efforts if the Government develops a suitable replacement. AGA would allow a few years of overlap to check the consistency of the two systems.

#### FEDERAL ESTIMATES AND AUTHORITIES

Several Federal agencies--primarily FEA; FPC; and the U.S. Geological Survey (USGS), Department of the Interior (DOI)--have had authority to collect natural gas reserves

estimates in carrying out their responsibilities. The functions of FEA and FPC have since been transferred to DOE. Details regarding these agencies' activities in reserves estimates are given below.

### Federal Energy Administration

FEA was created as a temporary agency, primarily to manage short-term fuel shortages, but became the major energy information clearinghouse of the Government. The FEA Administrator had broad powers to collect and verify information deemed necessary from all persons engaged in any phase of energy supply or major energy consumption. The Administrator was required to prepare reports on the Nation's oil and natural gas reserves and resources.

The Congress indicated an intent to consolidate many energy information responsibilities in FEA. The Energy Conservation and Production Act, approved August 14, 1976 (42 U.S.C 6801), established in FEA an Office of Energy Information and Analysis to coordinate all Federal energy data collection and analysis activities.

The FEA Act of 1974 directed FEA to submit to the President and the Congress a complete and independent analysis of actual oil and gas reserves and resources in the United States and its Outer Continental Shelf (OCS). FEA encountered various difficulties, including short time frames and manpower and funding limitations. Consequently, a complete and independent analysis was not possible and, instead, a survey was conducted of the oil and gas field operators requesting their estimates of the reserves on the properties they operated. Independent engineering studies were conducted of 60 major fields to provide a check on survey results.

The FEA survey, issued in 1975, estimated there were 240.2 trillion cubic feet (Tcf) of domestic natural gas reserves, 3 percent more than AGA's figure of 233.2 Tcf. FEA concluded this variance was to be expected when comparing estimates from different sources. FEA also compared the field estimates made by its engineering teams with the estimates submitted by the operators of the particular fields and found differences of more than 20 percent in 34 out of 60 fields. In many cases, FEA could not explain the reason for the discrepancies. Both sets of figures, incidentally, are distinct from the AGA field estimates, which are not published and were not compared.

The credibility of the FEA survey was challenged for various reasons, including

- an emphasis on older, producing fields although new fields might have been more likely to contain unreported reserves and
- a lack of independence, because of a reliance on responses from operators and the use of private contractors associated with the industry.

#### Federal Power Commission

The Natural Gas Act of 1938 (P.L. 75-688, June 21, 1938) gave FPC jurisdiction over the interstate sale of natural gas for resale. This jurisdiction was extended to the rates and sales of independent producers selling gas in interstate commerce for resale by the U.S. Supreme Court on June 7, 1945 (Phillips Petroleum Co. vs Wisconsin, 347 U.S.C. 672).

The Natural Gas Act provides authority to require regulated companies to file any reports deemed necessary or appropriate. FPC's authority to collect information on gas reserves is limited to natural gas companies in interstate commerce. Regulated natural gas pipeline companies are required to file an annual report of gas supply which includes estimates of the natural gas reserves they control. These reports, in the aggregate, include about 60 percent of the gas reserves in the lower 48 States.

This reporting requirement does not extend to the reporting of reserves owned by pipelines before they have been dedicated to the interstate market nor to producer data when the reserves are not owned by the pipelines. FPC's definition of proved reserves differs from FEA's and AGA's in that it does not require demonstration of the ability of a reservoir to produce, through actual production or conclusive formation test, in order for the reserves to be considered proved. Therefore, FPC's definition would result in a greater amount of reserves being reported. FPC also obtained estimates of reserves related to specific regulatory actions or investigations, such as pipeline construction certifications.

FPC conducted a Natural Gas Reserves Study in 1972-73 in which engineering teams prepared reserves estimates for year end 1970 for 158 of the approximately 6,400 total gas fields in the country. From these 158 fields, FPC staff

projected a national reserves total of 258.6 Tcf, 9.8 percent less than AGA's year end 1970 estimate. This study was criticized for its statistical techniques and its concentration on older, larger fields.

On February 25, 1975, FPC began requiring a second annual report on natural gas reserves entitled "Natural Gas Companies Annual Report of Proved Domestic Gas Reserves." Owners engaged in interstate commerce are required to file the report. Data elements included the amount of reserves in every reservoir owned, commitment status of the gas, and whether and why a reservoir might be shut-in.

#### Other agencies

Various other agencies collect reserves estimates. The major one is USGS, which obtains extensive data on the oil and gas fields on leases on Federal lands, including reserves estimates. In addition, USGS is currently estimating reserves in the Gulf of Mexico's OCS using basic data available to it.

The Federal Trade Commission (FTC) and the Securities and Exchange Commission (SEC) are concerned with the ownership of reserves. FTC regulates trade practices on a continuing basis to maintain free competition and to prevent unfair trade practices. FTC does not periodically collect gas reserves data, although it is currently collecting such data under two ad hoc collection activities.

SEC requires issuers of securities for public sale to file registration statements to inform the investing public. These statements contain financial and other data, including information on gas reserves owned. SEC only requires companies to report a total figure for all their domestic reserves.

#### Department of Energy

On October 1, 1977, FEA, Energy Research and Development Administration (ERDA), and FPC were abolished and their functions were transferred to the Department of Energy, established that day by an Executive order of the President, under the authority of the Department of Energy Organization Act of 1977 (42 U.S.C. 7101). The FEA functions we examined were transferred to DOE's EIA, and most FPC functions were transferred to FERC, an independent organization within DOE. Consequently, many of the ongoing reserve estimation activities are in a state of change in the new Department.

When we discuss an agency in this report, we will refer to it by the old or new name depending on which was appropriate when our information was gathered.

#### PRIOR GAO REPORTS

In our report, "Domestic Energy Resource and Reserve Estimates--Uses, Limitations, and Needed Data" (EMD-77-6, issued Mar. 17, 1977), we discussed the need for improving energy reserves estimates generally for the purposes of Federal lands management and energy policy formulation. Specifically, we recommended that oil and gas estimates be updated regularly and include the effects of cost-price relationships. We also recommended determination of the ownership and/or control over domestic energy fuels by major companies.

In our report, "Actions Needed to Improve Federal Efforts in Collecting, Analyzing, and Reporting Energy Data" (B-178205, issued Feb. 6, 1974), we discussed the need for improvements in energy data collection and analysis. We noted the need for timely, credible data, and recommended a complete study of the needs of data users be conducted which might help reduce Government collection efforts. Such a study would determine the data needs for energy planning and decisionmaking and answer such questions as

- what data are needed,
- who needs the data, and
- how detailed the data should be.

In our report, "Review of the Information-Gathering Practices of the Federal Energy Administration" (OSP-76-18, issued May 11, 1976), we noted that a key role of FEA was to provide the Nation with the information needed to make sound energy policy decisions. We stated that since the oil embargo many other Federal agencies were increasing their collection of data from the energy industry and emphasized that it was important that agencies:

- Insure that data being sought are actually needed for a specific agency function.
- Search other data sources for usable data already being obtained that might serve the stated need.
- Compare the value of the data sought against the burden it will place on respondents.

--Assess periodically the effectiveness of the information-gathering process.

We also stated that FEA should field test its proposed data collection systems, requiring a sample of respondents to actually complete the survey forms.

In commenting on our draft report, FEA proposed several steps including (1) the expansion of field testing procedures, (2) the advance publication in the Federal Register of proposed data collection efforts, and (3) making forms clearance a responsibility of an Assistant Administrator.

A report by the Professional Audit Review Team entitled "Activities of the Office of Energy Information and Analysis, Federal Energy Administration" (issued Dec. 5, 1977), addressed some of the issues included in our report. In its report, the team, which included representatives from several Government agencies, reported that there were several deficiencies in the energy data collection and analysis activities of the former Office of Energy Information and Analysis. These included: (1) the credibility of energy data should be improved by having the Government verify the data reported by industry through an examination of source documentation maintained by the reporting company, (2) further action was needed to assure that this Office, which gathered and analyzed energy data, was independent of the energy policy function, and (3) the credibility of the Office's forecasting models should be improved through proper documentation, verification, and validation.

In response to the report by the team, the Secretary of Energy, in November 1977, proposed steps to (1) strengthen the data validation function, (2) separate data gathering from policy functions, and (3) use an advisory panel to help monitor the design of data systems.

In our report to the Secretary of Energy entitled, "Improvements Needed in the Department of Energy's Efforts to Develop a Financial Reporting System" (EMD-78-95, July 31, 1978), we discussed problems in DOE's financial energy information reporting system that are similar to problems discussed in this report. In that report we recommended that the Secretary of Energy document the needs and uses of the data in the proposed collection forms and ensure that the data relate directly to the reporting system's objectives.

## CHAPTER 2

### A REASONABLE PROGRAM IS EMERGING, BUT SOME PROBLEMS ARE NOT RESOLVED

In recent years there have been several major Federal attempts to estimate natural gas reserves rather than continue to rely on an industry association's estimates as a basis for regulating the price of natural gas and performing other Government functions. The Office of Management and Budget (OMB), FEA, and EIA have all made attempts to devise a coordinated Federal reserves estimation program. EIA is now developing the only program to collect national estimates of reserves and related data for natural gas, crude oil, and natural gas liquids. It would supersede several duplicative Government programs that are not as comprehensive.

In addition to the obvious benefits of collecting reserves figures independently and eliminating duplicative programs, we believe the approach being used in the new program is appropriate because it proposes to obtain the information from oil and gas operators--those who have the best knowledge of the reserves--and to verify the information by annual audits of a sample of the information reported.

Although this EIA program is a move in the right direction, it does need further development and improvement. In particular,

- we doubt that all the data EIA plans to collect are needed to fulfill Government functions,
- EIA does not intend to conduct a pilot test of its survey form, and
- EIA has not yet developed a strong data validation program.

### RECENT EFFORTS TOWARD A SINGLE GOVERNMENT PROGRAM

In recent years, there have been several major efforts to estimate natural gas reserves, including two national data collection efforts, one addressed to owners, one to operators. In addition, USGS is estimating reserves on Federal lands. Because of these duplicative programs, OMB formed an Ad Hoc Interagency Committee on Oil and Gas Reserves Survey in 1976 to determine whether a coordinated Federal reserves estimation program could

be devised. The Committee was composed of representatives of seven agencies that would be involved in conducting a Federal program or using the reserves estimates, or both.

The major problem discussed by the Committee was whether the reserves survey should collect data from the operators or the owners of the reserves. Most of the agencies favored an operator survey, but FPC, SEC and FTC representatives insisted that data from owners were required for their purposes. However, FTC would need ownership data on an ad hoc basis while SEC would have only a total figure reported from owners.

Another problem was whether data should be collected on a field-level or reservoir-level basis. Only FPC and USGS representatives stated that they needed reservoir-level data.

Yet another problem was that Federal agencies had not been using the same definition of proved reserves. It was agreed that a standard definition was needed. The Committee resolved the problem with a compromise by recommending that two classes of proved reserves be reported. Class A would require that a reservoir be flow-tested to prove that it contained hydrocarbons. Class B proved reserves would include both reserves that had been flow-tested and reserves based upon indirect measurements.

In January 1977, the Committee issued its report in which it recommended that FEA, in cooperation with USGS, conduct an annual survey of operators for reserves estimates by field, with a sampling verification program which would audit all major fields over a 3-year period and smaller fields less frequently. USGS would be responsible for the survey of reserves on Federal lands and would acquire such additional information as it required on individual reservoirs. The Committee did not stipulate what data elements would be collected.

The Committee was unable to devise a means of accommodating FPC's, SEC's and FTC's desire to obtain ownership information and stated that FPC's data collection program would continue unless and until such accommodations were devised. The Committee did not have the authority to require the agencies to resolve their differences and come up with a single survey program.

#### Federal Energy Administration

In April 1977, an FEA official advised us that FEA planned to conduct the annual survey recommended by the OMB Ad Hoc Committee. It was to be similar to the one performed

by FEA in 1975 except that USGS was to collect reservoir data on Federal lands. The proposed budget was \$3.6 million: \$2.2 million for FEA activities and the balance for USGS.

The scope and cost of the FEA survey was later expanded, possibly in response to the Petroleum Production and Reserves Information System proposed in the National Energy Plan. In August 1977, FEA released a draft of the survey form that it would use to collect reserves data from operators, including some information on the operators' holdings, aggregated by State. Two classes of reserves were requested, along the lines of the Ad Hoc Committee's recommendation. New data elements included

- geological data on reserves, similar to data reported by AGA;
- information on the number of non-producing reservoirs in a field and the reasons why; and
- the price used to determine that the reserves were economically feasible to produce.

FEA requested that the total budget for the survey be increased from \$3.6 million to almost \$8 million.

At a public meeting on September 13, 1977, FEA announced its intention to have its form in the hands of respondents by January 1978 for return in April 1978. An industry representative at the meeting suggested that respondents would probably not be able to complete the form for the first time in the 3 months allowed. One reason was that the new definitions would likely be confusing to many operators because they introduced new terminology, such as "semi-proved" (i.e., "Class B") reserves.

FEA did not pilot-test its survey form by having some respondents complete the form with actual data. Rather, a "pre-test worksheet" was sent out on August 26, 1977, which asked for comments on the form. A pilot test would have tested the reporting instructions, the useability of the new form, and the reliability of the data reported. The Commission on Federal Paperwork had earlier recommended a pilot test for a similar form prescribed for the second annual report on natural gas reserves required by FPC.

In response to the pre-test worksheet, the industry and other respondents suggested major revisions in the survey form. Respondents stated that there was a substantial amount of duplication of data collection among the various agencies. Some of the data requested were considered too expensive to

develop, such as semi-proved reserves data and reservoir data on lithology, geological age, and type of entrapment.

### Federal Power Commission

As mentioned previously, on February 25, 1975, FPC began requiring an annual report entitled "Natural Gas Companies Annual Report of Proved Domestic Gas Reserves". (This report requires owners of natural gas in interstate commerce to provide reservoir-level data. Data elements include an estimate of reserves in each reservoir owned, whether the reserves are committed to the interstate market and whether and why a reservoir is shut-in.) The industry challenged the requirements of this report in the case of Union Oil Company, et al., vs. FPC. The Ninth Circuit Court of Appeals issued a stay against this requirement on October 15, 1975.

On June 2, 1976, the court remanded the case to FPC, requiring FPC to justify its regulatory need for the data and to create a record showing that the respondents actually had the data required by Form 40. FPC did this and included the data in Order 526-B issued June 30, 1977, in which FPC required companies to submit the data beginning with 1976 data by November 1, 1977, and for each subsequent year beginning April 1978. On August 26, 1977, FPC granted a rehearing on its order, but did not cancel or extend its submission deadline. (See p. 27 for the current status.)

### Further efforts for a consolidated survey

On September 21, 1977, FEA sent a memo to FPC suggesting a combined survey. FEA and FPC met and FEA decided to delay the implementation of its survey.

On October 1, 1977, FPC and FEA were abolished and their functions transferred to DOE. The FPC functions were, for the most part, assigned to FERC, an independent commission within DOE. The FEA information functions were assigned to EIA.

EIA was given rather broad authority to collect energy data. Among other responsibilities, the Administrator of EIA was "responsible for carrying out a central, comprehensive, and unified energy data and information program."

FERC's information collection authority under the DOE Organization Act appears to be less than was held by FPC. Section 407 of the act transferred to the Secretary of Energy FPC's power to require natural gas companies to file annual reports as FPC had deemed necessary or appropriate.

The act also instructed the Secretary to collect for FERC such information as FERC requested.

The discussions begun by FPC and FEA on combining their surveys were continued by FERC and EIA. FERC chose to continue its data collection, merely delaying the deadline for submitting 1976 data by 1 month to December 1, 1977. Data for 1977 were to be submitted by April 1, 1978. The FERC officials responsible for the form stated that a key reason the data should be collected was that FERC needed the data for its national rate-making function. However, the rate-making proceeding for the current biennium was indefinitely suspended on September 30, 1977. On December 12, 1977, the Project Director, Oil and Gas Information System, was appointed and given responsibility for re-designing the EIA survey.

#### THE EMERGING EIA PROGRAM

By February 1978, the Project Director, Oil and Gas Information System, had developed a proposed comprehensive program to collect annually national estimates of reserves and related data for natural gas, crude oil, and natural gas liquids. The information is to be obtained from oil and natural gas operators, on public and private lands, both onshore and offshore. On February 3, 1978, he requested comments from industry and other Government agencies on a draft form to be used in the program, entitled "Oil and Gas Operators' Annual Report of Proved Reserves and Related Data."

A public hearing was held on May 8, 1978, to again solicit comments from respondents of the proposed form. A representative from the American Petroleum Institute stated that the Institute would stop its reserve estimation efforts as soon as the Government began its own effort.

Company estimates of the cost of completing the EIA form for the first year ranged from \$325,000 to over \$3.4 million, and one company estimated the cost of subsequent reporting at \$200,000 per year.

Many of these companies stated that reporting by reservoir was an unnecessary burden on them. USGS, in written comments to EIA, questioned whether sufficient use would be made of the reservoir data to justify the burden that it would place on both industry and Government for the annual compiling, processing, etc., of the data. Despite these and other comments, only minor changes were made to the proposed form and EIA submitted it, in August 1978, to OMB for clearance. OMB approved the form in December 1978. Summary

information on reserves at year-end and annual domestic production by State and in total are required by March 13, 1979. Reservoir-level data are due May 29, 1979.

The EIA draft form includes many of the data elements collected by the FERC form. It is to supersede the draft survey form FEA proposed in August 1977 and the FERC data collection form.

Of the universe of about 10,000 operators, about 9,000 will report reserves totaled by State or by subdivisions within a State. About 1,000 will be required to report reserves totaled by fields. Those with natural gas production of 10 billion cubic feet (Bcf) or more a year or oil production of 1 million barrels or more a year will have to report reserves for each reservoir. EIA estimates that about 185 operators fall in this last category and that they are responsible for about 85 percent of the annual production.

EIA intends that scientifically selected samples of the data responses and of the reported reservoirs will be audited by teams of Government and/or contractor specialists. However, the audit plans have not been completed.

The Project Director stated that FERC's data collection form will be used to collect calendar year 1976 data and then be retired. FERC had required that calendar year 1977 data also be reported, but the reporting deadline was postponed from April 1, 1978, to September 1, 1978, and was indefinitely postponed on November 22, 1978. Despite these postponements, 81 respondents have submitted the calendar year 1977 data.

#### Further improvements needed in EIA program

Although the EIA program is a move in the right direction because it proposes to obtain the information from oil and gas operators and to verify the data by annual audits, it does need further development and improvement. We believe that in the further development of the program, EIA should give serious consideration to several matters.

We question whether there has been adequate justification and demonstrated need for some of the data to be collected, especially information on individual reservoirs. Also, we believe the program should be pilot-tested to assure that it will efficiently and effectively accomplish its objectives.

In addition, although a reasonable approach is being used to plan audits of collected data, the program for data verification is of prime concern and is now only in the early stages of development.

Questionable justification  
for data to be collected

We believe that before data are collected by the Government, the need for the data should be justified on the basis that they are needed at the time the collection takes place to support a specific authorized Government function. This is especially important when the proposed data collection will impose a substantial burden upon the industry or the Government. We are primarily concerned about the justification for the requirement of reservoir-level reporting by the 185 companies responsible for about 85 percent of the Nation's production of oil and natural gas. FPC expected that it would require only 116 companies in 1974 to report reservoir-level data on the natural gas reserves they owned.

EIA has not prepared a written justification for the data it plans to collect which relates specific data elements to specific governmental functions. We believe such an analysis and justification should be performed and that the recommendations in our previous reports (see pp. 7 and 8) should be followed.

Since EIA failed to do this, we analyzed the major program activities cited by DOE officials as justification for collecting data on individual oil and natural gas reservoirs through the EIA program. These are primarily FERC activities. We concluded that data on individual reservoirs are needed only when the Government is conducting validation audits of companies' reports. We believe the reservoir data necessary for the audit can be obtained from the companies at the time of the audit and need not be collected initially from everyone. FPC has used such a procedure in other audits.

EIA plans to require reservoir-level reporting. The EIA Project Director stated that he had reviewed FERC's asserted needs for reservoir-level data and determined that these needs were sufficient to justify collecting these data. FPC staff, in compliance with a Circuit Court of Appeals remand (see p. 12), had developed a position paper which is the primary documentary justification for the reservoir data it required.

According to the position paper and further information from DOE officials, DOE needs reservoir-level data for the following purposes,

- regulating the well-head price of natural gas,
- regulating contractual delivery obligations,
- determining whether natural gas reserves are committed to the interstate or the intrastate market,
- general information and studies, and
- resource base information.

Our analysis of each of these needs follows.

Pricing regulation--FERC (successor to FPC) sets the national wellhead price for the sale of natural gas to interstate pipeline companies. In its justification for its data collection program, FPC asserted that it needed data from owners on individual reservoirs to set the price.

FPC stated that under its methodology it needs data on new additions to gas reserves, the drilling footage to reach those reserves, and the costs associated with that drilling. FPC asserted that for rate-making purposes, data should be gathered from the owner so FPC can study how individual owners would react to changes in pricing policy.

After the EIA program was proposed, FERC officials informed us that national rates would be developed using data on the operators' gross working interest and aggregated at the State level required by the EIA program. The final FERC calculation would be based, in part, on reserves aggregated at the national level. Therefore, the data on individual reservoirs to be collected by EIA would not be used in FERC rate-setting and cannot be justified on that basis.

FPC asserted that it needed data on individual reservoirs to ensure the data was credible, accurate, and could be audited. This is related to FPC's assertion that it needed reservoir data to allow a sample of the reservoirs to be selected for audit prior to visiting the companies. However, the audits in a given year will not cover all companies or all the reservoirs of a particular company selected for audit. Therefore, we believe the reservoir data can be obtained from the companies at the time of the audit visit and the sample then be selected and thus the reservoir data need not be reported annually by anyone. FPC had used such a procedure in other audits. The fact

that the reserves estimates for individual reservoirs are not reported to the Government does not prevent the audit team from conducting adequate validation audits at the reservoir level when visiting companies.

FPC further stated that it needed data on individual reservoirs to allow setting special rates for higher cost sources of natural gas, such as the offshore areas or deep reservoirs. FERC now requires owners to apply for such special rates and to supply justification for the request. FERC has not initiated any changes in this procedure.

Also, it is doubtful that FERC would have sufficient data to set such special rates. FERC collects exploratory and drilling costs from companies on another form, but does not require that the drilling costs for higher cost sources of natural gas be reported separately. FERC, therefore, would not be able to associate the various types of high cost sources of gas with the related drilling costs.

FERC also stated that the natural gas pricing provisions of the proposed National Energy Act might require that FERC have reservoir-level data. However, the Natural Gas Policy Act of 1978, as passed, provides that determinations of eligibility for the various prices are to be made by the appropriate State agency regulating gas production if the gas involved is located on lands subject to State jurisdiction, or by a Federal agency such as USGS if the gas is located on lands under Federal domain. Determinations of eligibility, and the supporting documentation, would be subject to FERC's review.

Delivery obligation regulation--Before natural gas can be sold in interstate commerce, a producer sale certificate must be obtained from FERC, which stipulates conditions of sale, including delivery obligations. To identify sellers who are not meeting delivery obligations, FPC asserted that it required data on the volume and location of shut-in reservoirs as well as the reason why the reservoirs are shut-in. Reservoir-level information, it stated, is necessary because a producing field may have shut-in reservoirs or wells which would not be identified otherwise.

FERC staff claims that availability of reserves information on a reservoir basis will enable the Commission to determine not only whether producers are living up to their contracts to deliver gas, but also whether gas reserves are nearing depletion (and therefore a possible subject for FERC's regulation of abandonments). There is no merit to these assertions because:

- The respondent is not required to specify which interstate pipeline(s) the natural gas is dedicated to, either by reservoir or any other basis. Thus, there is no association of specific gas and specific contracts.
- FERC already receives annual reports from interstate pipeline companies which include reservoir-level information on natural gas reserves dedicated to them. Thus, FERC already receives data which it could use if it decides to begin a comprehensive abandonments compliance program. EIA did not state why this reporting requirement should be extended to gas sold intrastate.

FERC asserted its authority to regulate delivery obligations at the reservoir level in FPC Order 539-B, in which it proposed a "prudent operator" standard for ensuring gas producers meet their delivery obligations. This standard would be used to require holders of producer sales certificates to increase gas production by the recompletion of existing wells, by drilling of new wells, or by other actions, if FERC deemed such action was economically and technically feasible. FERC intended to use the EIA data on non-producing reservoirs to exercise this "539-B" authority.

Industry has contested this authority on a number of grounds, including that it oversteps the restriction imposed on FPC--and now FERC--by the Natural Gas Act of 1938, to confine its regulatory authority to gas transportation and sale. We note that 43 U.S.C. 1331 gives the Secretary of the Interior responsibility to regulate the activities of lessees on Federal lands, where most of FERC's attention on Order 539-B has been directed.

On January 20, 1978, the U.S. Court of Appeals for the 5th Circuit ruled against FERC's assertion of authority (Shell Oil vs. FPC, Court Dockets 77-3066, et al.). After the U.S. Supreme Court in February 22, 1979, affirmed the 5th Circuit court ruling, FERC rescinded its Order 539-B on April 10, 1979. This eliminates FERC's claimed need for data items pertaining to non-producing reservoirs.

Although USGS may need this type of information to exercise its own authority in this area, USGS already maintains lease files with complete information on changes in production status of wells and reservoirs on Federal lands. These USGS data are much more current than the EIA annual report could provide because they are obtained directly from the lessees as the changes occur.

Officials at both EIA and FERC said USGS has not asked EIA to collect reservoir production status information. EIA and FERC officials told us that USGS was given a copy of the EIA form and asked to comment, but USGS was not involved in the planning or design of the present form, nor was USGS asked to justify that these data were needed and not already available from other sources.

Commitment of natural gas to interstate commerce--One of the principal FERC responsibilities under the Natural Gas Act is to assure that interstate consumers have an adequate supply of natural gas at a reasonable price. FPC has said that to perform this regulatory function properly it needs data to determine the amount of natural gas reserves committed by contract to the interstate and intrastate markets. This would allow an important evaluation to be made: does the price set for interstate gas continue to attract an adequate portion of the new gas discoveries to the interstate market? FPC stated that it needed commitment data by reservoir to satisfy this function and collected such data from both the owners of the natural gas and the companies in interstate commerce purchasing the gas.

EIA will collect commitment status information at a State level of aggregation from operators having a working interest (ownership) in reserves. We believe the proportion of new gas discoveries added to the interstate market can be determined with less burden on firms reporting to EIA and with more accuracy if FERC would compare commitment data it collects from the interstate buyers to data on total reserves to be collected by EIA.

General information and studies--FPC cited a need to require reserves data for general information. However, FEA and the Bureau of Mines were already responsible for obtaining and publishing information on natural gas reserves, and their responsibilities were transferred to EIA.

Neither the Bureau of Mines nor FEA asserted that reservoir data were needed. In fact, FEA proposed a form in August 1977 which would have collected information on a State and field basis and which would have satisfied FEA's need for general reserves information. Therefore, we believe the need for general information does not justify the added burden of detailed reservoir reporting.

Resource base information--FPC asserted the need for reservoir level data to determine information about the Nation's resource base, but this is the primary concern

of other agencies with clearer requirements. Several Federal agencies need information on the Nation's identified and undiscovered resources of natural gas for policy planning reasons.

Many groups have made estimates of this total gas resource base. Since 1963, at least 22 estimates have been made by industry and Government groups, including a USGS estimate dated June 20, 1975. Basically, all resource base estimates are made by using information about known gas areas to project the quantity as yet undiscovered.

FPC asserted that the USGS estimate of the total resource base was not adequate because it was not based on sufficient amounts of reservoir data. FPC, however, did not intend to make an estimate of the total resource base itself. Rather, data it collected were to be made available to other agencies, including USGS, in case they wished to use the data to make an estimate.

If the Government is going to collect data for the purpose of making a total resources estimate, the data to be collected should be specified by those who will be making the calculations. We found that USGS, in commenting on the form prepared by EIA, questioned the usefulness of obtaining reservoir-level data, except possibly for use in regulating shut-in reservoirs, but did not otherwise participate in the design of the FPC or EIA forms to ensure that the data each asked for were either necessary or suitable for USGS' resource estimation work.

We believe the Government can acquire sufficient information for making an estimate of the resource base by collecting field-level data on the EIA form and by collecting reservoir-level information for a sample population during data validation checks by the audit team.

ERDA, whose functions are now under DOE, also claimed a need for resource base information. ERDA did not collect gas reserves data itself; it used data collected by others, such as USGS, FPC, AGA, and private contractors. We believe the need for an estimate of the total resource base can be met by using the one prepared by USGS. There is also a need for a rather large amount of detailed data on a limited number of areas, such as recovery from unconventional areas, and on areas where advanced recovery techniques were used. This could continue to be collected by ad hoc efforts. Since these data are only needed for a limited number of cases, we do not believe it is appropriate to impose a major data requirement on all respondents in a universal survey.

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Because we have such serious doubts about the adequacy of FPC's justification for requiring that data on individual reservoirs be reported, we believe that these data should not be required.

The FERC staff (see app. I), in commenting on our proposed report, stated:

"Section 407 of the Department of Energy Organization Act specifies that the Secretary of Energy shall include in certain specified 'reports and investigations such specific information as requested by the Federal Energy Regulatory Commission.' There is no provision for EIA review of Commission requested information in this legislation. The draft report's suggestion for EIA review is, thus, contrary to the provisions of the Department of Energy Organization Act."

DOE (see app. II) supported this position. However, we note that section 205(a)(2) of the Department of Energy Organization Act, 91 Stat. 572, states that the Administrator of the Energy Information Administration

"shall be responsible for carrying out a central, comprehensive, and unified energy data and information program"

EIA's mandate for administering this program requires the Administrator to take steps to avoid duplicative or burdensome energy information reporting requirements. Therefore, it is appropriate that EIA review this and other requests for specific information and not blindly accede to every request for information.

DOE in its comments (see app. II) reiterated in general terms the claimed needs for reservoir-level reporting that we previously analyzed and refuted. However, DOE added

"The system should also be designed in sufficient detail so as to limit what have recently become repetitive and time consuming investigations into reserve and productive capacity related matters. These ad hoc investigations are disruptive to on-going work, consumptive of scarce resources and for the most part unnecessary given the existence of a data collection system such as that proposed. We note that if the data called for by proposed Form EIA-23 had been available in the past, the FPC investigations of producible shut-in leases and nonproducing reservoirs, as well as a recent investigation by the Secretary of the Interior to determine whether

or not producers were withholding production on Federal lands, would not have been necessary. Clearly, the data as currently reported by AGA/API on a geographic basis are insufficient to provide answers to charges of withholding or lack of diligence and field basis information would not have been of much more use. In a period of shortage the government must know what economic and engineering measures are required to place various increments of shut-in or nonproducing oil and gas on stream. These measures can only be determined from reservoir by-reservoir analysis."

DOE fails to recognize that the basic reason for the "repetitive and time consuming investigations into reserve and productive capacity related matters" and the "charges of withholding or lack of diligence" with respect to leases on Federal lands lies in the failure of the Government to establish policies and regulations to govern the speed of exploration and development and the level of production by the lessees of Federal lands. There are no definitions of "diligence" or "withholding." In consequence, there has been no effective regulation of these matters.

#### Need for pilot testing

We believe any major new data collection instrument should be pilot-tested on a sample population before it is imposed on the entire universe of respondents. This is especially important on a form such as EIA's, which introduces novel definitions (e.g., tested and untested reserves), has wide coverage and requires great industry effort, and which is a significant part of the Nation's energy information system. A pilot test might involve having a sampling of small and large companies complete the form on a small portion of their oil and gas operations, after which EIA personnel might attempt to process these data. Such a pilot test could uncover problems with definitions, instructions, and format; provide data for accurate burden estimates; and even possibly allow EIA to determine the sufficiency of company internal records to supply the information and to support credible audit.

No such pilot test has been performed. EIA only solicited comments and we believe this was not adequate to demonstrate the viability of the proposed effort.

DOE, in commenting on a draft of this report (see app. II), stated that the experience with the 1974 FEA survey and the FPC program obviate the need for a pilot test of the EIA form because of its similarity to the two forms previously used. We believe the previous programs are an inadequate

pilot test because EIA is calling for significant new data not asked for by either, such as geological age and whether a reservoir has been flow-tested. The EIA form is also the first to require reserves reporting from three perspectives--gross working interest, net working interest, and amount operated. Also, EIA is planning to request reservoir information on both natural gas and oil reserves, while FPC dealt only with gas and FEA only required field data. Finally, FERC has not used the reports it received to evaluate the form's adequacy and the possible need for revising it.

DOE stated that none of the parties who commented on the EIA program suggested that a pilot test be performed. However, we note that many comments were made, particularly by industry, that

- the form asked for unnecessary data;
- it would be a burden to report much of the reservoir data, particularly under the new format and new definitions to be used; and
- operators may not be able to submit the report by the April 1 annual deadline.

We believe that a pilot test would determine the validity of these claims.

In light of the significance attached to a reserves reporting system by the National Energy Plan and by various legislative acts, we believe it is especially important that EIA pilot-test its form.

#### Data verification

The move to a Government program for obtaining national natural gas reserves estimates has been primarily motivated by the desire to assure that the estimates relied upon by the Government are valid. Therefore, one of the most important aspects of EIA's program will be the audits of the reports filed by the oil and gas operators.

Two factors affecting the adequacy of the audits are the availability of sufficiently detailed company data and the competence of the auditors. We believe the data will be available, but there are unresolved problems in assembling the audit staff.

Data availability--We visited five companies which operate leases on the Gulf of Mexico OCS to determine the

methods they use to calculate reserves and whether the records they maintain can be used to check the reserves figures they may report to the Government. The companies we contacted were:

- Continental Oil Company (CONOCO)
- Shell Oil Company (Shell)
- Chevron U.S.A., Inc. (Chevron)
- Placid Oil Company (Placid)
- Forest Oil Corporation (Forest)

Placid and Forest are among the smaller operators on the OCS, while the others are among the largest. The owners and operators of leases on the Gulf of Mexico OCS have been required to report reserves estimates to various Government agencies in a variety of formats. These include an annual report to USGS which contains an estimate of the reserves for each producing reservoir and a national survey by FEA in 1975 which required a report of reserves estimates by fields.

During our visits to the five companies, we examined their internal records to determine if the reserves figures they reported to FEA and USGS for 88 reservoirs in 23 fields agreed with company records. We grouped the reservoirs by the recoverable reserve volumes estimated by USGS, as shown below.

<u>Total reservoirs reviewed by USGS</u>	<u>Number of reservoirs selected by GAO</u>	<u>Reservoir volumes (Bcf)</u>
27	3	more than 80
50	16	40-79
255	36	10-39
<u>458</u>	<u>33</u>	less than 10
<u>790</u>	<u>88</u>	

Placid and Forest were unable to reconcile their reservoir estimates with the field reserves figures reported to FEA. For Shell, CONOCO, and Chevron, the reserves figures on the FEA form could be supported by the company records. All the companies' records agreed with the reservoir reserves estimates reported to USGS.

Placid officials stated that prior to 1974 they had not placed a high priority on keeping records of reserves estimates. They began maintaining better records in 1974 when USGS issued OCS Order 11 requiring each operator to submit an estimate of recoverable reserves for producing reservoirs. Placid established a reporting system that identifies the reservoirs on each lease, the reserves estimates for the reservoirs, and the total reserves in each field.

Forest was the only company that did not have an automated reserves reporting system to identify reserves estimates by reservoir. While Forest was unable to reconcile its records to the field reserve figures reported to FEA as of December 31, 1974, it does have the current reserves estimates by reservoir for the leases.

Each of the five companies was able to show us the well performance data for the reservoirs we reviewed. This included a record of the water, gas, and oil produced. Four companies had periodically measured the reservoir and surface shut-in pressures for most of the reservoirs. The remaining company had periodically recorded only flowing reservoir pressure measurements for its reservoirs.

The companies showed us maps of several reservoirs which reflected their interpretation of the size and thickness of the reservoir. The companies told us the raw data (well logs) used to make those maps were retained in their files.

The company officials told us they review most of their reservoir estimates at least annually and revise the reserves estimates when new information warrants a change.

On the basis of our review of the data available at the companies we visited and discussions with the personnel responsible for computing those reserves estimates, we found that data submitted to the Government could be checked for consistency with internal records maintained by the companies. In addition, we believe the company reserves calculations could be verified by a Government team using the basic data retained by the operator to make independent reserves estimates and comparing them to the operators' estimates.

Audit staff--Within EIA, the Office of Energy Information Validation was given the task of determining the validity, reliability, and accuracy of the oil and gas reserves estimates to be collected. To accomplish this, an Oil and Gas Reserves Data Validation Program is being developed. An early draft of this program addresses the problem of staffing and notes that the greatest amount of congressional criticism of the 1975 FEA survey of national oil and gas reserves centered on the awarding and management of contracts to conduct field studies to develop independent estimates of reserves for about 60 oil and gas fields. The criticisms related to

- inadequate specification of methodology, format, and content of final reports;
- little or no specific contract monitoring or guidance, and poor quality control; and
- contractors' use of "moonlighters" and other personnel with ties to industry.

The Validation Office initially proposed that contractors be used to perform the audits with assistance and supervision by Federal employees. Other controls were also proposed which would avoid similar criticism of the proposed validation program. However, the Director of the Oil and Gas Reserves Data Validation Program revised the proposal on April 26, 1978, and planned to use Federal employees to the extent they are available.

We met with the Director of the Program on May 1, 1978, to propose that USGS staff conducting the reserves estimation program and the lease evaluation program for the Gulf of Mexico OCS be used to assist EIA in conducting the validation audits. The basis for our proposal was our view that the USGS programs were duplicative and unnecessary until policies are established with respect to natural gas production from Federal lands and for diligence in exploration, development, and production. We also presented our proposal to the EIA Project Manager on May 2, and to representatives from DOI and USGS on May 3, 1978. They all agreed to begin negotiations toward implementing our proposal.

Our proposal is discussed in detail on page 39.

It appears that a reasonable approach is being used to plan the audits of the data to be collected by EIA. However, the plans we reviewed were only tentative. EIA must still complete this planning and implement a validation program. The Administrator, EIA, has stated that such a program would begin in fiscal year 1979.

The purpose of the Oil and Gas Information System is to provide accurate, reliable estimates of the Nation's oil and gas reserves. To assure the credibility of these reserves estimates, it is essential that an adequate audit program be implemented as soon as possible.

## CHAPTER 3

### DUPLICATIVE RESERVES ESTIMATION

#### PROGRAMS SHOULD BE TERMINATED

Although DOE is committed to developing the EIA program, there are two other Federal reserves estimation programs. The first is FERC's. It has already collected natural gas reserves data for 1976, and wanted to obtain 1977 data. However, OMB refused to approve the data collection form for further use. Subsequently, FERC indefinitely postponed further reporting on the form. The EIA program makes this one unnecessary.

The second program is one USGS has been conducting since 1974 to compile an inventory of oil and gas reserves in OCS fields by having USGS staff compute reserves estimates from data obtained from lessees. USGS plans to complete the initial inventory in 1979 at an estimated cost of over \$9 million for the 300 active fields discovered as of September 1976. These estimates will be outdated except for those most recently computed.

Because the EIA program will (1) provide the information USGS is compiling, (2) cost less, and (3) provide current data, we believe the USGS program should be ended, and the positions be reassigned to EIA to conduct the data validation audits.

The EIA program is the most comprehensive of the three. It will collect information on natural gas, natural gas liquids, and crude oil. It will collect the information from all operators, those on public and private lands, both onshore and offshore. The USGS program will collect information only on leases in the OCS. The FERC program will collect information only on natural gas and will not collect information from companies operating exclusively in the intrastate markets.

#### THE LINGERING FERC PROGRAM

On June 30, 1977, FPC required jurisdictional companies to report 1976 natural gas reserves data by November 1, 1977, (later delayed to Dec. 1, 1977). It also ordered them to report 1977 data by April 1, 1978. Since then, the reporting date for 1977 data has been postponed to Sept. 1 and was indefinitely postponed to April 22, 1978. These companies are required to report on reserves they own regardless of whether the natural gas is sold in the interstate or intrastate markets.

FERC officials had estimated that about \$256,000 a year would be spent to process and analyze the data it would collect in fiscal years 1978 and 1979, although this did not represent the complete cost of the program. They were unable to provide us an estimate of the cost to design the form and implement the program.

FERC did not estimate the cost to the industry of compiling and submitting the data, although it did state that the program might be a burden to the industry the first year. Officials of two oil companies advised us that their companies had not yet submitted 1977 data and were waiting for DOE to decide which program would be used. During hearings held by FERC one company estimated it would cost about \$100,000 to compile and submit the FERC data for 1976 alone. The company also estimated it would cost the entire industry about \$12 million to submit the data.

By Dec. 12, 1977, it was decided that EIA would conduct the only national survey of natural gas reserves, and by February 1978 it was intended that EIA's reporting form would be first used in 1978 to collect 1977 data.

FERC officials stated that a key reason for its program was to provide FERC data for its biennial rate-making. However, the rate-making proceeding for the 1977-78 biennium was suspended on Sept. 30, 1977, and the Natural Gas Policy Act of 1978 sets gas prices and procedures for adjusting them.

The EIA Project Director stated that FERC and EIA would not collect duplicative data, and yet both forms are intended to collect similar 1977 data. EIA can collect 1977 data, and by doing so would ensure maximum compatibility of 1977 and 1978 data.

In July 1978, FERC requested OMB approval to use its form to collect calendar year 1977 data. On July 21, 1978, OMB advised FERC that it was returning the request without action because DOE's subsequent request for approval of the EIA form stated that the EIA program would supersede the FERC program. OMB stated that if unforeseen events prevent or materially delay the EIA program, it would consider another request for approval of the FERC form.

OMB also stated that FERC should notify respondents that no data was to be submitted until further notice. On July 31, 1978, FERC issued an order extending the filing date from Sept. 1, 1978, to Dec. 1, 1978. However, FERC

neither informed respondents that the FERC program would probably be eliminated if OMB approved the EIA program nor notified the respondents not to file their reports until further notice.

On Sept. 8, 1978, the Administrator, EIA, notified respondents that the EIA program would replace the FERC program and stated that respondents were not required to file data for the FERC program. The Administrator also advised the respondents of the position taken by OMB on the FERC program.

As of Sept. 26, 1978, 81 companies had filed their reports with FERC. Twelve companies submitted the data after FERC had been notified by OMB to cease its collection efforts. It was not until November 22, 1978, that FERC indefinitely postponed the reporting requirement for 1977 data. However, FERC has yet to cancel its program.

THE ENTRENCHED USGS  
RESERVES INVENTORY PROGRAM

The Reserve Evaluation Section, established in 1974, is compiling an inventory of reserves in the OCS oil and gas fields. The section, originally staffed by 2 members, grew to 32 employees by Sept. 1977; the majority had geology and/or petroleum engineering degrees. The Section Chief told us that there are no plans to increase the section's current staffing level.

USGS estimates that it will have spent over \$9 million to complete its reserve inventory for the 300 active OCS fields discovered as of Sept. 1976. In addition, when the initial reserve inventory is completed, USGS is estimating an additional \$1.5 million per year will be spent to update the estimates. The cost is summarized as follows:

<u>Period</u>	<u>Cost</u> (millions)
Before FY 1977	(a)
FY 1977	\$1.3
FY 1978	<u>b/7.0</u>
FY 1979 (estimated)	<u>1.4</u>
	<u>\$9.7</u>

a/USGS's accounting system did not identify the cost of the section prior to Oct. 1, 1976.

b/Includes an additional estimate of \$3.3 million for contractor work.

Over \$5.3 million of the funds for fiscal year 1978 are for use in obtaining contractors to assist in the reserves inventory.

As of March 1977, the section's latest Field and Reservoir Reserve Estimate report showed the remaining reserves in 258 fields were 2.496 billion barrels of oil and 29.886 Tcf of natural gas. Reservoir-level reserves estimates were shown for the remaining 133 fields.

Problems identified  
with USGS estimates

The most significant problem with the Field and Reservoir Reserve Estimate report was that the field-level reserves estimates prepared by USGS employees for the 133 fields were not derived by analysis of individual reservoirs. USGS does not consider these field-level estimates to have a high degree of accuracy and is presently conducting estimates at the reservoir level.

We compared reserves estimates for 20 fields which had been made on a reservoir basis with previous field-level estimates for the same fields. (See chart on following page.) total reservoir-level estimates of recoverable reserves were 8 percent higher. The individual differences ranged from 481 percent over to 76 percent under. More than half of the field estimates differed by at least 35 percent from the reservoir estimates.

Comparison of Field and Reservoir  
Level Estimates of Natural Gas  
Reserves in 20 Fields

Reservoir-Level estimates (Bcf)	Field Level estimates (Bcf)	Difference (+ or -)	Percentage difference
17.2	100.0	- 82.8	-481
21.6	50.0	28.4	-131
177.2	353.0	175.8	- 99
33.2	46.0	12.8	- 39
366.2	500.0	133.2	- 36
148.9	180.0	- 31.1	- 21
708.1	822.4	-114.3	- 16
257.9	290.0	- 32.1	- 12
202.1	200.0	+ 2.1	+ 1
89.3	87.9	+ 1.4	+ 2
711.8	600.0	+111.8	+ 16
204.4	159.9	+ 44.5	+ 22
386.9	300.0	+ 86.9	+ 22
32.2	24.0	+ 8.2	+ 25
827.9	500.0	+327.9	+ 40
53.1	30.0	+ 23.1	+ 44
55.9	28.1	+ 27.8	+ 50
346.5	150.0	+196.5	+ 57
49.8	20.0	+ 29.8	+ 60
<u>204.2</u>	<u>50.0</u>	<u>+154.2</u>	+ 76
<u>4,895.0</u>	<u>4,491.3</u>	<u>403.7</u>	+ 8

Note: Bcf = Billion cubic feet.  
Source: USGS.

The accuracy of the reserves estimates for a reservoir improves with the length of its production history; therefore, the production history must be reviewed periodically to determine if the reserves estimates should be revised. The most obvious indication of an outdated estimate is when the cumulative production exceeds the estimate of recoverable reserves.

We examined 23 of the 125 fields which had reservoir-level data reported in the March 1977 Field and Reservoir Estimate report. As of March 1977, the report showed that 324 reservoirs in the 23 fields operated by the five oil companies we visited were producing. Cumulative production had exceeded the estimated recoverable reserves in 99 of the 324 reservoirs. The reserves evaluation section plans to use some staff time to review reservoir estimates; however, the majority of its effort will be directed towards completing the reservoir-level review of the outdated field-level estimates.

DOI, in commenting on our proposed report (see app. III), acknowledged that some of its field estimates are outdated, stating that one of the goals of the OCS Reserves Inventory Program is to become, within practical limits, totally current. DOI stated that in late fiscal year 1979 or early fiscal year 1980 full-time updating procedures will begin. In subsequent discussions with USGS officials, we were advised that this would be accomplished primarily by subtracting production every 6 months from the estimates.

USGS officials told us they had the data necessary to calculate reserves estimates on a reservoir basis using the volumetric analysis and production decline methods. Although the pressure decline method--where applicable--is recognized as a better method for gas expansion reservoirs, USGS seldom used this method because it believed the operators had not performed enough reservoir pressure measurements. Conversely, however, four of the five companies we visited performed reservoir pressure tests on most reservoirs annually. They used these reservoir pressure measurements along with surface shut-in pressure measurements to estimate the reservoir's remaining reserves.

In commenting on our proposed report (see app. III), DOI stated:

"On the reservoirs producing prior to 1974, well pressure data was not required for automatic submittal to USGS, and the Survey staff has often found an inadequate pressure history for reserves

estimation of the older reservoirs. When well pressure data is missing, it is now being requested from the operator to build the pressure history. It is USGS's policy at headquarters and the field that all applicable data will be obtained and used. The pressure decline method in fact is being used by USGS where such data exists. The USGS officials, unidentified in the report, obviously were not speaking to established policies and/or were unaware of procedures being followed by other USGS personnel. (An investigation of field adherence to Survey's policy of using all available and applicable data is being made.)"

Comparison of company  
and USGS estimates

We compared the estimates of ultimate recovery made by five companies which operate on the Gulf of Mexico OCS to the estimates made independently by the USGS Reserve Evaluation Section. The term "ultimate recovery" refers to the total amount to be recovered, while the term "reserves" refers to the amount remaining to be recovered. These terms represent the same amount only before production begins.

We did not make a scientific random sample, but made the selection using the following criteria.

- The estimates for the reservoirs must have been reported by the companies to FEA in its 1975 survey and to USGS under OCS Order No. 11.
- USGS must have made independent estimates for the same reservoir under its estimation program.
- A mix of large and small companies was desired.
- A mix of large, medium, and small reservoirs was desired.

The following table shows the result of the comparison.

Reporting company	No. of reservoirs	Company est. (Bcf)	USGS est. (Bcf)	Difference	
				Bcf	percent
Shell	18	272.2	319.0	+ 46.8	17.2
CONOCO	13	316.2	307.5	- 8.7	2.8
Chevron	24	600.5	663.0	+ 62.5	10.4
Placid	17	431.2	301.9	-129.3	29.9
Forest	<u>16</u>	<u>980.7</u>	<u>1041.8</u>	<u>+ 61.1</u>	<u>6.2</u>
	<u>88</u>	<u>2600.8</u>	<u>2633.2</u>	<u>+ 32.4</u>	<u>1.2</u>

Note: Bcf = Billion cubic feet.

For individual reservoirs, USGS estimates were lower than the company estimates for 51 reservoirs. The USGS and the company estimates were the same for three reservoirs.

Although the chart on page 31 shows a net total difference of only about 1 percent between company and USGS estimates, the USGS estimates for individual reservoirs differed by as much as 733 percent over and 74 percent under the company estimates. It should be noted that the greatest differences in estimates were on relatively small reservoirs, but on the average the reservoir estimates differed by 56 percent. When the reservoir estimates are aggregated by fields, the USGS and company estimates for fields differed by an average of 31 percent.

Reserves estimation is based to some extent on judgment, which makes it difficult to state that one estimate is right and another wrong. However, we found USGS was not always using all the available data, the most current data, or the best method of estimating. We found instances in which Chevron, CONOCO, Placid, and Shell had pressure measurements or production data on a reservoir, which would permit making more accurate reservoir estimates, but USGS chose not to use these data.

The Field and Reservoir Reserve Estimate report for March 1977 for many fields was based on old field-level estimates made by USGS which did not accurately reflect the reserves in those fields. Also, for many reservoirs the reserves estimates are not current and need to be reviewed and revised.

In commenting on our proposed report (see app. III), DOI stated:

"The GAO uses the chart on page 42 1/ to illustrate USGS inaccuracy. An equally valid conclusion can be drawn from the chart that the companies and USGS are both internally consistent in their methods of reserves estimation.

USGS tends to estimate near the average of the companies shown. The table suggests that smaller companies tend to estimate their reserves high, while the larger companies tend to estimate low, using more conservative interpretations. This could be expected, considering the differing corporate structures and policies as to how reserves are to be mapped and calculated."

DOI's observations, above, that smaller companies tend to estimate high and larger companies tend to estimate low is necessarily based on DOI's assumption that the USGS estimates are the most accurate. Having reviewed both USGS and company estimates, we do not share that assumption. While the USGS and company estimates in total are close (and thus average estimates are close), we noted above that for individual reservoirs the USGS estimates varied from company estimates by as much as 733 percent.

We also note that the Secretary of the Interior, in a statement on July 13, 1978, releasing a National Academy of Sciences report on its investigations of six Gulf of Mexico OCS leases, stated that he was initiating an investigation of why USGS estimates were so much higher than estimates of the six lessees and of the NAS contractor.

The USGS program  
should be ended

The EIA program will (1) provide estimates of oil and natural gas reserves on the OCS, (2) use a less costly approach, and (3) provide more current estimates than the USGS program. USGS has needs for data of the type used and generated in the reserves estimation process, but these needs can be met by using data from sources other than the USGS Reserves Inventory Program. EIA needs staff for its data validation program with the qualifications possessed by personnel now employed in the USGS program.

The EIA program is superior--The USGS program has 73 positions authorized and over \$3.6 million appropriated for

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1/GAO note: Page number refers to our proposed report.  
The chart is on p. 31 of this report.

fiscal year 1978. This work is similar to the work planned to validate data on reserves under the EIA program in that independent estimates of lessees' reserves are made. However, an important difference is that USGS is independently preparing all the estimates, while EIA intends to obtain the estimates from the lease operators and check their accuracy by auditing a statistical sample through the use of independent estimates. This is why the EIA approach is less costly.

Also, because the operators review their estimates annually (as indicated on p. 25), the estimates EIA will collect from them will be more current than most USGS estimates. As noted on page 32, USGS intends to update its estimates by subtracting production every 6 months. As noted on page 34, this procedure contributed to the inaccuracies in the USGS Field and Reservoir Reserves Estimate report.

The President should eliminate the staff positions authorized for the USGS Reserves Inventory Program and add to the EIA program the number of positions needed to fully staff the EIA validation program. In addition to the transfer of positions, there is the matter of personnel transfers. The more staff members that transfer from USGS to EIA, the greater immediate benefit of meeting the problem of assembling the EIA staff and thereby getting the EIA program off to a good start.

Meeting USGS data needs--In commenting on our proposed report (see app. III), DOI stated:

"The EIA program will not provide the information the USGS needs, which is OCS oil and gas field analysis consisting of independently prepared maps, reservoir data and reserves. It is suggested that the term "OCS Oil and Gas Field Analysis Program" replace the existing term "OCS Oil and Gas Reserves Inventory" to clearly define the purpose of the USGS program and differentiate it from the EIA program."

In describing the purpose to which the "OCS oil and gas field analysis" would be put, DOI stated:

"Complete field studies are needed on 90 percent of the OCS fields under our jurisdiction for supporting other USGS functions, such as production rate control, diligence, approval of applications to drill, unitization considerations, and to provide accurate geological and engineering data for lease sale evaluation."

DOI also commented that

"GAO has been one of the chief critics of USGS pre-sale estimates of the worth of Federal lease sale offerings, yet would now cancel these efforts to compare actual reserves, reservoir distribution and production characteristics, and other technical data developed in the reserves inventory with the same variables used in the pre-sale evaluations prior to leasing."

In examining USGS' claim that it needs to continue to independently prepare these data, we first consider the availability of these data from various sources.

The lease operator is the source of most of the raw geological and engineering data which are interpreted and analyzed to produce the maps and reserves estimates, using the standard methods of the geological and petroleum engineering professions. The lease operator also uses the raw data to prepare the maps and reserves estimates.

The EIA validation program for the EIA program to estimate reserves will generate independently prepared Government estimates, reservoir data, and maps and these will be available to USGS. It also should be noted that the reports filed with EIA by the lease operators are certified by them and are subject to EIA's audit. Therefore, it is incumbent upon the operators to have adequate support for the reports and that this support is available to USGS for its purposes.

The National Academy of Sciences, under a contract with DOI, has had independent estimates of reserves on 6 major fields in the Gulf of Mexico OCS.

And of course USGS has the maps, data, and estimates it has already prepared under its Reserves Inventory Program.

Now let us consider the uses USGS will make of these data.

With respect to lease sale evaluations, there are two types. One type is of a general nature, forecasting reservoir sizes, reservoir distributions, and reservoir production characteristics for various areas. This has been done for the Gulf of Mexico OCS by USGS in a study completed in 1974. USGS has no plans to prepare a new general study.

The second type of lease sale evaluation is of specific leases. In such cases, information on adjacent explored or developed leases is highly valuable for use in evaluating the value of a lease which is to be sold. The data are normally available from the lease operator and usually can be relied upon, according to USGS officials.

As noted on p. 66, in several of our previous reports we have criticised USGS' pre-sale evaluations. In those reports we recommended that USGS obtain additional geo-technical information on frontier and wildcat OCS areas, where sufficient data are not available from adjacent explored or developed leases.

In another report entitled "Policy Needed To Guide Natural Gas Regulation on Federal Lands" (EMD-78-86, issued concurrently with this report), we reported that DOI has no policy or regulations for production rate control or for diligence in exploration, development, or production of OCS leases. When a policy is developed, we believe the necessary data to enforce the policy can be obtained from the lease operators. USGS officials stated that in considering applications to drill and unitization applications, they have relied on lessees' data unless they became suspicious of its accuracy. We also note that unitization (operation of several adjacent leases as one because they overlap on reservoirs) is not so common as to justify the Government making reserves estimates of all leases.

It should be recognized that for a number of leases, most or all of the regulatory decisions have been made. It would be highly wasteful for USGS to now make independent reserves estimates for these leases.

There is an important distinction to be made here. We fully recognize that USGS has bona fide needs for geological and engineering data and for maps, reservoir data, and reserves estimates to carry out its responsibilities. The real question is the extent to which USGS needs to make its own independent interpretations and analyses of the raw data generated by the lease operators. The heavy public and congressional demand for independently prepared data has centered on national estimates of natural gas reserves. This is being met through the EIA program.

DOI does have legitimate needs for maps, reservoir data, and reserves estimates, but not for all OCS leases and not always independently prepared by USGS.

To support other USGS functions (such as approval of applications to drill or to make pre-lease sale evaluations of tracts), USGS may believe that it needs to prepare some reserves estimates itself (on a limited ad hoc basis) to (1) supplement data already available to it from other sources or (2) verify data available from lease operators. If so, USGS can follow the usual procedure for requesting and justifying the necessary positions to perform this work.

Validity and cost considerations--In its comments, DOI stated:

"It should be noted that the annual USGS cost after FY 1978 of developing and maintaining data not needed to support regulatory and evaluation functions is about \$150,000. (2) The EIA Reserves Validation Program should cost less not only because it uses data produced by others, but because it produces less data due to the far less rigorous needs of that program. However, it might be noted that the cost of EIA's validation program is only estimated at this time and may become fairly large as the program is implemented."

Considering the continuing demand for credible national estimates of natural gas reserves, we believe the needs of the EIA program to be valid is as rigorous as for USGS' Reserves Inventory Program. EIA will be taking advantage of the work that the operators perform anyway to annually obtain current estimates. To assure accurate reporting by the operators, EIA will conduct validation audits of a sample of operators. Although EIA's costs may increase, the EIA approach has advantages over the USGS program in terms of efficiency and currency.

#### Proposal for EIA/USGS cooperation

During the course of our review, as the EIA program began to take definite shape and to emerge as a comprehensive program, we found that EIA was having difficulty in identifying qualified Government employees who could be used to conduct the EIA validation work. We also recognized that the EIA program was the most comprehensive of the three programs and that USGS already had employees working on the USGS program which should be superseded by the EIA program. Therefore, we proposed to DOE and DOI officials that they consolidate their efforts to develop a Data Validation Program for the EIA program. We met with DOE and DOI officials on May 1, 2, and 3, 1978, to discuss our proposal. In these meetings, we pointed out that:

- USGS could use its experience to help EIA develop the audit program.
- USGS could retain the documents generated or acquired during the validation audits for use in its regulatory programs. Such files could be subject to quality control inspections by EIA. This also would obviate the need for duplicative records retained by EIA.
- USGS could add to the audit program if it later finds it needs additional data for its own purposes.
- Some USGS data already acquired might be used to meet EIA requirements.
- The USGS staff would be available for part of the year for other USGS needs.

The DOE officials agreed with our proposal because it offered substantial assistance in solving the difficult problem of quickly assembling a staff of Federal employees to carry out the data validation program for the EIA program. DOI officials generally agreed with our proposal and said negotiations with EIA officials would begin as soon as possible.

DOE, in commenting on our proposed report (see app. II), stated

"we agree with the GAO recommendation that the Geological Survey drop its Federal lands reserve collection program. Elements of that program duplicate those of the EIA-23 program and the USGS personnel released from those duties should be utilized in support of the Form EIA-23 effort."

DOI, in commenting on the proposed report (see app. III), stated that it has been generally agreed between the staffs of USGS and EIA that USGS will conduct, in the course of its ongoing OCS Oil and Gas Reserves Inventory Program, the validation of OCS data for EIA.

We are well aware of the negotiations being conducted at our suggestion between USGS and EIA. As of May 16, 1979, there have been no specific agreements made.

## CHAPTER 4

### RECENT LEGISLATIVE REQUIREMENTS INVOLVING GOVERNMENT RESERVES ESTIMATES CAN BE MET BY THE EIA PROGRAM

The OCS Lands Act Amendments of 1978 (to be codified at 43 U.S.C 1801), approved September 18, 1978, require an investigation of trade association natural gas reserves estimates. This act also requires that reserves estimates of oil and natural gas on the OCS be provided to States and local governments affected by production from the OCS. The reserves estimates to be prepared by EIA can meet these requirements.

The Secretary of the Interior, under section 26(b) (2) of the OCS Lands Act (a new section added by section 208 of the OCS Lands Act Amendments of 1978) is required, in part, to provide estimates of the oil and gas reserves in OCS areas leased or to be leased to the States affected by such production, and upon request, to any affected local governments. These oil and gas reserves estimates are intended to assist States and local government in planning for the onshore impacts of possible oil and gas development and production. To carry out this requirement, section 26(a)(2) directs each Federal department and agency to provide the Secretary of the Interior with any data and information which they have obtained. Thus the estimates prepared under the EIA program could be used to satisfy the requirements of section 26 for oil and gas reserves estimates.

The Secretary of the Interior also is required, under section 606 of the OCS Lands Act Amendments of 1978, to conduct a continuing investigation to determine the availability of all oil and natural gas produced or located on the OCS. The investigation is to be based on data and information which the Secretary determines has been adequately and independently audited and verified.

The major segments of the investigation include

- a determination of maximum attainable rates of production of crude oil and natural gas from significant fields on the OCS and an analysis of whether the actual production has been less than the maximum attainable rates and, if so, why;
- an estimate of the total discovered crude oil and natural gas reserves by fields (including proved

and indicated reserves) and undiscovered crude oil and natural gas resources (including hypothetical and speculative resources) of the OCS;

- the relationship of any and all such information to the requirements of conservation, industry, commerce, and the national defense; and
- an independent evaluation of trade association procedures for estimating OCS reserves, ultimate recovery, and productive capacity for years in which trade associations made such estimates.

The evaluation of trade association estimating procedures is to include a report to the Congress on the relationship between trade association data and the new data collected by the Government under the continuing investigation. We believe that the requirements of section 606 for Government estimates of proved and probable reserves of oil and natural gas can and should be met through the estimates collected under the EIA program.

The OCS Lands Act Amendments of 1978 were approved on Sept. 18, 1978, after DOE and DOI provided comments on this report in July 1978. Therefore, they did not comment on the conclusions and recommendations we made on the basis of this chapter.

When the House and Senate bills were introduced in the Congress in January 1977 to consider amending the OCS Lands Act, EIA had not established its program for estimating reserves of crude oil, natural gas, and natural gas liquids. Therefore, the Congress was not aware that the EIA program would provide the reserves estimates needed by DOI under the OCS Lands Act Amendments of 1978.

We believe the requirements in the OCS Lands Act Amendments of 1978 for reserves estimates of oil and natural gas under section 208 (providing for an OCS oil and gas information system) and section 606 (providing for an investigation of availability of oil and natural gas from the OCS) should not be used as support for a duplicative reserves estimation program to be conducted by DOI. Rather, these requirements should be met through use of the reserves estimates collected by EIA.

## CHAPTER 5

### CONCLUSIONS AND RECOMMENDATIONS

The number and variety of Federal programs to obtain national estimates of natural gas reserves indicates the importance of the information to the Government. Unfortunately, in spite of our recommendations in prior reports (see pp. 7 and 8), officials at EIA and FERC continue to encounter problems similar to those outlined in our prior reports. Matters still not resolved include (1) duplication in information gathering, (2) improper assessment of burden on Government and industry, (3) need for an adequate pre-test, and (4) need for implementing a credible audit approach.

The emerging EIA program is definitely a move in the right direction by the Government, because it proposes to obtain the information from oil and gas operators--those who have the best knowledge of the reserves--and because it is intended to supersede two major duplicative programs. It is also addressing the important problem of data verification, to ensure the accuracy and credibility of the estimates. This problem has been a major source of congressional concern.

EIA's planned use of Government professionals should alleviate questions about potential conflicts of interest that arose in the 1975 FEA survey, and a properly planned audit strategy could examine the Nation's reserves in a systematic fashion over a period of several years, without the need for a more expensive "stand-alone" audit each year. EIA's data verification program is still in the early stages of development, and it is essential that an adequate audit program be implemented as soon as possible.

Also, there are matters of concern that the EIA program still must address. First, the current EIA form has not been pilot-tested to uncover potential problems. This is a serious oversight in a significant and important program and it should be corrected.

EIA has also failed to justify adequately some of the data it plans to collect, especially the data on individual reservoirs. In previous reports we have stated the need for data should be analyzed before they are collected, to avoid duplication of effort and unnecessary burden on industry.

Our analysis indicates that reservoir data in the detail EIA plans to require may be unnecessary, especially

now that the major FERC justification for reserves data-- setting the national gas rate--is superseded by the pricing provisions of the Natural Gas Policy Act of 1978. Even if such data were justified the EIA program would collect more reservoir-level information than FERC has previously required, because EIA would collect information on oil reserves and reserves of companies not under FERC jurisdiction. EIA--and FEA before it--originally did not see a need for reservoir-level data collection; its position changed only when the officials responsible for the FERC data collection program assumed authority for the EIA reserves estimation program.

We believe EIA should act as an impartial reviewer of energy information requests of Federal agencies, to ensure that the needs and requirements of the agencies are clearly justified and that they are balanced against the burdens they would impose on respondents. FERC data requests to EIA may fall into a special category, because the Department of Energy Organization Act states that the Secretary of Energy shall collect such information as FERC requests. Practically speaking, EIA could at least require written justifications for FERC requests for data, with the opportunity for EIA to question data items for which it finds insufficient support.

Although development of the EIA program is far along, there still are duplicative reserves estimation activities within the Government. FERC has slowed down its program by indefinitely postponing the submission date for 1977 data, but has not cancelled the program.

Another duplicative program is the USGS program to compile an inventory of oil and gas reserves in OCS fields by having USGS staff compute reserves estimates from data obtained from lessees. The program is estimated to cost over \$9 million by the end of fiscal year 1979; however, when the program is completed, the estimates will be outdated except for the ones most recently computed. Also, an estimated \$1.5 million will be spent annually thereafter to update the initial estimates and review 20 new fields. The EIA program will provide more current information than USGS is compiling and at lower cost.

The recently emerging comprehensive program being developed by EIA promises to fulfill DOI's need for estimates of oil and natural gas reserves on the OCS to carry out provisions of the OCS Lands Act Amendments of 1978. We

believe the limited funds and personnel available to the Government should be devoted to the most comprehensive and beneficial of the three programs--that of EIA.

#### COMPANY COMMENTS

We provided extracts of our proposed report to the five companies named in this report to obtain their comments. All responded in writing and stated that the technical information we used in the report relating to their leases was factually correct, except for two minor clarifications. All of the comments were reviewed and, where warranted, changes were made to this report. The full text of the company comments is available on request.

Two of the companies stated that they preferred to report reserves aggregated to the field level instead of by individual reservoir. Placid further stated that 15 percent of the time it spent on reservoir and geological work was used to report information to Federal agencies.

#### AGENCY COMMENTS

We received comments on our proposed report from DOE (see app. II) and DOI (see app. III). DOE stated that FERC was also providing comments on our proposed report as we requested, but none were received.

The only comments received were those of FERC staff who clearly emphasized that their comments should not be construed as representing the views of the Commission itself or any member thereof. The FERC staff comments have been presented and analyzed in our report.

DOE disagreed with our proposed recommendation that reservoir reporting of reserves by the largest operators be reduced to field-level reporting (see app. II). DOE's reasons for its position and our analyses of them are on pages 15 to 20 of this report. We found no compelling reason to change our position. We believe that the most accurate reserves estimates are those made reservoir-by-reservoir; however, we found no reason to require that the estimates for each individual reservoir be reported in a national reserves inventory program, as long as the individual reservoir estimates are available to the Government upon request.

DOE stated that experience with previous programs obviates the need for a pilot test of the proposed EIA form because it is so similar to the forms previously used. We believe there are sufficient dissimilarities to warrant pilot testing (see p. 22).

With respect to the need to emphasize the development of a strong validation program, DOE stated that it views the validation of the reserves data as extremely important, noting that the usefulness of the data collected depends on its validity.

DOE stated that if timely OMB approval of the EIA form is obtained and if prospects of litigatory delay appear remote, it would take steps to cancel the FPC program. However, if delays are encountered, it would continue the FPC program. We believe that the EIA program is the most appropriate and that all Government efforts should be directed toward strengthening and implementing it and that other duplicative and less desirable programs should be eliminated (see app. II). DOE agreed that the USGS reserves collection program should be dropped because elements of it duplicate the EIA program and also that the USGS personnel released from the USGS program be used in support of the EIA program.

DOI took strong exception to our proposed report, stating that the OCS Oil and Gas Reserves Inventory Program provides indispensable information necessary to carry out the evaluation and regulatory functions of USGS and DOI. It stated that the termination of that program would have a serious impact on those evaluations and regulatory functions and that the EIA program being developed will not provide the technical information and support required. DOI agreed to conduct the validation of OCS field reserves for the EIA program.

We believe that DOI has overstated the need for its OCS Reserves Inventory Program, particularly the evaluation and regulatory functions it would support and has understated the amount and value of the data available from lessees and their operators, from existing USGS files and from the EIA program. (See pp. 29 to 39.)

#### RECOMMENDATIONS TO THE SECRETARY OF ENERGY

We recommend that the Secretary of Energy direct the Administrator, EIA, to take actions during the development of the oil and gas reserves program to:

- Document whether all the data to be collected are needed to fulfill Government responsibilities. The potential users should be required to provide written justification for obtaining any data questioned. Reservoir data is not needed at the time the respondents initially complete and submit the form to EIA.
- Conduct a pilot test of the data collection instrument.
- Emphasize the development of a strong validation program to ensure that the data collected are accurate and complete.

RECOMMENDATION TO THE  
CHAIRMAN, FERC

We recommend that FERC advise EIA that it does not require that the EIA program collect data on individual reservoirs.

RECOMMENDATION TO THE  
SECRETARY OF THE INTERIOR

We recommend that the Secretary meet the requirements for reserves estimates of oil and natural gas, contained in section 208 and section 606 of the OCS Lands Act Amendments of 1978, through use of the reserves estimates collected by EIA.

RECOMMENDATION TO  
THE PRESIDENT

We recommend that the President eliminate the staff positions authorized for the USGS Reserves Inventory Program and add to the EIA program the number of positions needed to fully staff its validation program.

RECOMMENDATION  
TO THE CONGRESS

We recommend that no additional funds be appropriated for the USGS Reserves Inventory Program.

CHAPTER 6

SCOPE OF REVIEW

Because of the concern over how the Government should obtain the natural gas reserves information it needs, we examined how estimates are developed in the public and private sectors and how Federal agencies use them.

We made our examination at the following Federal agencies in Washington, D.C.:

- Federal Energy Administration. *ABC00075*
- Energy Research and Development Administration. *ABC00066*
- Bureau of Mines, Department of the Interior. *ABC00214*
- Federal Power Commission. *ABC00258*
- U.S. Geological Survey, Department of the Interior.
- Federal Trade Commission. *ABC00059*
- Securities and Exchange Commission. *ABC00199*

At each of these agencies we interviewed officials and reviewed pertinent documents and reports. We also attended public meetings in which agency plans for new data collection activities were discussed.

We determined the specific procedures followed by private companies and USGS to determine natural gas reserves from geophysical data. We limited our investigation to estimation procedures followed in the Gulf of Mexico Outer Continental Shelf, though these techniques are generally followed nationwide. We chose the Gulf of Mexico OCS because of congressional and administration interest in this region's natural gas reserves.

We did this portion of our examination at the USGS regional office in Metairie, Louisiana. In addition, we contacted five companies which operate leases on the Gulf of Mexico OCS to determine the methods they use to calculate reserves and whether the records they maintain can be used to check the reserves figures they may report to the Government. The companies we contacted were:

Continental Oil Company  
Shell Oil Company  
Chevron U.S.A., Inc.  
Placid Oil company  
Forest Oil Corporation

FEDERAL ENERGY REGULATORY COMMISSION  
WASHINGTON, D.C. 20426

July 11, 1978

Mr. Monte Canfield, Jr.  
Director  
Energy and Minerals Division  
U. S. General Accounting Office  
Washington, D. C. 20548

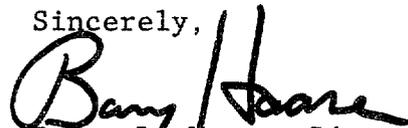
Dear Mr. Canfield:

This transmits the Federal Energy Regulatory Commission (hereinafter FERC or Commission) staff's comments on the draft GAO report entitled "Natural Gas Reserves Estimates: A Good Federal Program Emerging, But Problems and Duplications Persist." These comments reflect the views of the Commission staff and should not be construed as representing the views of the Commission itself or any member thereof.

As the comments make clear, we believe that reserves reporting on a reservoir basis is fully justified. We also believe that Form EIA-23 can be substituted for FERC Form 40. However, FERC Form 40 should not be eliminated until Form EIA-23 has been implemented. Immediate elimination of FERC Form 40 at this time could result in incomplete reserves data or reserves data which is not available in a timely manner.

We appreciate the opportunity to provide these comments and trust that they will be useful in drafting the final report.

Sincerely,



Barry L. Haase, Director  
Office of Pipeline and  
Producer Regulation

COMMENTS OF THE FERC STAFF CONCERNING  
THE DRAFT GAO REPORT --  
"NATURAL GAS RESERVES ESTIMATES: A GOOD FEDERAL  
PROGRAM EMERGING, BUT PROBLEMS AND DUPLICATIONS  
PERSIST."

These comments respond to the above noted draft GAO report. The following areas are discussed: the need for reservoir data and the need for FERC Form No. 40.

(1) The Need for Reservoir Data

The draft report questions the need for reporting reserves data on a reservoir basis, rather than on a field basis, and suggests that the Energy Information Administration (EIA) obtain written justification from the Federal Energy Regulatory Commission (hereinafter FERC or Commission) before requiring reservoir reporting. Section 407 of the Department of Energy Organization Act specifies that the Secretary of Energy shall include in certain specified "reports and investigations such specific information as requested by the Federal Energy Regulatory Commission." There is no provision for EIA review of Commission requested information in this legislation. The draft report's suggestion for EIA review is, thus, contrary to the provisions of the Department of Energy Organization Act.

Notwithstanding the foregoing, the Commission has discussed with EIA, in great detail, the need for reservoir reporting during the process of developing proposed Form EIA-23 which is an expanded version of FERC Form No. 40. The Commission has determined that legitimate regulatory needs justify the reporting requirement. The Federal Power Commission (FPC) and the FERC have provided this written justification in their orders.

Chief, among these justifications is the fact that reservoir reporting is the only accurate basis upon which reliable reserve estimates can be obtained. As the FPC stated in Order No. 526-B:

The record here makes clear that the reservoir is the only unit of gas reserves in which the gas is found in one body, is held under similar conditions of permeability, pressure, porosity and depth, and can be produced as a unit by one or more wells. In estimating the amount of gas reserves it would be impossible to obtain accurate results without estimating the reserves in each reservoir.

In Order No. 526-C, a copy of which is attached (Attachment A), the FERC reiterated this rationale:

In Order No. 526-B, the Commission pointed out that to make an accurate estimate for the field it would be necessary to make an estimate for each reservoir. In those few instances where there are no available reservoir records, an estimate by allocation or any other reasonable means may be employed. Total reserve figures will be more accurate where based to the greatest degree possible on reservoir data available to the producers. In Opinion No. 526-B, it is shown that a large number of the producers have been able to file their data on a reservoir basis.

The draft report ignores this justification but implicitly acknowledges that reservoir reporting is the only accurate basis for reserve estimates. The draft report states that data on individual reservoirs is needed for validation audits of companies' reports and cites the USGS experience with field reporting as the basis for reserve estimates. We agree that the data is needed for auditing purposes and submit that, if data is needed for auditing purposes, then that data should also be included in and provide the basis for an accurately filed report.

The draft report also questions the regulatory justifications for reservoir reporting. These justifications have been set forth in both FPC and FERC orders related to FERC Form No. 40 and have been fully presented to EIA and reflected in proposed Form EIA-23.

For example, the draft report dismisses the need for reservoir reporting in connection with national rate determinations for producers with the observation that the Commission has suspended the biennial rate-making proceeding for the 1977-1978 biennium. The Court of Appeals has underscored the need for an accurate, independent estimate of reserves in connection with the determination of a national rate. As noted, such an estimate should be based on reservoir reporting. The Commission's deliberations on FERC Form No. 40 reflect this concern. As the Commission stated in Order No. 526-C:

Finally, the FERC emphasizes the FPC's reference to the Second Natural Gas Rate Cases, F.2d (D.C. Cir., June 16, 1977), in Order No. 526-B. The Court examined the Commission's estimate of drilling productivity based on data gathered by the American Gas Association, comments of the parties, and the FPC staff studies, and concluded that the evidence was the minimum upon which the Court would base its opinion. The Court was unwilling to remand the proceeding for further evidence because of the overriding need for certainty of natural gas prices and noted that the Commission was "building an administrative record for its Form 40, to permit its gathering of direct information on producers' reserves, rather than through statistical appraisal by the industry committee." (Slip opinion at 61.) "To sum up," the Court said, "we do not approve or embrace the AGA figures; we simply tolerate them for purposes of this proceeding. We expect that by the next biennium the Commission will have put into effect its own procedures for gathering reserves data." (Slip opinion at 62.)

The Form 40 data requested here are vital for carrying out this mandate. We stress that while we have attempted to accommodate industry suggestions the data specified in this order are essential to discharge FERC's duties.

The Commission has determined that reservoir reporting of reserves will best facilitate rate-making. That judgment, which is supported by EIA's concurrence in reservoir reporting and by applicable court decisions, is correct.

Moreover, the draft report's discussion of the need for reservoir reporting in connection with national rate-making assumes that the Commission will continue to use the current methodology for determining those rates. Information obtained from reserve reporting on a reservoir basis may indicate the need for modification of the methodology. The Commission recognized this possible result of reserve reporting on a reservoir basis in Order No. 526-C:

Apart from increasing the accuracy of reserve data and auditing procedures as discussed in Order No. 526-B, we note that Form 40 gives us data on the depths of reservoirs that could be used for granting price incentives, where necessary, for deeper drilling (See §2.76 of the Commission's Rules); the data on committed and uncommitted gas reserves which will enable us to determine whether producers are living up to their contracts to deliver gas; and the means to compare proved reserves with cumulative production on a reservoir basis in order to determine which gas reserves are close to depletion.

Even assuming that this information will not be needed for setting new gas rates for producer sales in the future, the information will likely still be needed for other natural gas pricing purposes. The natural gas pricing sections of the National Energy Act, as set forth in the Conference Agreement, provide for different price treatments depending upon past production characteristics of particular reservoirs and impose upon FERC the responsibility for verifying new gas eligibility. The need for reservoir data will, thus, increase, not decrease, if these provisions are adopted.

We also disagree with the draft report's discussion of the reporting burden. In Order No. 526-B, the FPC noted that a large part of the burden relates to filling out the form the first time. In any event the FERC lessened the reporting burden by reducing the number of companies required to file FERC Form 40 and the number of companies required to file information on a reservoir basis. Order No. 526-C states:

In sum, the FERC has analyzed the reporting burden on the smaller entities in the natural gas industries and balanced this with the marginal contribution to effective regulation of the data lost as a result of changing the reporting requirements. We have concluded that the substantial reduction in reports required merit this change in requirements. Where a reduction of the filing burden of this magnitude can be permitted with no loss of data necessary to perform the FERC's regulatory responsibilities, the Commission feels compelled to do so in order to protect the regulated entities from unnecessary reporting requirements. However, we feel any further reduction in reporting requirements would result in an unacceptable loss of information.

Finally, we disagree with the draft report's conclusion that the Shell Oil Company case removes any justification for reservoir reporting in order to carry out regulatory functions related to delivery obligations. That case does not address depletion questions. As noted above, the Commission has stated that the availability of that information on a reservoir basis will enable the Commission to determine, not only whether producers are living up to their contracts to deliver gas, but also whether gas reserves are close to depletion. In short, the Shell Oil Company case does not alter the Commission's duties concerning abandonments, duties which will be better carried out through reporting on a reservoir basis. We would also note that a petition for certiorari has been filed with the U. S. Supreme Court in the Shell Oil Company case.

The need for reserve reporting on a reservoir basis is, we believe, clear. The Commission's determination on that issue is fully consistent with legislative and judicial pronouncements and with the judgments of other Federal executive agencies, including USGS and EIA.

(2) Need for FERC Form No. 40

The draft report concludes that FERC Form No. 40 duplicates proposed Form EIA-23 and should be eliminated. While we do not agree with all the justifications advanced for eliminating FERC Form No. 40, we do agree with FERC Form No. 40 can be eliminated if the information obtained from Form EIA-23 filings is sufficient for the Commission's purposes and available in a timely manner. Please find attached a memorandum from Kenneth F. Plumb, Secretary of the Commission, to C. William Fischer, Deputy Administrator, EIA, which discusses the relationship between FERC Form No. 40 and Form EIA-23 (Attachment B).

The Commission staff agrees that duplicative data collection programs should be eliminated where possible. The proposed Form EIA-23 promises to be a more comprehensive form for reserves reporting than FERC Form No. 40. The Commission, however, must insure that its legitimate need for accurate, reliable reserves data is met in a timely manner. As the memorandum makes clear, the Commission will continue to require the submission of FERC Form No. 40 data if delays are encountered in the implementation of Form EIA-23. Elimination of FERC Form No. 40 is premature at this time and would be

inappropriate since such elimination could result in incomplete reserves data which would reduce the value of the reserves data which is obtained.



Department of Energy  
Washington, D.C. 20545

July 18, 1978

Mr. Monte Canfield, Jr., Director  
Energy and Minerals Division  
U. S. General Accounting Office  
Washington, D. C. 20548

Dear Mr. Canfield:

We appreciate the opportunity to review and comment on the GAO draft report entitled, "Natural Gas Reserve Estimates: A Good Federal Program Emerging, But Problems and Duplication Persists." Our views with respect to the text of the report and the recommendations made by GAO are discussed below.

In general, we agree with the recommendations of GAO with two major exceptions. Our comments regarding the recommendations follow:

GAO Recommendation

The Secretary of Energy should direct the Administrator of the Energy Information Administration to take actions during the development of the oil and gas reserves information program to:

--evaluate carefully whether all the data to be collected under its program is needed to fulfill government responsibilities. The potential users should be required to provide written justification for obtaining any data questioned. Special attention should be paid to the need for data on individual reservoirs.

DOE Comment

We disagree with the GAO recommendation that reservoir reporting of reserves by the largest operators be reduced to field reporting.

As is evident from the draft report discussion of historical developments leading up to Form EIA-23, different communities of interest exist within the Federal government regarding reserve information. These communities tend to be grouped around agency and/or legislative interests and responsibilities. Form EIA-23 represents a compromise struck between those communities interested in detailed information for regulatory purposes and those interested in reserves data for informational and analytical purposes, each at different levels of detail.

The regulatory community has long held that reservoir reporting is necessary. We believe collection of gas reservoir information on EIA-23 to an extent at least equivalent to that collected on Form 40 is necessary and that we are obligated under the terms of the DOE Organization Act to collect such data. Additional support for reservoir reporting by the large producers was provided in formal comments submitted to DOE by Congressman Dingell and by Congressman Moss' staff. The latter suggested even more detailed reporting requirements than those proposed in our draft Form EIA-23. We firmly believe that the benefits which will accrue from the collection of data by reservoir outweigh the costs incurred.

Our view is that reservoir level data are critical to the establishment of a data base which is adequate to the Nation's needs. Most regulatory and analytical requirements for reserve data revolve around the need to know the rate at which hydrocarbon supplies are being developed and the source and character of these additions. For example:

- ° Are new reservoirs being discovered at greater depth than previously discovered reservoirs and if so where?
- ° What are the extent and distribution of extensions to previously developed reservoirs?
- ° What are the reasons for revisions being made to reserves in existing reservoirs, and where are these reservoirs located?
- ° What are the past and anticipated implications of price and other policies on these supply components?
- ° Where and to what extent do nonproducing reserves exist, for what reasons are they shut-in?
- ° What is their commitment status?

In order to be responsive to these information needs, our systems must be able to identify new reserves and changes in existing reserves as to the type of changes, their geographic and geologic location, depth, producing status, commitment status and volume. Without reservoir level reporting we would be unable to effectively determine and track these factors because this information would be masked at the field level of aggregation proposed by GAO.

The system should also be designed in sufficient detail so as to limit what have recently become repetitive and time consuming investigations into reserve and productive capacity related matters. These ad hoc investigations are disruptive to on-going work, consumptive of scarce resources and for the most part unnecessary given the existence of a data collection system such as that proposed. We note that if the data

called for by proposed Form EIA-23 had been available in the past, the FPC investigations of producible shut-in leases and nonproducing reservoirs, as well as a recent investigation by the Secretary of the Interior to determine whether or not producers were withholding production on Federal lands, would not have been necessary. Clearly, the data as currently reported by AGA/API on a geographic basis are insufficient to provide answers to charges of withholding or lack of diligence and field basis information would not have been of much more use. In a period of shortage the government must know what economic and engineering measures are required to place various increments of shut-in or nonproducing oil and gas on stream. These measures can only be determined from reservoir-by-reservoir analysis.

The fact that the reservoir is the geologic unit of occurrence for oil and gas and that it is the only natural basis of its occurrence should also facilitate the development of the most efficient sample of units to be audited by our data validation group.

GAO Recommendation

--conduct a pilot test of the survey form.

DOE Comment

In our judgment the FEA experience with its 1974 survey of oil and gas reserves and production, DOE experience with collection of gas reserves and production data on FPC Form No. 40, and industry's experience with both forms, obviate the need for a pilot test of the proposed Form EIA-23. On the basis of the responses to Form No. 40, the vast majority of gas producers, most of whom are also oil producers, have detailed reservoir data available to them and moreover can provide these data to us within a reasonable period of time. Inasmuch as the schedules and instructions to Form EIA-23 are very similar to those of Form No. 40, we see no necessity to conduct a pilot test. The initiation of a pilot testing procedure at this juncture would result in a delay of the program until the 1978 reporting year. None of the 153 parties who commented in response to the Consultative Questionnaire of February 3, 1978, the Federal Register notice of February 17, 1978, or who participated in the public hearing of May 8, 1978, requested a pilot test.

GAO Recommendation

--emphasize the development of a strong validation program to ensure that the data collected is accurate and complete.

DOE Comment

DOE views the validation of Form EIA-23 data as extremely important. The

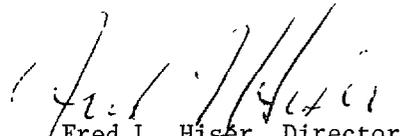
usefulness of the data collected on Form EIA-23 is a function of its validity. As noted in the GAO draft, our data validation program is currently being developed.

With respect to the recommendation to the Federal Energy Regulatory Commission (FERC), concerning cancellation of Form 40, the Department of Energy is taking steps to promulgate a new Form, Form EIA-23, which will collect data and which will supersede Form No. 40 when it receives approval by the Office of Management and Budget. If timely approval is obtained and if prospects of litigatory delay of Form EIA-23 data appear remote, we will take appropriate steps to cancel the requirement to file Form No. 40. If delays are encountered in the implementation of proposed Form EIA-23 resulting in the unavailability of timely data, Form No. 40 will continue to be required.

In addition, relative to the recommendation to the Secretary of the Interior, we agree with the GAO recommendation that the Geological Survey drop its Federal lands reserve collection program. Elements of that program duplicate those of the EIA-23 program and the USGS personnel released from those duties should be utilized in support of the Form EIA-23 effort.

Other DOE comments of an editorial nature have been furnished to members of your staff. FERC is also providing comments on this report.

Sincerely,



Fred L. Hiser, Director  
Division of GAO Liaison  
Office of the Controller



## United States Department of the Interior

OFFICE OF THE SECRETARY  
WASHINGTON, D.C. 20240

JUL 20 1978

Mr. Monte Canfield, Jr., Director  
Energy and Minerals Division  
United States General Accounting Office  
441 G Street, N. W.  
Washington, D. C. 20548

Dear Mr. Canfield:

Enclosed with this letter are the Department's comments on the draft GAO report titled "Natural Gas Reserve Estimates: A Good Federal Program Emerging, But Problems and Duplications Persist."

We are very concerned by this draft report. In our opinion, it contains erroneous and misleading statements, which are detailed in the attachment. It also proposes actions which impair the Geological Survey's ability to conduct a variety of regulatory and evaluation functions on the Outer Continental Shelf. We urge changes in the draft to recognize the points made in the attachment.

Sincerely yours,

Larry E. Meierotto  
Deputy Assistant Secretary - Policy,  
Budget and Administration

Enclosure

## COMMENTS ON DRAFT GAO REPORT EMD 78-68

The GAO Report, "Natural Gas Reserves Estimates: A Good Federal Program Emerging, but Problems and Duplication Persist", appears to be both out of date and inaccurate. The Department of the Interior and the U.S. Geological Survey disagree with the report's recommendations to the Secretary of the Interior.

Complete field studies are needed on 90% of the OCS fields under our jurisdiction for supporting other USGS functions, such as production rate control, diligence, approval of applications to drill, unitization considerations, and to provide accurate geological and engineering data for lease sale evaluation. In FY 1977, all field studies were consolidated under the OCS Reserves Inventory Program to achieve uniformity and to meet the demand from Congress and the Department of the Interior that a thorough inventory of Federal reserves be conducted. Although the program does produce reserve estimates, the term "OCS Oil and Gas Field Analysis" is more appropriate than its present designation on an "OCS Oil and Gas Field Inventory." The products that support other USGS functions are reservoir maps, pressure decline curves, and reservoir analyses.

The results of the Energy Information Administration (EIA) survey will not meet USGS needs. The EIA survey will provide estimates of reserves of oil and gas by reservoir as submitted by operators. No supporting maps or reservoir analyses are provided. Data provided to EIA by operators is the wrong type of data to make an independent check of operators' submittals for regulatory action or as a basis for evaluating tracts to be leased to operators.

The methods for reservoir analyses used by the USGS are standard methods used by the geological and petroleum engineering professions and include reservoir mapping, volumetric analysis, pressure and production decline, and material balance techniques. The staff is experienced, having successfully conducted reservoir studies for several years, both for the USGS and other Federal agencies. The USGS program is the only tested independent systematic reserve estimation in Government. The EIA Program has not yet fully been defined or tested. A possibility exists that the results of the program may be no more acceptable than other operator surveys conducted to date, namely the FPC gas survey, the FEA oil and gas survey, or the annual American Petroleum Institute and American Gas Association annual surveys. In all cases, including EIA, the basic source of reserves is the same, namely, the operators, and all were validated through a variety of methods.

The Department of Interior and the USGS propose to continue the OCS Oil and Gas Reserves Inventory Program as funded and manned. The program is properly designed to fulfill both departmental and USGS mission and is cost effective. It has been agreed with Mr. Gignilliat of EIA that their tentative audit plan which included the 35 largest fields in the United States and a selected sample of other fields would be acceptable. The large fields include South Pass Block 61, Eugene Island Block 330, Bay Marchland Block 2, South Pass Block 27, and Hondo. These large fields are presently being worked on either by USGS staff or will be contracted within the next few months. Preliminary results of all field studies are expected in December or January. It is not expected that the audit will

require any work not presently conducted within the existing inventory program. A memorandum of understanding will be prepared shortly covering cooperation in the validation process.

Conclusion

We believe that the ongoing OCS Oil and Gas Reserve Inventory provides indispensable information concerning oil and gas resources on the public lands necessary to carry out the evaluation and regulatory functions of the USGS and the Department of the Interior. We believe the termination of that program would seriously impact those evaluation and regulatory functions and that the proposed EIA program does not provide the technical information and support required. We will conduct the validation of OCS field reserves for EIA, but vigorously oppose termination of funding for our existing necessary programs.

Specific comments on the report are as follows:

p. ii: According to the GAO draft report, the EIA program to collect estimates of oil and gas reserves from the operators and to verify these estimates with annual audits by Federal personnel of a sample of the reports reviewed, will provide sufficiently valid, reliable, and credible information for all governmental needs, including presumably the accommodation of the USGS OCS regulatory responsibility. The report should identify and distinguish between the various governmental needs for reserve estimates, e.g., (a) collecting sufficiently reliable reserve estimates for national statistics requirements, toward which the EIA program is oriented, and (b) developing the information required to administer a regulatory responsibility involving publicly-owned energy resources where the complete analysis of each field is used as a basis for regulatory criteria and enforcement.

The report should state the function and the purposes of the USGS program as perceived to USGS, the Department of the Interior, or the House Appropriations Committee that added funds to the FY 1978 budget to accelerate the program. The USGS OCS Reserves Inventory Program has two major purposes. The first is to provide an inventory of Federal OCS oil and gas reserves, totally independent of operator interpretations, in order that the Survey and Government policymakers can make evaluation and regulatory decisions concerning these publicly-owned resources. The inventory is fully documented with independently-derived maps of each reservoir, analysis of recovery factors, reservoir drive, and reservoir or well history. The

second is that these maps and reservoir analyses directly support other USGS functions, such as production rate control, diligence, approval of applications to drill, unitization considerations, and to provide accurate geological and engineering data for lease sale evaluation. The maps and reservoir interpretations are available to and used by geologists and engineers of the regional offices and complete sets of applicable maps have been requested for the local District Offices. Approximately 90% of the program effort serves this purpose.

EIA-type estimates of total reserves under Federal control are understandably useful for the making of leasing policy, and the EIA canvass can also be used for general policymaking by the Department of Energy (DOE) and to inform the public of the current energy situation. However, simply having an operator's final estimate of a reservoir's reserves is not adequate for the Geological Survey or the Department of the Interior's needs for lease supervision unless all supporting geological, geophysical, and engineering data are also available and have been independently analyzed. The type of estimates to be obtained by EIA cannot be used for these purposes.

p. iii: Regardless of whether industrial data are satisfactory for national inventory, we do not believe, as stewards of public resources, that DOI or USGS should rely on industrial data for OCS leases. Considerable criticism by the public and by Congress has been directed at the Government's reliance on industry-derived reserve estimates where public lands are concerned. However, GAO now recommends in this draft report that the

industry's reserve estimates are sufficiently reliable for regulatory purposes, provided that samples of the estimates are audited and verified by Government personnel. We disagree in principle.

p. iii and 38: In response to the Energy Policy and Conservation Act of 1975, the USGS proposed an onshore Federal oil and gas inventory early in the FY 1979 budget process (spring 1977). In the budget process the Secretary of the Department of the Interior determined that USGS should not undertake an onshore inventory effort and the program proposal was never made to OMB or Congress. Neither the USGS nor the Department of the Interior now support such a survey. In view of that history and the Department's policy position, these references to an onshore effort seem inappropriate and misleading and should be deleted.

p. 3: The report states that there is an unresolved question as to whether the Government should collect its own raw data. Congress and the administration in policy statements, the budgetary process, and in regulations have resolved the question that raw data must be collected by the Government for its own Federal lease management functions.

p. 3: The report states that there is an unresolved question: "What are the Government's needs for reserve estimates . . .?" GAO has been one of the chief critics of USGS pre-sale estimates of the worth of Federal lease sale offerings, yet would now cancel these efforts to compare actual reserves, reservoir distribution and production characteristics, and other technical data developed in the reserves inventory with the same variables

used in the pre-sale evaluations prior to leasing.<sup>1</sup> Reserve studies provide some of the most comprehensive information used to project onto unleased lands for purposes of fair market value estimation and to check pre-sale assumptions, as well as for lease management purposes.

p. 4: The report states that trade associations lack access to raw data needed to prepare reasonably sound estimates. Only the USGS has access to all proprietary G&G data on the OCS, and hence has the unique capability to prepare independent credible estimates for all oil and gas fields. No single company has this access and can therefore prepare as reliable estimates. American Gas Association and American Petroleum Institute procedures are based on incomplete sharing of the raw data, and represent primarily a compilation of industry inputs.

p. iii and 56: The report recommends that "the Secretary of the Interior eliminate the USGS Reserve Inventory Program and use the staff to assist EIA in development and implementation of their data validation program and perform other DOI duties when not employed in the EIA program," and that "no additional funds be appropriated for the USGS Reserves Inventory Program." The USGS disagrees strongly with this recommendation.

In the first place, to pursue other regulatory functions we need complete field analyses on about 90 percent of the OCS fields. Due to the diversity

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<sup>1</sup>See GAO report "Outer Continental Shelf Oil and Gas Development - Improvements Possible in Determining Where to Lease and at What Dollar Value", 1975.

of uses for the data it is our opinion that all of these field analyses be conducted under a single internal program using uniform standards. We also feel that the effort to complete the remaining 10 percent of the fields and to eventually maintain all field studies at a current level is justified on the basis of our mandate to know the current status of Federal OCS oil and gas holdings under our direct supervision as specified by the Congress and the Secretary of the Interior. If funding is terminated for the Reserves Inventory Program, the work will have to be redistributed back to the evaluation and regulatory functions which it presently supports. This will adversely affect our ability to maintain our existing workloads in those areas. We suggest that the term "OCS Reserves Inventory" be changed to "OCS Oil and Gas Field Analysis" to both clearly differentiate the program from that of EIA and more clearly reflect the nature and purpose of the program. We do not believe that the program can be operated with benefit to the USGS if it is funded, staffed, and priorities set by EIA.

In the second place, in the budget process funds are appropriated by Congress and positions are allocated by the Office of Management and Budget (OMB) to a Department/Agency to carry out specifically described and justified programs. Without OMB and Congressional concurrence or approval, USGS staff cannot be redirected to support a Department of Energy funded program. It is most likely that if the Secretary or Congress eliminated USGS's

Reserves Inventory Program, OMB and/or the Department would take the associated positions away from USGS and USGS would not have the staff to assist EIA.

p. 35 and 54: The USGS OCS Oil and Gas Reserves Inventory program is characterized as both "duplicative" (pages 35 and 54) and "entrenched" (page 38). The report's use of "entrenched" is not clear. It seems to be used in a derogatory manner with neither explanation nor documentation. It is entrenched in the sense that both the Secretary and the USGS consider this program crucial to performing the Department's functions.

Since no other Government agency is involved with making independent oil and gas field analyses for the OCS, and since no such program is proposed by another agency, we do not feel that the program is "duplicative." As long as the EIA does not assign its own engineers and geologists to a comprehensive program of raw data analyses and independent reserve determinations for the OCS, there is no overlap.

p. 41: The report states that the USGS oil and gas reserve estimates for some fields have become outdated. One of the goals of the OCS Oil and Gas Inventory Program is to become, within practical limits, totally current, with semiannual reporting of updated reserve determinations for internal use and annual reporting for publication. (Incidentally, it should be noted that EIA's data will be updated only on an annual basis.) There were less than 300 known fields when the program started. New fields are added at the rate of about 20 per year. There are presently about 335 fields identified and there may be about 355 when the catch-up

phase of the program is completed. Approximately 180 of these fields presently have USGS reservoir-by-reservoir reserve estimates. Survey staff and Survey-monitored contract studies are scheduled to complete the remaining fields by the end of FY 1979. The reserves inventory for the Pacific OCS, which includes 11 fields, is complete and current to January 1978. Most of the Survey's current effort is directed toward completion of the fields for which reservoir analysis has not been made.

Some of the reserve estimates made several years ago obviously need updating with new geologic and engineering data. However, the first objective of the reservoir analysis is to construct a file of data consisting of maps, charts, well production and pressure histories, and reserves for all reservoirs. There will be a lag in updating the reservoir estimates until all reservoirs are mapped and analyzed at least once. In late FY 1979 or early FY 1980 full-time updating procedures will begin. The OCS Oil and Gas Field Analysis System will become current and totally responsive to the Department's and USGS's needs by the end of FY 1980.

p.41: The report states, "USGS methods may not be providing the most accurate estimates." On the reservoirs producing prior to 1974, well pressure data was not required for automatic submittal to USGS, and the Survey staff has often found an inadequate pressure history for reserves estimation of the older reservoirs. When well pressure data is missing, it is now being requested from the operator to build the pressure history. It is USGS's policy at headquarters and the field that all applicable data will be obtained and used. The pressure decline method in fact is being used by USGS

where such data exists. The USGS officials, unidentified in the report, obviously were not speaking to established policies and/or were unaware of procedures being followed by other USGS personnel. (An investigation of field adherence to Survey's policy of using all available and applicable data is being made.)

p.42: The GAO uses the chart on page 42 to illustrate USGS inaccuracy.

An equally valid conclusion can be drawn from the chart that the companies and USGS are both internally consistent in their methods of reserves estimation. USGS tends to estimate near the average of the companies shown. The table suggests that smaller companies tend to estimate their reserves high, while the larger companies tend to estimate low, using more conservative interpretations. This could be expected, considering the differing corporate structures and policies as to how reserves are to be mapped and calculated.

P.44: The report states that, "Because the EIA program will provide the information USGS is compiling, cost less, and provide more current data, the USGS program should be ended." The statement is inaccurate and misleading for several reasons: (1) The EIA program will not provide the information the USGS needs, which is OCS oil and gas field analysis consisting of independently prepared maps, reservoir data and reserves. It is suggested that the term "OCS Oil and Gas Field Analysis Program" replace the existing term "OCS Oil and Gas Reserves Inventory" to clearly define the purpose of the USGS program and differentiate it from the EIA program. It should be noted that the annual USGS cost after FY 1978 of developing and maintaining

data not needed to support regulatory and evaluation functions is about \$150,000. (2) The EIA Reserves Validation Program should cost less not only because it uses data produced by others, but because it produces less data due to the far less rigorous needs of that program. However, it might be noted that the cost of EIA's validation program is only estimated at this time and may become fairly large as the program is implemented. (3) As USGS reserves inventory moves into the maintenance stage in 1979, its data will be updated as frequently as EIA's information.

p. 44: The report proposed that, "The (USGS) staff presently assigned to the reserves inventory program should be made available to assist EIA in developing and implementing the data validation program for the data EIA collects."

It has been generally agreed between the staffs of USGS and EIA that the USGS will conduct, in the course of its ongoing OCS Oil & Gas Reserves Inventory Program, the validation of OCS data for EIA. The final report of the Ad Hoc Committee on Oil and Gas Reserves Reporting, chaired by OMB and published as "A Plan for Collecting Oil and Natural Gas Reserves Data" in the January 1977 issue of the Statistical Reporter, recommended this division of responsibilities.

p. 44: The GAO refers to another of their reports in saying, ". . . we recommended that the Secretary of the Interior cancel the USGS Reservoir Shut-In/Diligence Program. In the Program, USGS personnel are reviewing developed fields in the Gulf of Mexico to identify opportunities for increased production; however, criteria have not been established to provide

a basis for requiring specific development and production actions by the lessee."

The Secretary of the Interior and the Congress support the general concept of assuring diligent development of existing leases. The USGS's Reservoir Shut-In/Diligence Program was initiated in the current fiscal year (1978) and is still in the process of being staffed. The effectiveness of the program will be dependent upon the quality and completeness of data generated in the OCS Reserves Inventory Program. Specific criteria for requiring specific development and production actions by the lessees are to be developed by the Secretaries of the Interior and Energy. While the criteria have not been developed at this moment, they will be forthcoming and there is every reason to believe that USGS will be called upon by Congress, DOE, and DOI to conduct a better defined diligence program than is presently in effect. The USGS has not seen the report referred to on page 44 and believes any recommendations resultant from that study should not be included in the present report on reserves.

p. 56: The GAO recommends, ". . . that personnel involved in the USGS OCS Reservoir Shut-In/Diligence Program also be used to assist EIA." Such a proposal would be inconsistent with established budgetary concepts and procedures: i.e., Congress appropriates funds, and OMB allocates positions, to carry out work specifically described and justified in budget documents. These funds and people cannot be used to pursue other program goals without explicit concurrence by OMB and Congress.

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