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REPORT TO THE CONGRESS

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Outer Continental Shelf Oil And Gas Development-- Improvements Needed In Determining Where To Lease And At What Dollar Value

Department of the Interior

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

RED-75-359

JUNE 30, 1975

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

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

Our report concerns improvements needed in determining where to lease Outer Continental Shelf oil and gas and at what dollar value.

We made our review pursuant to the Budgeting and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

We are sending copies of this report to the Director, Office of Management and Budget and the Secretary of the Interior.

Comptroller General
of the United States

Contents

ABBREVIATIONS

GAO	General Accounting Office
BLM	Bureau of Land Management

GLOSSARY

Bright spot	A portion of the seismic reflection that for certain types of petroleum accumulations will appear noticeably stronger.
Geological structure	Term pertaining to the physical results of folding, faulting, and displacement of rock layers due to movement of the earth's crust. Some structures may trap oil or gas.
Geological	Technical data associated with earth processes which identifies the arrangements and composition of subsurface rocks.
Geophysical	Technical data which identifies the structure, composition, and development of subsurface rocks.
Horizon	The surface separating two beds or layers of buried rock sometimes identified or characterized by a particular fossil assemblage or horizon.
Paleontology	A branch of geology dealing with the life of past geological ages based upon the study of fossil remains of organisms.
Reservoir	A natural underground rock formation in which the pore space is sufficient to contain a liquid such as oil or water and gas.
Seismic	Geophysical data pertaining to the speed with which induced sound waves pass through different types of rock. The result is the detection and analysis by means of reflection or refraction techniques of elastic waves generated in the earth.

Stratigraphic test	A hole drilled to determine the nature of rock layers and their physical and chemical properties; specifically, the abil'ty of the rocks to transmit and retain oil and gas.
Well log	Records of the earth (rock) materials penetrated in drilling a well.

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

OUTER CONTINENTAL SHELF OIL AND GAS DEVELOPMENT--IMPROVEMENTS NEEDED IN DETERMINING WHERE TO LEASE AND AT WHAT DOLLAR VALUE
Department of the Interior

D I G E S T

Development of oil and gas resources on the Outer Continental Shelf is recognized as one way to lessen U.S. dependence on foreign energy supplies. Interior and the Federal Energy Administration indicate that much of the increase in future U.S. domestic oil and gas production will have to come from the Shelf.

GAO recommended that the Secretary of the Interior take steps to improve the Federal Government's programs for deciding where to lease potential offshore oil resources, and at what dollar value.

Recommendations broadly outlined below call for:

--Interior to direct an exploration program for a systematic planned appraisal of Outer Continental Shelf oil and gas resources, including selective stratigraphic test drilling in Shelf areas before leasing. (See pp. 15 and 35.)

--Industry involvement in resource appraisal through exploration permits and Government-financed exploration to insure implementation of federally planned efforts. (See pp. 15 and 35.)

--Federal regulations aimed at providing the Government and the general public with geotechnical information. (See pp. 15 and 35.)

--Procedures for periodic assessment of economic factors used in valuing resources and adjusting such factors on the basis of the most current information available. (See p. 36.)

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--Pacing lease offers at a frequency which will permit Interior to adequately consider geotechnical data in its Shelf valuation programs. (See p. 36.)

--Establishing a test program to evaluate, offer, and lease entire geological structures as opposed to the present practice of leasing tracts. Unitization of exploration and development activities would be required for test purposes. (See p. 41.)

This report, second of a series on Federal leasing policies and practices concludes that the Federal Government's Shelf evaluation programs

--are hindered by inadequate data and analysis,

--do not reasonably insure that a fair market value return is received on lease offers of shelf oil and gas resources, and

--are being jeopardized by an accelerated leasing pace.

Interior said it was studying all the issues presented in the report and while it saw positive features to implementing the recommendations it felt there were many drawbacks to the recommendations.

Interior agreed to withhold lease offers until it could adequately consider geotechnical data, and in April 1975 announced proposed regulations providing for availability of geotechnical data for Government and public use. (See p. 34.)

Interior is generally opposed to federally financed exploration including stratigraphic test drilling but it favors industry financing of such exploration. Also, Interior favors a a benefit-cost analysis of structure leasing before proceeding with a test program. (See p. 14.)

GAO believes in a sound balanced approach to the development of the oil and gas resources on the Outer Continental Shelf. The Government's

direction and financing are essential to insure that exploratory activities are sufficiently broad to implement a systematic plan for resource appraisal in the public interest. (See p. 13.)

GAO also believes a test program to evaluate, offer, and lease entire geological structures will allow the merits of a structure leasing proposal to be analyzed and evaluated.

Legislation now pending before the Congress deals with these issues and with expanding the Federal Government's role in developing the mineral resources of the Outer Continental Shelf. The major bills now before the Congress include S. 426, S. 521, and H.R. 6218. Matters discussed in this report should be of interest to the Congress in considering the proposed legislation.

CHAPTER 1

INTRODUCTION

The United States is the largest energy-consuming Nation in the world. With only 6 percent of the world's population, it consumes about one-third of the energy used. Since the mid-1960's energy consumption in the United States has grown at an annual rate of over 4 percent, but domestic production of the two primary energy sources, oil and natural gas, has not been able to meet demand.

U.S.-measured reserves 1/ of oil have been declining since 1966. In 1974 these reserves had declined to 35 billion barrels. Natural gas reserves peaked in 1967 to 293 trillion cubic feet and declined by 1973 to 250 trillion cubic feet.

The Arab oil embargo imposed in October 1973 called vivid attention to the Nation's growing dependence on foreign oil imports. Increased exploration and development of oil and gas resources on Federal lands can be one way of increasing the Nation's reserves of these fuels. Interior statistics show that in 1974, 61 percent of the oil production and 74 percent of the natural gas production from Federal land came from the Outer Continental Shelf. Production from the Shelf totaled 332 million barrels of oil and 3.5 trillion cubic feet of gas.

The Department of the Interior and the Federal Energy Administration both indicate that much of the increase in future U.S. domestic oil and gas production will have to come from the Shelf. The Secretary of the Interior has stated that the Shelf lands offer the best prospects for providing the Nation with major new oil and gas reserves in the next 10 years, with less environmental impact, than any available alternative energy source. Interior estimates that 76 percent of the Federal measured oil and natural gas liquid reserves and over 70 percent of the Federal measured natural gas reserves are on the Shelf. A November 1974 Federal Energy Administration report on the Project Independence study stated that the accelerated development of the Shelf could add 5.1 million

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1/Identified reserves from which an energy commodity can be economically extracted with existing technology and whose location, quality, and quantity are known from geological evidence supported by engineering evidence.

barrels of oil and natural gas liquids a day, or about 25 percent of the total U.S. production by 1985.

The Outer Continental Shelf Lands Act (43 U.S.C. 1332) provides for U.S. jurisdiction over Shelf submerged lands--all submerged lands seaward and outside State waters. Federal jurisdiction of Shelf lands generally begins about 3 miles from the coastline of each State. No seaward limit to the Federal jurisdiction of the Shelf has been defined.

The act authorizes Interior to lease such lands for certain purposes, including the production of oil and gas, and to regulate Shelf oil and gas operations to prevent waste and to conserve natural resources. The act requires that oil and gas leases be issued only on a competitive-bidding basis. Leases are awarded through sealed bids on the basis of the highest (1) cash bonus bid with a fixed royalty or (2) percentage royalty bid with a fixed cash basis. Interior has conducted only one offer where 10 leases were offered on the basis of a royalty bid.

The Interior's Bureau of Land Management (BLM) executes the leases of Shelf lands. The BLM leasing and management goals for the Shelf are (1) orderly and timely resource development, (2) protection of the environment, and (3) receipt of a fair market value return for leased resources.

The Interior's Geological Survey assists BLM in its leasing objectives by providing technical and administrative assistance and services for managing and disposing of Shelf areas. Of particular importance is Survey's responsibility to value tracts before leasing on the basis of engineering and other technical evidence and economic analysis. Survey is also responsible for supervising and regulating exploration, development, and production activities on the leases once they are leased to private industry.

Through 1974, about 10.8 million acres had been leased in the 20 years of the program through competitive lease offers. Cumulatively, this acreage has produced revenues for the Federal Government of over $18 billion.

Interior's system of selecting areas to lease has a direct impact on the ultimate discovery of oil and gas. Selection of the most promising areas will encourage rapid development. Historically, Shelf lease offers have been scheduled on an irregular basis. Industry interest and the desire to obtain money for the U.S. Treasury through

bonuses generally determined when and where to lease Shelf lands.

Faced with today's energy needs it is important that Interior select those areas to be leased that will encourage rapid exploration and development. At the same time the public should have assurances of receiving a fair market value return for the disposition of the mineral resources on public land.

Legislation now pending before the Congress deals with these issues and with expanding the Federal Government's role in developing the mineral resources of the Outer Continental Shelf. The major bills now before the Congress include S. 426, S. 521, and H.R. 6218. Matters discussed in this report should be of interest to the Congress in considering the proposed legislation.

In the following chapters we discuss the effectiveness of Interior's tract selection and tract valuation procedures and practices. The scope of this review is discussed in chapter 5.

CHAPTER 2

EFFECTIVENESS OF TRACT SELECTION SERIOUSLY HINDERED BY INADEQUATE DATA

A principal weakness in the tract selection process is that determinations to lease certain tracts are based on geological inference and speculation as to whether oil and gas actually exist. The geological characteristics and specific potentials for oil and gas in the Shelf wildcat tracts or the frontier areas are not known until holes have been drilled. Under the present leasing program even shallow exploratory drilling generally is not done until after the lease offer. Deep exploratory drilling to actually discover reserves also is not done until after leasing.

TRACT SELECTION

Although Survey and BLM headquarters and field offices participate to some degree in various phases of tract selection, since 1974 when the Federal Shelf leasing program was first established, the Federal Government has relied primarily on industry interest in deciding where to lease. Interior believes that regardless of the competence the Government might attain in selecting tracts, it could not expect to do a better job in identifying prospects for offer than the industry as a whole could do.

Presently, industry interest in developing certain Shelf areas and tracts is generally expressed under a "two-tier" nomination system. The first tier call requests all interested groups to comment on the potential for leasing in various Shelf areas. The second tier call requests all interested groups to nominate specific tracts for inclusion in the lease offer. Also, according to Survey officials, operators at times voluntarily present data to Survey to support their requests for including tracts in lease offers.

Nominations cannot be taken at face value as representing all potential bidder interest. This point is illustrated by the diversity in company nominator bid strategies for the 1974 Shelf offer presented below. It is also consistent with comments we received from major oil company officials.

Selected companies	Tracts nominated by company	Tracts offered in sale by BLM	Tracts bid on by company
A	-	-	52
B	-	-	33
C	3	2	30
D	106	35	-
E	68	34	33
F	271	100	37
G	396	94	15

As shown in the above table, bids for several companies represented only a small fraction of those nominated. On the other hand, two companies who did not nominate tracts bid vigorously on them.

Officials of several major oil companies told us that they nominate some tracts solely to camouflage their real interest from competitors. Other reasons given for not bidding on tracts nominated are that (1) new data acquired before bidding may show a less desirable production potential and (2) the risk may be too great for one company to bid on. One industry official told us that before 1969 his company's policy was to avoid nominating any tracts for fear that they would tip their bidding plans to competitors. This attitude may account for the nomination/bid strategies of companies A and B above.

BLM and Survey roles in tract selection

Following the receipt of nominations, specific tracts are selected for lease offer by BLM and Survey field offices within guidelines established by BLM headquarters. The guidelines include the general criteria to be used in selecting tracts, the recommended offer size acreage, and at times special considerations (such as the inclusion of gas prone and deepwater tracts). Final selection responsibility rests jointly with the BLM and Survey headquarters staffs.

Tracts selected may be categorized as

--drainage: a tract which has a reservoir that is subject to being drained from wells on adjacent tracts;

--development: a tract which is located on the same general structure as proven producing wells, but not known to have a reservoir subject to being drained from the nearby wells;

--wildcat: a tract, not located in the vicinity of a producing structure whose potential for being productive is completely unexplored.

Tentative selection lists of tracts are compiled at the field level by both BLM and Survey. All drainage tracts, as identified by Survey geophysical and/or geological data are included on both lists, regardless of the number of industry nominations. Development and wildcat tracts are added to make up the acreage needed to meet the recommended offer size.

The predominant factor influencing BLM tract selecting is the number of industry nominations per tract. According to an Interior official, the preferred procedure is to include all tracts having at least one-half of the nominations of the tracts with the highest number of nominations. If there are not enough tracts to fill out the required acreage using this criterion, or if there are special conditions, such as including deepwater locations, tracts, with nominations below the cutoff are included.

BLM's rationale for emphasizing industry interest in its tract selection stems from historical bidding results which show that, in general, tracts which have received the highest number of nominations generally have received the most bids and have brought the largest bonuses.

Survey uses available geological and geophysical information to predict production potential of wildcat tracts. However, a Survey official told us that wildcat tracts with no nominations are not selected for the lease offers. From 1954 to 1968 Interior offered some wildcat tracts that were not nominated by industry. The tracts chosen by the Department drew little interest in the offers, as only about 20 percent of the tracts received bids; therefore, BLM and Survey decided that selecting wildcat tracts in which industry has shown no interest will have counterproductive leasing results.

Using available geological and geophysical data Survey compiles a tentative selection list over a 3- or 4-day

period by a team comprised of one geologist, two geophysicists and one paleontologist or stratigrapher.

Once the tentative selection lists are compiled Survey and BLM meet to discuss differences in tract selection and agree to a joint BLM-Survey list which is forwarded to Washington headquarters for review and determination of a final list of tracts for the offer.

Before the offer, changes in the tract selection list are occasionally made at the initiative of both Washington and field offices. For example, drainage tracts may be added on the basis of new drilling results or tracts may be deleted from the offer on the basis of environmental considerations.

Need for prelease geological data

Neither Government nor industry has the geological data essential for adequately determining if geological characteristics necessary for petroleum accumulation exist in the wildcat tracts, or the frontier Shelf areas. Although Shelf areas are known to have potentially attractive geological structures, as indentified by geophysical data, and by extrapolation of geological trends, the geological characteristics and specific potentials for oil and gas are really not known until holes have been drilled.

Under present practice exploratory drilling generally is not done until after leasing. Consequently, the Government and industry have to rely on geological inference and speculation as to whether petroleum actually exists. Problems relating to use of this geological data in valuing tracts are discussed further in chapter 3.

Although the need for knowledge about the geology of the Shelf is readily acknowledged, there are divergent views on (1) how much data should be gathered before leasing and (2) who should sponsor and pay exploratory activities.

It seems clear that actual information on Shelf resources in general would require a massive drilling effort. It would be highly judgmental as to how much exploratory work would be required and how long it would take to fully measure resources in large Shelf areas. Industry representatives suggest that exploration and development are, in reality, a single integrated effort and that there is no physical distinction between the exploratory drilling phase and the development and production phase of a new area.

One industry official points out that initial exploratory activity historically discovers only a small portion of the ultimate reserves of the area, and is followed by a period of simultaneous exploration, development, and production covering many years.

All this is used to argue against separating exploration from development whereby drilling to discover would be accomplished before lease--possibly through Government exploration--with the expectation that the amount of resources available in a large area could be determined.

Although opposed to prelease drilling to discover, Government and most industry officials we talked with believed that opportunities existed for better indentifying areas favorable for oil and gas accumulation before leasing. These officials believed that drilling stratigraphic holes in the vicinity of known structures would greatly improve the geological knowledge for potential petroleum accumulation.

From deep stratigraphic test results scientists can determine the nature of various rock layers and the ability of the rocks to transmit and retain oil and gas. To date, most prelease exploratory work has been limited to non-drilling activities including magnetic, gravity, and seismic surveys.

Interior has permitted shallow core hole drilling in some areas, limited to 1,000 feet, and two deep stratigraphic test wells (up to 16,000 feet) in the South Texas Shelf area. The deep stratigraphic tests, approved in August and November 1974, were initiated and financed by a consortium of oil companies.

Methods for conducting tests and data availability

Stratigraphic tests in Shelf areas could be conducted under a variety of options, including:

1. Drilling done by a contractor under the terms of an exclusive Government contract.

2. Drilling done by Government, using Government personnel and facilities.

3. Government and industry joint ventures on a cost-sharing basis.

4. Drilling done and financed by industrial groups with Government approval. (This is the method used in the South Texas tests.)

The way in which stratigraphic tests are conducted does not have to be limited to one of the above methods but could be undertaken through any combination of these methods. The key point is that the Government should insure that the scope of exploratory activities is sufficiently broad to encourage efficient and orderly development of Shelf resources, even if this means Government financing of drilling activities.

We believe that Interior should encourage industry to conduct additional stratigraphic drilling tests similar to those done off South Texas, as part of implementing a Federal systematic plan for resource appraisal in Shelf areas. Such a plan could set forth a timetable for providing minimum levels of exploratory coverage in Shelf areas, and the collection, analysis, and mapping of resource data.

The cost of the stratigraphic test program could vary markedly, depending on several factors including location, number, and depth of wells.

The cost of the Gulf of Mexico stratigraphic tests (consisting of two wells) were estimated at $2 million each. Interior officials told us that these costs were probably much lower than would be incurred in other more hostile frontier areas, such as Alaska.

Also, Interior noted that establishing minimum program needs would reflect differences in the subjective judgments of both Government and oil exploration companies. In the final analysis responsibility for establishing minimum program needs rests with Interior. For this reason, we did not attempt to estimate the cost of a stratigraphic program as part of our review. However, because of congressional committee requests for cost estimates of a stratigraphic drilling program, expressed subsequent to our review, we are working to develop such estimates.

If such a program encouraged industry participation, the sharing of costs between industry and Government could only be ascertained after a program was defined and industry had been given an opportunity to express its participatory interests. It is reasonable to expect that some companies would want to finance exploration to preserve the relative competitive advantage in bidding for leases they now enjoy by having access to more information

than others. Under the data disclosure guidelines outlined on page 11 and Interior's proposed regulations (see p. 12) this informational advantage obtained through private exploratory efforts would be preserved, at least for individual lease sales.

In addition to the cost issue, other unresolved issues concern whether (1) the tests should be made on or off the geological structure, (2) environmental impact statements would be required if drilling were done onstructure because of the higher probability of hitting oil or gas reservoirs, and (3) data should be released to the public at large.

In commenting on this report, Interior stated that offstructure versus onstructure drilling needed to be reviewed. It argued that if holes are drilled onstructure only where they would be drilled anyway after the sale there would be, in effect, no cost to society of drilling the test onstructure before the sale. A March 1975 Interior draft analysis of this provided us by a Department official, notes, however, that it would be necessary to determine which holes would certainly have been drilled after leasing if they were not first drilled before leasing--a difficult if not impossible task, in our judgment.

Also, differences exist between development drilling and offstructure stratigraphic drilling. For example, according to a Survey official an average exploratory and development well going to a depth of about 14,000 feet would require a surface hole more than 30 inches in diameter and would need casing to the bottom of the hole. In comparison, a stratigraphic test would require a surface hole as small as about 8 inches with only surface casing. Therefore, a stratigraphic test hole would not be as expensive as a development well. Also, as indicated above, onstructure drilling poses greater environmental risks than offstructure drilling.

Under methods 1 and 2 shown on page 8, the data could be released early to the public thereby helping to ease informational disadvantages among oil companies and encouraging competition. Survey has noted that under methods 3 and 4 industrial participants would expect the results of the tests to be proprietary because of the substantial investments they would be making. For the South Texas stratigraphic tests all data is being treated as proprietary to the public at large before the leasing offer, but will be made public following the offer. The data is being made available to the Government before leasing. Releasing the data following the offer would allow the public access to the test results and could be used in subsequent offers in the area.

Concerning data collected in the process of exploring or leasing the Shelf, we believe the following general rules are appropriate.

1. A clear distinction should be made between raw, processed, and interpreted data, to avoid disputes at some later date as to which specific data should be made available for public inspection.

2. Raw, processed, and interpreted data, produced directly by the Government, should be made available to the public.

3. Raw, processed, and interpreted data, produced through wholly federally financed activities, should be made available to the public.

4. Raw, processed, and interpreted data, gathered by private parties under exploration permit, should be made available to the Government; the raw and processed data should be made available to the public at large at a time certain, determined by the Secretary of the Interior, which would not be detrimental to the competitive interests of the permittee.

5. Raw, processed, and interpreted data, gathered by private parties under a Federal lease, should be made available to the Government; the raw and processed data should be made available to the public at a time certain, determined by the Secretary of the Interior as not being detrimental to the competitive interests of the lessee.

On April 18, 1975, Interior announced that it was proposing new regulations concerning geological and geophysical explorations which would include deep stratigraphic drilling. But indications are that drilling will still be done at industry's preference without Federal involvement or direction to insure adequacy of data coverage. Interior noted that data concerning the geology of the continental margin was a prerequisite to the appraisal of offshore resources, as well as the protection of the environment in the event of future development. In commenting on this report Interior noted that the chief value of stratigraphic drilling would be as an aid in establishing the risk factor and certain potential reservoir parameters.

Under Interior's proposed regulations geological and geophysical data, including processed but not interpreted information, collected pursuant to an exploration permit would be made available for public inspection, as follows:

--Geophysical data including processed information would be made available 10 years after issuance of a permit to conduct exploration.

--Geological data and processed information would be released

1. Immediately through public notice of the discovery during drilling operations of oil shows and environmental hazards on unleased lands when these shows or hazards are judged to be important by the Director, Geological Survey;

2. 10 years after issuance of the permit to conduct exploration except for deep stratigraphic drilling;

3. 5 years after the date of completion of a test well or 60 calendar days after the issuance of the first Federal lease within 50 geographic miles of the drill site, whichever is earliest, for deep stratigraphic drilling.

Written comments concerning the proposed regulations are to be submitted to the Director, Geological Survey. Interior expects that all comments will be received by June 1975.

Interior's proposed regulations do not require industry submission of interpreted data to the Government, but do require lessees to submit interpreted data on operating leases. Their value would seem to be equally, if not more, justified before leasing because they would give Survey the benefit of a broad spectrum of expert analyses for comparison with its own analyses.

Also, Interior's proposed regulations do make a clear distinction among raw, processed, and interpreted data. We believe clarification is needed at this time to avoid disputes at some later date as to which specific data should be made available for public inspection. Furthermore, we believe data retention periods, such as those proposed of 5 and 10 years, should be established only as outside limits and that Interior should strive to make data available for public inspection earlier, if the Secretary determines that to do so would not be detrimental to the competitive interests of the lessee or permittee.

CONCLUSIONS

The Federal Government relies primarily on industry interest in deciding where to lease. Interior has for all intents and purposes left tract selection up to industry. But industry officials admit that they do not have adequate data concerning resource potential of new Shelf areas and wildcat tracts.

Information received from stratigraphic test drilling, carefully located in previously undrilled areas of the Shelf, would be valuable in indentifying areas favorable for oil and gas accumulation. This knowledge would allow exploration and resource appraisal to proceed more scientifically and efficiently than would otherwise be possible. Benefits of stratigraphic test drilling in the Shelf would accrue to both Government and industry and is favored by both.

Interior has recently announced new proposed regulations which would include deep stratigraphic drilling in Shelf areas. But indications are that drilling will still be done at industry's preference without Federal involvement or direction to insure adequacy of data coverage. In all likelihood industry would concentrate its efforts in prime Shelf areas and provide little, if any, information on other Shelf areas.

We believe that the Government should take the lead to insure the development and implementation of a systematic exploration plan for resource appraisal. To the extent the Government finances exploration in implementing the plan the data should be made available for public inspection as soon as practicable. Also, the results of industry-financed activities should also be made available at an early date if the Secretary determines that to do so would not be detrimental to the competitive interests of the lessee or permittee.

Therefore, we proposed to the Secretary of the Interior that he (1) undertake a Government-financed exploration program which would include selective stratigraphic test drilling in all Shelf areas before leasing and (2) issue pre-leasing exploration permits which would require industry to submit all geotechnical data which Survey considered necessary to adequately value Shelf oil and gas resources.

AGENCY COMMENTS AND OUR EVALUATION

Interior, in commenting on this report on April 30, 1975 (see app. I), stated that it believed non-Government-financed presale exploration, including stratigraphic drilling was useful in some instances, but believed that a Government-financed program would not be justified. Also, Interior stated that our second proposal was presently being accomplished.

Interior favored continuing the present system of industry exploration over our proposal to have the Government finance exploration efforts when warranted, because (1) development would probably be delayed for 1 or 2 years and (2) having private industry finance the exploration serves to insure that the exploration was really worth more than it costs.

Although we agree that exploration activities could delay leasing somewhat we are aware of no evidence to indicate that development would be similarly delayed, and Interior does not offer any supportive evidence. Interior's argument does not take into account the fact that exploration is a prerequisite to development in any event whether or not the timing of this activity is before or after leasing. Stratigraphic drilling data is not merely nice to have but by Interior's own account is data which is a prequisite to appraising offshore resources, as well as protecting the environment in the event of future development. We do not agree with the implication of the second point that private exploration is always cost effective and in the best public interest. Obviously, private exploration will continue as long as it is profitable to do so. However, it does not mean that the exploration costs reflected in the prices charged for the commodity and borne by the consuming public are necessarily the lowest costs, and result from the most successful exploration activities. A case in point is the string of exploratory failures under the leases acquired in the December 1973 offer of northeastern Gul. of Mexico acreage. According to industry reports millions have been spent during nearly a year of drilling without reported finds.

Our proposal to insure the availability of all geotechnical information under exploratory permits is not being fully accomplished at the present time, as Interior indicates. First, the December 1974 Secretarial Order on this subject and the April 1975 proposed regulations concerning exploration

activities require the submission of processed data but not interpreted data. Second, availability of data for public inspection has not yet been decided since Interior has only proposed new rulemaking provisions and is awaiting public comments on the proposal.

RECOMMENDATIONS

We recommend that the Secretary of the Interior:

--Direct a geological exploration program which would provide for the development and implementation of a systematic plan for appraising Shelf oil and gas resources, including selective stratigraphic test drilling in Shelf areas, before leasing and which would insure implementation of planned exploration through federally financed activities. Data produced through federally financed activities should be made available to the public as soon as practicable.

--Issue prelease geological exploration permits under which exploratory work could be done and financed by industrial groups with Government approval. All geotechnical data, including interpreted data, should be available to the Government. The raw and processed data should be made available to the public at large at a time certain when determined by the Secretary of the Interior that it would not be detrimental to the competitive position of the permittees. A clear distinction should be made among raw, processed, and interpreted data, to avoid disputes at some later date as to which specific data should be made available for public inspection.

CHAPTER 3

EFFECTIVENESS OF TRACT VALUATION PRACTICES SERIOUSLY HINDERED BY INADEQUATE DATA AND ANALYSIS

Because of inadequate geological and geophysical data and the inability to analyze and interpret available data, Interior cannot reasonably insure the integrity of the valuation system. A major contributing factor is that lease offer size and frequency in 1974 have resulted in an abbreviated valuation program to meet workload demand.

SIGNIFICANCE OF ADEQUATE VALUATION PROGRAM

After industry has nominated the tracts they are interested in, and before offering tracts for lease offer, Interior conducts a preoffer evaluation of the resource potential of each tract. This is an independent evaluation of the worth of each tract offered for lease and the estimated value is used as a primary factor in determining the acceptability of industry bids.

The results of overvaluation and undervaluation of tracts are difficult to assess. Tracts overvalued in relation to industry bids might result in turning down a bid even if there appears to be adequate competition. On the other hand, those undervalued would likely be awarded at less than fair value if there is inadequate competition and could be a bargain to the high bidder.

In situations where the market functions well; e.g., when there are many bona fide bidders and the market is truly competitive, there would be no need for a valuation system to develop a presumed market price.

Interior is attempting to enhance the competitive climate in Shelf leasing. It is proposing new bidding and data disclosure regulations and is undertaking a review of alternative bidding systems. There is merit to Interior actions to create a competitive environment for lease offers.

Some Interior officials argue that the costs to society of overestimating public resource values are greater than the costs of underestimating resource values. The argument is that if the Government overestimates the resource value of a tract, and the high bid is less than the Government estimates, then the tract usually will not be leased

and developed, and the net value of oil will not be recovered. On the other hand, if the Government underestimates resource value, the economic rent of the resource will not be fully captured by the public. However, an Interior official said that this does not mean that the value is lost, only that it accrues to the high bidder (petroleum company) instead of the Treasury. We and others would argue, however, that this is a critical point since these are the public's resources and it is the Government's job to not give them to industry for less than they are worth.

The argument against overvaluation fails to note that the tract's resources are not lost but rather their exploitation is only postponed for later development.

Another Interior official takes the opposite position.

> "If we reject a bid when we should not, the consequences are usually not too serious because we can reoffer the tract later. If we make the opposite mistake, and lease when we should not there is almost no way we can retrieve our error. This says that if we lean in either direction, it should be toward rejecting bids in close cases, not toward accepting them."

The reason it is increasingly important to focus on the valuation system is that the conditions necessary to produce a highly competitive market are not always present. As pointed out in a March 1975 report on Shelf leasing goals, 1/ large acreages offered quickly usually mean spreading bidders and dollars thinly. Once bidders have accumulated sizeable amounts of undrilled property, their incentive to purchase more is reduced, further weakening the market. Availability of equipment, labor, etc., also affects the market. These conditions are likely to increase if present policies are pursued vigorously.

The following sections detail weaknesses in the valuation program and offer suggestions for improvement.

1/Outlook for Federal Goals to Accelerate Leasing of Oil and Gas Resources on the Outer Continental Shelf (RED 75-343), March, 1975, p. 27.

TECHNIQUES USED IN TRACT VALUATION

Survey field offices, with assistance from Interior headquarters are responsible for the preoffer evaluation of tracts.

Factors affecting the value of oil and gas properties on the Shelf, such as the amount and characteristics of reserves, exploration and development costs, levels of taxation and the future prices of oil and gas, cannot be determined. Therefore, the values for each of the factors used for tract evaluation require many judgments and involve many uncertainties which have to be weighed and evaluated on the basis of individual experience, knowledge, and choice.

To deal with the uncertainties involved in the valuation process, Survey uses a scientific technique called the Monte Carlo method of simulation. This method has proven merit in scientific applications and is an accepted industry technique in evaluating petroleum prospects.

Essentially, the Survey evaluation uses a computerized mathematical model that predicts the possible future development of a Shelf tract. Based on the laws of probability, the Survey model predicts 500 possible outcomes that might result from the exploration and development of a tract. A discounted cash flow calculation is performed by computer for each of the possible outcomes, to determine the range of possible values for each tract. The average of the possible values is used as the Government's estimate of the tract's fair market value. The Survey simulation model incorporates over 30 factors which break down into three types of information--geotechnical (geological and geophysical), engineering, and economic.

Of the 30 factors used in the model, the 9 listed below have more impact on Shelf tract valuation than others.

Type of information	Variable factors	Factor definition
Geotechnical (geological and geophysical	Number of productive acres	Volume of predicted reservoir(s)
	Reservoir thickness	" " " " " "
	Dry risk	Percentage chance that track will not contain hydrocarbons
Engineering	Recovery factor for oil	Proportion of oil and gas in reservoir expected to be recovered
	Recovery factor for gas	" " " " " "
	Development costs	Cost of exploratory and development drilling and platform construction
Economic	Oil price	Prices expected over the life of the project
	Gas price	" " " " " "
	Discount rate	Minimum rate of return used in determining the present value of expected cash flow

The following table serves to illustrate the sensitivity of the tract values to changes in the factors. We computed the differences in dollar value of a tract which Interior valued at about $9 million by introducing into Interior's computation a factor change of plus and minus 50 percent. It should be noted that 50 percent was used only to highlight the sensititivity of changes. We are not suggesting that the revised factors should be used in the valuation model or that they are necessarily more realistic indicators of existing condidtions.

Factor type	Factor value used by Interior (note a)	Factor value used by GAO	Percentage change in factor values	Change in dollar value of tract (millions)
Discount rate	13%	6.5%	-50	+6.6
	13%	19.5%	+50	-3.4
Dry risk	50%	25%	-50	+5.2
	50%	75%	+50	-5.1
Producing Acres	573	286.5	-50	-5.0
	573	859.5	+50	+4.7
Reservoir thickness	100ft.	50ft.	-50	-5.0
	100ft.	150ft.	+50	+4.7
Projected oil price (per barrel)	$6.50	$3.25	-50	-4.2
	6.50	9.75	+50	+4.2
Oil recovery factor (barrels per acre foot in reservoir)	480	240	-50	-3.6
	480	720	+50	+3.5

a/Most probable factor value. All factors except the dry risk factor have a range (minimum, maximum, and most probable)

The geotechnical factors used in the Government's Monte Carlo model determine the volume of oil and gas resources for each Shelf tract. Estimates of the values of the factors involve collective interpretive efforts of Survey geophysicists, paleontologists, geologists, and engineers.

Essentially the role of each is as follows:

--Geophysicists use seismic information to construct three dimensional maps of the tract's subsurface structure to identify possible reservoirs.

--Paleontologists and stratigraphers use well data to extrapolate the paleontologic ages and zones of the subsurface sediments, and the number, depth, and

thickness of potential reservoir beds expected to be encountered on the tract to be offered.

--Geologists, by studying the above information, the drilling history of the area in which the tract is located, the results of specially processed seismic information, (bright spots, sand/shale) estimate the amount and type of resources expected to be found on the tract.

--Engineers, together with geologists, determine the probability that the tract's geological structure will be dry; i.e., will not contain hydrocarbons in commercial quantities, based on the entire spectrum of data used in the resource evaluations.

Both Government and industry officials told us that petroleum scientists having access to the same data would not necessarily agree among themselves about interpretations of data used in estimating dollar value for a given tract. Thus different values would result.

TRACT EVALUATION BASED ON INADEQUATE DATA AND ANALYSIS

Because of data limitations neither Government nor industry knows for certain whether a tract contains oil or gas before drilling. Therefore, resource estimates represent only an intelligent guess as to the availability and value of the resources.

The source and characteristics of the data base for each information type, and shortcomings in the availability and use of this data are discussed in the following sections.

Geological data

With poor or missing geological data the Government is likely to conservatively estimate tract dollar values in undeveloped areas. According to Survey scientists their evaluations in the Gulf of Mexico offer in December 1973 (Mississippi, Alabama, and Florida) were conservative mainly because of the lack of well data for the area. Survey valuation of the tracts receiving bids for that sale was less than 10 percent of the high bids.

Regulations require submission to Survey of geological data derived from each Federal Shelf well drilled. Because of this requirement its overall well data base is assumed

to be normally greater than the well data base of any one petroleum company.

This geological data includes various types of well logs, well tests, samples, and production information. Survey must rely on voluntary submission by industry of available State well data that is not public information. As indicated earlier (see pp. 13 and 15) we believe that Interior should undertake an exploration program which would provide for a systematic appraisel of Shelf oil and gas resorces.

Inadequate quantity and use of geophysical data

Survey is at a disadvantage in valuing tracts for lease offer because it does not have as much geophysical data as a given company has for individual tracts, and is trailing industry in its ability to make the best possible use of the information.

Inadequate quantity of data

Geophysical data normally includes regular and specially processed seismic data.1/ This is usually purchased by Survey from industrial sources. Individual petroleum companies also purchase data from industrial sources, and in some cases acquire their own geophysical data.

In contrast to geological data, industry does not now submit to Survey geophysical data collected and processed under exploratory permits issued before lease offer. As indicated on page 12, Interior announced new proposed regulations in April 1975 which would require a permittee to submit to Survey raw and processed geological and geophysical data obtained through his explorations.

1/Seismic surveying is by far the most frequently employed geophysical technique used in Shelf exploration before a lease offer.

Survey usually purchases seismic data on 2x2 mile grid spacing over each tract offered. In contrast, petroleum companies usually purchase or develop their own seismic data on much smaller grid areas, in some cases as small as 1,500x1,500 feet enabling better resource identification.

Until recently, Survey has not considered grid control tighter than 2x2 miles to be necessary because a major structure could be easily identified with such data. But now, according to Survey, all major structures in the Gulf of Mexico have been identified and smaller seismic grid data are needed to identify and evaluate the smaller prospective marginal structures and stratigraphic traps which remain in the relatively well developed areas.

Recently Survey began purchasing "fill-in" seismic data which will effectively give a 1x1 mile grid spacing in many Gulf of Mexico areas. In nonexplored frontier areas, however, for instance the Atlantic, Survey still considers 2x2 mile seismic data ample to identify the larger structures.

In our review of Survey evaluations, we also noted a few cases where Survey had no seismic coverage. According to Survey, no seismic data was available for purchase in these instances. However, the bidding companies probably had seismic coverage because they had either obtained the information themselves or had contracted with a geophysical contractor to obtain it. Survey field officials indicated that they do not contract with geophysical companies for such exclusive work because it is 3 to 4 times more expensive than buying on the nonexclusive open market.

We believe that Interior should issue exploration permits requiring industry to submit all geophysical data, including interpretive data, which the Government considers necessary to adequately value Shelf oil and gas resources. The raw and processed data should be made available to the public at a time certain as determined by the Secretary of the Interior. As indicated earlier Interior's proposed regulations do not require that interpreted data be made available to the Government.

Also, we believe that Interior should finance geophysical exploration to insure the implementation of a systematic exploration plan. The program could provide for gathering the data under the terms of an exclusive Government contract with drilling contractors. The data gathered under such arrangements should be available to the public as soon as practicable.

Government not able to use data now on hand

Workload pressures caused by increases in lease-offer size and frequency in 1974 have resulted in an abbreviated evaluation program to meet workload demands. Survey is not able to use some seismic data now on hand to adequately evaluate potential petroleum accumulations.

Two of the most critical factors which determine tract value are reservoir acreage and thickness. These variables are used to determine the volume of the reservoir and are estimated by a geoscientist from analysis and interpretation of seismic structure maps and geological data from nearby wells, if available.

The number of structure maps a geoscientist is able to construct and interpret is one of the most important aspects of the evaluation since it represents potential petroleum accumulations at various subsurface horizons or levels. The fewer maps prepared the more uncertain the evaluation is and a conservative estimate of resources if likely to reflect that uncertainty. According to Survey, for most tracts, structure maps at two or more horizons are needed to insure a reasonably accurate profile of the subsurface structure.

Before the 1974 lease offers, Survey normally prepared from seismic information, structure maps at two different horizons. However, in a June 1974 memorandum to the Chief, Conservation Division of Survey, concerning lease offer evaluation procedures, the Conservation Manager of Survey's Gulf of Mexico Office stated:

> "With the sales increasing in size and the interval between sales becoming more compressed, it is physically impossible for our geophysicists and geologists to prepare multi-horizon maps for every tract."

Thus, for the 1974 lease offers, only one horizon map was prepared for most of the offered tracts. In contrast to the single horizon evaluation, petroleum companies' evaluations of a given tract normally include at least 4 horizon maps, and according to Survey, companies will prepare as many as 10 maps at different horizons for some tracts.

Our discussions with major companies showed indications that tracts are analyzed extensively. One company stated that every technique available is used to

analyze a given tract; and another said that the data for a given tract is "fine-tuned."

In contrast, consider the following example from a March 1974 lease offer which illustrates the consequences in situations where the Government maps only one horizon instead of two or more.

The example group comprised four tracts. A seismic structure map was prepared for an horizon at about 3,500 feet. The interpretation results of this horizon map showed that one of the four tracts had good prospective acres for oil or gas discovery. The other three tracts as interpreted at this horizon showed no prospective acres. If the analysis had stopped at this point, Survey would have considered the three tracts to have no value.

In this instance, however, Survey had time to prepare an additional map for an horizon at about 6,500 feet. The interpretive results of this horizon showed that all four tracts rather than just one had good prospects. The details are shown in the following table.

Tract	Value per one horizon	Value per two horizons	High bid
		(millions)	(millions)
1	Valuable but not computed	$27.4	$24.9
2	None	5.3	14.9
3	"	7.9	23.4
4	"	4.5	23.4

Results of the May 1974 offer provides another example of how evaluations are affected by multiple mapping.

Because of the risk of leasing more acreage than could be adequately evaluated, few multiple horizon maps were prepared in making the tract evaluations for that offer. A Survey analysis of 20 of their tract evaluations for this offer indicated that by not preparing multihorizon maps Survey failed at least twice to identify potential oil and gas accumulations. On one of the tracts Survey placed a nominal value of $144,000--$25 per acre, whereas the high

bid was $4.7 million and the average of the 7 bids was $2.1 million. Similarly, the nominal value of $144,000 was placed on a tract which received a high bid of $5.2 million and an average of $2.6 million for 7 bids.

Inadequate mapping can also lead to possibly overvaluing a tract's worth and result in rejection of a bid. For example, Survey's postoffer evaluation of a tract indicated that:

> "A deeper map would have been desirable to evaluate the remainder of the prospective section but was eliminated due to lack of time. To compensate for this, optimistic values for average net pay and reservoir fill up were used on the shallow horizon."

The optimistic values for the tract, however, resulted in a presale value which exceeded the high bid by about $4.5 million and caused the rejection of the high bid. Survey recommended to BLM that the bid be accepted in this case because of its optimistic estimate, but its recommendation was not accepted.

The results of stratigraphic drilling which we favor could alleviate the mapping weaknesses by delineating potential petroleum accumulations at various subsurface levels. Such knowledge would help define the levels to be mapped.

In addition to inadequate mapping, the accelerated leasing program has precluded a detailed examination of available well data which would aid in the geological and engineering aspects of tract evaluation.

Survey engineers told us that manpower shortages had prevented indepth studies of existing reservoirs.

We believe that Interior should pace lease offers at a frequency which will permit Survey to construct and interpret multiple horizon structure maps.

Government trailing industry in developing and using technological advances

Another advantage industry has in valuing tracts is in developing and testing technological advances in geophysical data enhancement.

Industry representatives told us that they continually explore new ways to use and interpret data to hopefully develop new techniques to reduce uncertainties and risks. According to Interior, individual petroleum companies have computer programs that are capable of analyzing seismic data in many different ways. These programs are considered by the companies to give them a competitive advantage and therefore are kept confidential.

Some new advances, however, do become marketed and available to Survey. One such technique that Survey believes has had a major influence on bidding is the "bright spot." This technique came to the fore in the late sixties and is now used extensively by industry; however, bright spot was not available to Survey on an open market basis until 1973.

Industry has had the opportunity to correlate bright spot data with empirical experience whereas Survey does not yet know how reliable this data is so as to attach a high degree of confidence to data indications.

Survey officials believe that they need much more experience in drilling on bright spot areas before they can match industry's degree of confidence. It should be noted, however, that industry's high confidence may not be well founded. An article in the March 10, 1975, Oil and Gas Journal reports some industry officials as saying that their companies may have relied too heavily on bright spot and caution that a misapplication of the technique or a failure to recognize its limitations could well be the cause of rather high bonus prices that have not been justified by the results.

Examples from recent offers give some insight into the difference more confidence and better information could make in value estimates. Survey analysis of its evaluation of 18 tracts in the May 1974 sale indicated: "We had good bright spot occurrence on or near 5 of the 18 tracts but only increased our chance of success by 10 to 30 percent which is probably not nearly as optimistic as those used by the high bidders on these tracts."

In addition, since bright spots are derived by special processing of seismic data, industry's tighter seismic grids (1500x1500 feet against 2x2 miles or 98 percent smaller grid than the Government) enables industry to sometimes detect bright spots on tracts while Survey can not. For example, in a recent sale, Survey noted on one tract that:

"There was a weak resemblance of a bright spot, which we did not use in our chance of success of 30 percent. Evidently the bidding companies saw reliable bright spots on more seismic lines than were available to us."

Also, according to Survey some petroleum companies appear to have developed techniques for enhancing the quality of seismic data. This enhanced data, not available to Survey, could have a major effect on resource estimation. For example, there are several areas in the Gulf of Mexico where seismic data quality is poor because of channel fills (areas of mud deposits). The mud deposited in these areas blocks out much of the data normally received from seismic information.

Because of the poor data quality, Survey evaluations in these areas have been very conservative for finding oil and gas in relation to the high bids. In a recent offer, for example, Survey valued two tracts at the minimum value of $125,000 each because the data quality prevented the construction of a map. In contrast, the two tracts were valued at $11 and $18 million by the high bidders. Also, Survey could not prepare a complete map for another tract in the areas and as a result Survey valued the tract at $11 million compared to a high bid of $169 million. A major petroleum discovery has since been made on the tract.

Engineering factors not readily measurable

Engineering factors are used in the Government's Monte Carlo model for determining the amount, timing, and rate of petroleum resource recovery. Also as indicated on pages 19 and 20, engineering variables, such as oil recovery factors, have a major effect on preoffer values even when compared to geophysical and geological inputs.

Survey engineers told us that values for the majority of the engineering variables cannot be measured until the prospect has been drilled and developed, or in many cases, until after the structure has been depleted and abandoned. Consequently, engineers must estimate the magnitude of each factor on the basis of experience. Survey engineers noted that the accelerated program and lack of manpower had prevented indepth studies of existing reservoirs which would aid in the engineering aspect of tract evaluation.

One major data problem is the lack of engineering information concerning costs of development in deepwater areas. Presently the deepest well completion in the Gulf

of Mexico is in 374 feet of water. Tracts in water exceeding 800 feet were offered and leased in 1974. This factor will be especially critical in Gulf lease offers scheduled by Interior for 1976, because of the emphasis placed on deepwater tracts.

The value of a given tract (based on the data that is currently in the Monte Carlo computer program and assuming a major reservoir), decreases greatly at progressively deeper water depths. For example, a tract having a value of about $84 million in 400 feet of water decreases in value at 800 feet by about 30 percent, at 1200 feet by about 80 percent, and at 1600 feet by about 90 percent. The maximum platform costs Survey introduced into the evaluation model is $30 million regardless of the water depth. Industry appears to be in a better position than Survey to estimate development costs but according to Survey and officials of four major petroleum companies we talked to, even industry does not know for certain what deepwater development costs will be. The technology for deepwater production is still in the research and development stage.

Economic factors are very speculative

Economic factors presently incorporated in the model include tax rates, oil prices, gas prices, and discount rates (or rates of return on investment). All are very speculative figures. The Government uses the economic factors on the Monte Carlo model to estimate the revenues and expenses expected to result from developing Shelf tracts. Values of the economic factors for each tract offered are normally the same except for drainage tracts.

Drainage tracts are expected to begin production sooner than development or wildcat tracts; therefore, the current market values are used in the Monte Carlo analysis of drainage tracts.

Washington headquarters furnished the oil and gas price and discount rate inputs which are developed by Interior economists and Survey determined the tax rate.

Oil price factor

Expectations about the future price of oil, influenced by longrun supply and demand forces, are very speculative and this holds true for the oil price used in Survey's Monte Carlo simulation.

The oil price was determined by Interior economists on the basis of (1) past oil shale and Shelf lease bids and (2) estimates of future prices obtained from Government agencies and individuals knowledgeable about the oil industry. An Interior official admits that it "could easily be wrong about the level of future oil prices."

Based on various sources Interior assumed for valuation purposes the price of oil lies between $5.50 and $7.50 per barrel, with $6.50 as the most probable price. Exceptions to these prices have been made for drainage tracts, however, since production is expected to come online much sooner than for wildcat tracts. We noted that the most probable prices of oil for drainage tracts ranged from $6.50 to $7.50 per barrel in the March 1974 Shelf lease offer.

Interior computed or solicited the following prices from the two principal sources mentioned above.

Source	Price estimate per barrel
Oil shale bids	$6.50 to $ 7.00
Shelf lease offer	$11.80
Individual forecasts	$6.50 to $10.00

According to an Interior headquarters official, he and Bureau of Mines personnel arrived at the oil shale price estimate by analyzing the first two oil shale tract offers. He told us he believed this figure represented the oil industries' estimate of future oil prices, since at least 5 years is required to reach production. To arrive at a price range for use in the Monte Carlo valuation method he arbitrarily reduced the price by $.20 (on the assumption that the Shelf oil was of lower quality) and estimated that it would sell $1 below or above the $6.50 figure to arrive at the $5.50 to $7.50 oil price now being used.

Interior corsidered the price of $11.80 per barrel implied from a recent lease offer to be too unreliable because Interior suspects that Survey's reserve figures for the leases could have been conservative and caused the higher bid price. The other forecasts which, according to Interior, were obtained through discussions with Government officials, a consulting firm, and an oil company in September 1973 were believed to be in the same general range as the oil shale based price estimate.

The $5.50 to $7.50 oil price range used in the Monte Carlo evaluation method is much lower than the January 1975

domestic oil prices of about $10 per barrel. According to Interior officials the $5.50 to $7.50 range was used through the October 1974 lease offer although the domestic price was about 50 percent higher or $10 per barrel at that time.

In the February 1975 offer a $5.00 to $11.00 oil price range was used in the Monte Carlo valuation. A $7.00 per barrel price was used as the most probable oil price in the February offer. An Interior official informed us that no analysis was performed to arrive at the $5.00 to $11.00 range. This range was a "common sense" estimate of future oil prices under various assumptions about future political and economic conditions which would have an impact upon the price of oil. As discussed previously, the price of oil is one of the most important factors in the Monte Carlo method for establishing the dollar values of the leases. An increase in the oil price used in the evaluation process greatly increases the value of the tracts. (See p. 20.)

Gas price factor

In evaluating Shelf tracts Interior has assumed a future expected price range for natural gas between 55 cents and 75 cents per thousand cubic feet with 65 cents per thousand cubic feet as the most probable future price. The projected gas prices were determined by analyzing excess demand in the natural gas market. Interior concluded that, although natural gas prices in interstate markets are presently controlled at 50 cents per thousand cubic feet by the Federal Power Commission, the pressure for higher gas prices resulting from the excess demand for natural gas "will likely lead to accommodations in regulatory policy." Interior noted that evidence of excess demand is indicated by negotiating gas contracts for as much as $1 per thousand cubic feet in uncontrolled intrastate markets. We noted that the uncontrolled price could be much higher; for example, the January 1975 price of gas sold on a free market basis within Louisiana was about $2 per thousand cubic feet.

Tax rate factor

Survey developed the tax rate by determining the average taxes paid as a percentage of total revenue in 1972 for 20 large petroleum companies. The tax rate distribution used lies between 10 and 19 percent with a most probable rate of 13 percent. Survy does not know how, nor could we determine how, this rate compares to that used by companies in valuing individual tracts. According to Survey, companies calculate annual income taxes on a company-wide basis rather than on a lease-by-lease basis.

We believe that Interior could improve the economic factors by establishing procedures, requiring periodic assessments and, if warranted, adjustments in such factors, on the basis of the most current information available.

Other economic factors which the Government is not able to quantify

In addition to the many uncertainties inherent in interpreting and processing geophysical and geological data, we were told there are many market place factors which industry considers but which Survey could not and never will be able to consider. These factors, as enumerated by industry are

--the degree of optimism for given tracts in a given offer;

--the need for additional acreage to insure continued efficient use of equipment and manpower;

--the need for insuring continuing supplies to pipelines and refineries;

--the company's contractual commitments which will have to be met by new sources;

--the company's assessment of competition;

--the company's other economic considerations such as tax and profit position;

--the tract may be adjacent to one already leased, in which case the development cost would be less, since equipment, facilities, and manpower are already in the area;

--the company's comprehensive corporate plan may include the area and the tract is a key piece for the plan;

--the company may not be represented in the area at the time, and considers this the best opportunity to gain a position.

Because the quantitative impact of these factors on the bids submitted by industry are not known, a company's evaluation of a given tract is difficult to equate or reconcile to the Government's value.

Analysis of bid adequacy

Although Survey is primarily responsible for determining the Government's preoffer estimate of trac. value, responsibility for the postoffer analysis of bid adequacy is vested in BLM. BLM's lease award decisions are subject to the Secretary of Interior's final approval.

It has not been BLM's firm policy to reject as inadequate all high bids which are less than the Government's preoffer value. Since preoffer evaluations are based on geological, engineering, and economic speculation, BLM also considers other factors such as competition, bidder performance, and the quality of data used in the evaluation in addition to the Government's preoffer value.

Our study of BLM's lease award decisions for the 4 offers in 1974 indicated that BLM accepted all high bids which exceeds 82.6 percent of the Government's preoffer value. BLM told us that they use this cutoff percentage because a tract which is rejected normally cannot be re-offered for 2 years because of appeals. The 82.6 percent figure is Government's present value of the tract discounted for 2 years at a 10 percent discount rate. In a few cases, BLM has accepted bids which were less than the Government's estimate on the basis of other factors such as competition, bidder performance, and the magnitude of the bid.

CONCLUSIONS

The existence, magnitude and economic producibility of oil and gas on the Shelf cannot be definitely determined before drilling. Because of inadequate data and analysis the Federal Government cannot reasonably insure that a fair market value is received in lease sales of Shelf oil and gas resources in which competition is not adequate to protect the public interest. Increases in Shelf sale size and frequency in 1974 have caused workload problems resulting in an abbreviated valuation program and which have also lessened the Government's ability to insure a fair market value return on lease offers. All this occurs at a time when, because of large leasing offers, competition is weakened, thereby making evaluation all the more important.

Although one should recognize that the numerous factors which constitute the valuation process are difficult, if not impossible, to quantify with certainty, the fact is that the Government is not doing all that it can to to reasonably insure fair return on the disposition of oil and gas Shelf resources.

What can be done? First, the Government must take action to insure that sufficient geological data is collected and evaluated before lease offers. As indicated in chapter 2, even industry does not have such data, for undeveloped areas. A geological exploration program which we recommended would help fill a serious data gap. Second, all geophysical and geological data which industry has developed under exploratory permits should be available to the Government for use in the valuation program. Also, Interior should contract for needed exclusive geophysical data not available from industry, and should pace lease offers at a frequency which will permit survey to adequately consider geotechnical data in its Shelf valuation program. Third, the Government should improve the economic factors used in the valuation program by establishing procedures requiring periodic assessments and, if warranted, adjustment in such factors on the basis of the most current information available.

Admittedly, the availability of more and better geological and geophysical data will serve no useful purpose for valuation unless Government personnel can adequately use such data. Evidence indicates that Survey cannot adequately use all of the geophysical information it now has on hand. One might assume, therefore, that a call for more information as outlined above would only add to the inventory of unused data. On the contrary, however, the availability of more geological data and better quality geophysical data would allow improved staff use because of the ability to focus on the most relevant areas.

We believe efficiencies in staff use are also possible through evaluation of Shelf areas on a structure rather than tract basis, which is the present practice. Opportunities available under a structure valuation and leasing concept are discussed in chapter 4.

AGENCY COMMENTS AND OUR EVALUATION

In a letter dated April 30, 1975, Interior agreed to withhold lease offers until Survey could adequately consider geotechnical data in its Shelf evaluation programs. Interior stated that it experienced a "temporary" lack of capacity to accomplish Shelf evaluation programs in the most desirable and specific manner. But it believed that with the personnel hired and trained in fiscal year 1975, and assuming that the budget request for the work in fiscal year 1976 will be funded, Survey capacity to perform timely evaluations would be sufficient to meet lease offer schedules.

In view of the continued growth of Geological Survey's responsibility, both in geographic terms, and in the amount of geological and geophysical data to be interpreted for the tract selection and tract evaluation processes, staffing of technical personnel is likely to be a recurring problem, in our judgment.

Interior's comments regarding Government-financed geophysical exploration and the issuance of permits were reflected in its position concerning Government-financed exploration in general, as discussed on pages 14 and 15. Although Interior now finances some geophysical exploration through exclusive contracts, it generally favors private financing over Government financing of geophysical exploration because of the higher costs of exclusive data. We believe the public interest would be served better if Interior were to finance the collection of geophysical data needed for adequate resource evaluation rather than doing without the data. Under the present practice Interior cannot reasonably insure the integrity of the valuation system.

Interior's written comments did not contain references to our proposal to improve the economic factors used in the valuation program. However, Interior officials told us that they saw merit to formalizing procedures for updating such inputs.

RECOMMENDATIONS

We recommend that the Secretary of the Interior:

--Direct a geophysical exploration program which would provide for the development and implementation of a systematic plan for appraising Shelf oil and gas resources and insure implementation of planned exploration through federally financed activities. Data produced through wholly financed activities should be made available to the public as soon as practicable.

--Issue prelease geophysical exploration permits under which exploratory work could be done and financed by industrial groups with Government approval. All geotechnical data, including interpreted data, should be available to the Government. The raw and processed data should be made available to the public at large at a time certain when determined by the Secretary of the Interior that it would not be detrimental to the competitive position of the permittees.

A clear distinction should be made among raw, processed, and interpreted data, to avoid disputes at some later date as to which specific data should be made available for public inspection.

--Improve the economic factors used in the valuation program by establishing procedures requiring periodic assessment and adjustment in such factors on the basis of the most current information available.

--Pace lease offers at a frequency which will permit Survey to adequately consider geotechnical data in .ts Shelf valuation programs.

CHAPTER 4

IMPROVEMENTS INDICATED IN LEASING AND RESOURCE DEVELOPMENT PRACTICES WARRANT TESTING

In combination with a prelease stratigraphic program in the vicinity of major Shelf geological structures as discussed in chapter 2, further opportunities for improved evaluations and more efficient exploration and development of Shelf oil and gas resources are indicated through (1) evaluating, offering, and leasing entire geological structures rather than on a tract-by-tract basis as in the present practice and (2) unitization of exploration and development activities under which lease owners would agree to unified operating control, including central management.

STRUCTURE LEASING

Under present valuation practices Survey maps the entire geological structure but makes no overall estimates of value and potential reserves of the structure. This is done only for each tract on the structure. In turn, the tract valuations serve as the basis for accepting or rejecting individual bids.

These practices present two major weaknesses involving both the values placed on the tracts and the efficiencies in developing the resources. First, unless extensive structure mapping is done at many levels, geological conditions cannot be adequately identified on a tract-by-tract basis. Consequently, it is very difficult to allocate with any degree of confidence the potential reserves to the various tracts for purposes of valuation. As discussed on pages 24 to 26, presently there is no opportunity for Survey to accomplish the extensive mapping. Since Interior does not always accept bids for every tract for a given structure, only portions of structures are awarded. Industry representatives contend that this checkerboarding practice has constrained development and it prevents the most efficient use of industry resources.

Survey field officials believe that the structure valuation concept would mitigate problems in valuing resources because the overall structure could be adequately identified with less mapping than would be necessary for tract-by-tract valuation. The overall value of the structure could be more realistically established than could the values for any given tract on the structure. Since valuation would be on a

structure basis it would follow that the acceptability of bids on individual tracts not exceeding 5,760 acres (maximum acreage allowed under the Outer Continental Shelf Lands Act) would be judged on a total structure basis--the principal requirement being that the sum total of high bids on the tracts, at least equaled the Government estimate of value on the entire structure. In this way, all tracts within a structure may be leased whether or not the high bid on any one tract meets the Government value of that tract. Under present practice, if the high bid on an individual tract does not meet the Government's value of that tract no award is made, even if the sum of the high bids for the tracts constituting the structure meets the value of the structure.

According to a Survey field office official the structure leasing concept is a technically sound and logical basis for judging the acceptability of bids. Interior's Solicitor's Office, however, believes that since the Secretary is restricted from issuing lease on tracts greater than 5760 acres, the decision to accept or reject a bid cannot be made on a structure basis if the structure exceeds the acreage limitation. Apparently, the Solicitor's Office believes the Secretary lacks authority to accept an individual high bid on the tract that is less than the Government value of that tract even if the sum of the high bids for the tracts constituting the structure exceeds the fair market value of the structure; and that he lacks authority to reject an individual high bid that equals or exceeds the value attached to the tract where the sum of the high bids does not equal or exceeds the fair market value of the structure.

Industry officials told us that generally it is not uncommon for lessees to control leases covering a portion of a structure. If the lessees find through exploration that oil and gas are present on a portion of the structure there is a reluctance to develop the leases until after the remaining portion of the structure is offered for fear that their competitive edge will be disclosed throughout industry (lessees' exploratory data are proprietary and are not public).

Conversely, if other portions of the structure are not offered within 5 years the lessees are required by the lease terms to commit capital, manpower, and equipment to drill or relinquish the lease and at a location on the structure which may not be the best for its overall development.

A structure leasing program could take several forms. At least two major oil companies have put forth proposals for leasing whole structures. One proposal provides, in part, that bids be made for an undivided working interest in a group of blocks which cover an entire geological structure.

Parties could bid for any amount of working interest, but bids would be awarded to those individuals or companies who bid the highest 1-percent working interest. For example, a bid of 30-percent working interest at a rate of $100,000 per 1 percent would result in a total dollar bid of $3 million. The structure would be developed by a single operator who would be selected by the Government from among the high bidders.

Another proposal calls for leasing acreage covering the entire structure including all tracts that lie in whole or in part on the structure, even if some of the tracts have not been nominated by industry. Interior would offer leases for the highest cash bonus bid only, under the proposed system.

We believe Interior should, by means of a test program, pursue the merits of structure leasing to determine its usefulness and general applicability in leasing and developing offshore oil and gas resources. Interior also should seek a change in the law if, in defining a test program, it finds that the acreage limitation would preclude conducting the test in the most effective and practical manner.

Unitization agreements

The structure leasing concept could be effectively used along with a prelease unitization agreement whereby all tracts identified to a given structure are effectively combined into and considered as a single lease unit for development purposes. The essence of unitization is the provision for unified operating control, including central management. Typically, an operator with a major interest in the unitized area is designated unit operator or unit manager and acts on behalf of the operators as a whole. Because the entire structure can be explored by one operator, fewer drilling rigs, equipment, and manpower would be required. Shortages now exist in each of these areas and delays could be experienced in exploring and developing broad new areas of the Shelf. A GAO report issued in March 1975 discusses the problems caused by these shortages for accelerated Shelf development.

One industry official told us that unit operation encompassing an entire structure is the ultimate in efficient operation and recovery of the greatest volume of petroleum from any reservoir. It provides the opportunity for an operator to determine the optimum location for production equipment and facilities which will provide the greatest volume recovery with the least investment. Survey officials agree. Interior officials, however, pointed out, in an Interior draft staff paper, the advantages and disadvantages of unitized offshore activities.

According to the paper, among the major problems of mandatory exploratory unitization would be (1) the choice of an appropriate sharing formula, (2) selection of a unit operator and the determination of a drilling plan, and (3) the risk that unitization may become a leaseholding device--as long as a unit plan is in force, some drilling or production anywhere on the acreage included in the unit will maintain the leases on all lands in the unit.

The paper noted that all 15 oil company representatives questioned were in favor of unitization of development and production operations when the conditions warrant it. But all companies prefer voluntary unitization over mandatory unitization. Weighing the advantages and disadvantages, the paper concluded that interior should pursue mandatory unitization of frontier areas.

In light of the above it is fair to say that unitization of offshore exploration and development activities is not without problems, but is a promising tool for more efficient development of badly needed energy resources and should be given serious consideration at this point--especially when industrial resources are so constrained. It should be noted that the unitization concept itself is not new to industry. According to Interior's analysis, about 34 percent of total U.S. offshore oil production and 24 percent of the total gas production in 1973 resulted from voluntary unitization.

In conjunction with testing structure leasing we believe Interior should pursue the merits of mandatory unitization of exploration and development activities to determine its usefulness and general applicability in the Shelf program.

Interior has recently proposed new regulations that would ban joint bidding among the major oil companies. Interior considers oil companies that produce 1.6 million barrels of oil and natural gas liquids a day to be majors. The regulations are intended to encourage participation by smaller oil companies in developing the Shelf through joint bidding by majors and smaller oil companies. We believe that Interior's proposal to ban joint bidding among major oil companies would not be inconsistent with our proposal and would enable smaller oil companies to participate in the development of large structures in the frontier areas which they could not likely do on their own because of the high risks and costs associated with developing these areas.

CONCLUSIONS

Improved valuation and development of oil and gas resources is indicated through evaluating, offering, and

leasing Shelf areas on a geological structure rather than tractby-tract basis. Both Government and industry officials share this belief. Also, efficiencies in exploration and production activities are indicated through unitization whereby lease holdings would be developed under cooperative arrangements among oil companies.

Although these features are not without problems we believe they indicate promising potential which Interior should pursue to determine their usefulness and general applicability in leasing and developing Shelf resources. We believe that an actual test program under which empirical results could be observed and evaluated is needed to provide answers regarding these issues.

AGENCY COMMENTS AND OUR EVALUATION

In a letter dated April 30, 1975 (see app. I), Interior said that it believed that it would be better public policy to recommend analyzing the benefits and costs of both structure leasing and mandatory unitization before any test is conducted. Interior said it planned to conduct such an analysis.

While we do not oppose a cost-benefit analysis, we believe benefits of the proposal cannot be adequately judged without first evaluating tests results.

RECOMMENDATIONS

We recommend the Secretary of the Interior (1) establish a test program to evaluate, offer, and lease entire geological structures, (2) have the program provide for unitization of of exploration and development activities, and (3) seek a change in the law if, in defining a test program, it finds that the acreage limitation would preclude conducting the test in the most effective and practical manner.

CHAPTER 5

SCOPE OF REVIEW

We made our review at Geological Survey's headquarters in Reston, Virginia, and the area office in New Orleans, Louisiana; at the Bureau of Land Management's headquarters in Washington, D.C., and the area office in New Orleans.

We reviewed legislation, regulations, policies, procedures, and practices pertaining to Federal leasing of the Shelf. We interviewed Survey and Bureau of Land Management officials at headquarters, regional, and area offices.

We obtained comments from petroleum industry officials (both major oil companies and small oil operators) dealing with Federal Shelf leasing and implications of Federal goals for oil and gas development.

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

APR 30 1975

Dear Mr. Eschwege:

We have reviewed the draft of the report, Outer Continental Shelf Oil and Gas Development--Improvements Possible in Determining Where to Lease and at What Dollar Value. Our principal criticism is the lack of analysis supporting the following recommendations: (1) to establish a government financed exploration program, and (2) to establish a test leasing program to evaluate, offer and lease entire geologic structures which would provide for unitization of exploration and development activities.

All of these issues are ones we have under study and while we can see positive features to their implementation, we are aware of many drawbacks. We have tried by conversation with your staff, by sharing analyses we have prepared and by formal comments, to bring these problems to their attention. Because we believe the report does not address a number of these issues fairly, we are providing detailed responses to the recommendations and request that these be included in the report. Also attached are specific comments on other statements contained in the report which we feel are inaccurate or lack pertinent additional information.

If after reviewing these comments you feel it would be productive to meet again, we are willing to do so.

Sincerely yours,

Royston C. Hughes

Royston C. Hughes
Assistant Secretary--Program Development and Budget

Mr. Henry Eschwege
Director, Resources and Economic Development Division
U. S. General Accounting Office
Washington, D. C. 20548

Enclosures

Response to Recommendations

Recommendation

Undertake a Government financed geologic exploration program, which would include selective test drilling (stratigraphic) for all Shelf areas prior to leasing. Data gathered in the program should be available to the public.

Response

Critical analysis for the recommendation has not been presented by the GAO, particularly with regard to its cost effectiveness. A key unanswered question is whether the cost of Government financed exploration program would increase in equal amounts the return to the Treasury. GAO offers no estimates of either total costs to the Government or increased benefits. The GAO lists on page 12 several other potential benefits from the recommendation, but does not cite the related disadvantages. More timely resource development is cited as a benefit, but the probable added delay time of 1 to 2 years to conduct stratigraphic tests is overlooked. Improved use of drilling resources is a cited benefit, but the diversion of at least some of these resources to stratigraphic drilling is ignored.

Notwithstanding these inadequacies in the GAO analysis, we think that non-government financed pre-sale exploration, including stratigraphic drilling, is useful in some instances. In fact, we now encourage groups of companies to undertake such drilling themselves. It is important to recognize, however, that limited pre-sale stratigraphic exploration is not by itself sufficient to tell us the size of oil and gas reserves, or to eliminate all uncertainty about the value of individual tracts. Instead, such pre-sale drilling mainly serves to somewhat reduce the risks to purchasers of OCS leases.

Thus, the benefits of pre-sale exploration are limited, we think that a Government financed program would not be justified. First, such a program would probably delay development for 1 or 2 years, and there are high costs to such a delay. Second, having private industry finance the exploration serves to insure that the exploration is really worth more than it costs. For both of these reasons, we think continuing the present system of pre-sale exploration is preferable to initiating a Government financed pre-sale exploration program.

Deep strat tests off-structure will not define reserves for the purpose of establishing dollar values. Chief value would be as an aid in establishing the risk factor and certain potential reservoir parameters involved in dollar evaluations. Lithologic and paleontologic data are useful for stratigraphic projections and in velocity determinations used for geophysical studies.

How many tests, depth of tests, location of tests, etc. are required to meet minimum needs, would reflect differences in the subjective judgments of both Government and oil exploration companies.

The question of off-structure drilling versus on-structure drilling also needs to be reviewed. If holes are drilled on-structure only where they would be drilled anyway after the sale, there is in effect no cost to society of drilling the test before the sale. The same safety precautions would be followed for on-structure stratigraphic drilling as for off-structure drilling.

We also understand that the recommendation is to supplement industry sponsored strat tests and to gather information where necessary to fill remaining information gaps. If government were really to fill all gaps by financing strat tests, what would be the incentive for industry to finance their own interests?

Government now finances some geophysical exploration through exclusive contracts to provide publicly available data for use in environmental impact statements and analyses of geologic hazards at potential drill sites; these data are made available to the public. Exclusive data however are extremely expensive, often costing 20 times as much as comparable commercially available proprietary data.

Recommendation

Pace lease offers at a frequency which will permit Survey to adequately consider geotechnical data in its Shelf evaluation program.

Response

Acceleration of OCS lease sales in FY 74 required expansion of the existing Geological Survey capacity to evaluate the increased acreage offered (over 5 million acres). By way of comparison about 3.0 million acres were offered.

In FY 75 the Geological Survey received authorization to add 140 positions for the accelerated OCS resource evaluation program. The lag caused by receipt of authorization to hire, difficulty in recruiting personnel in view of industry competition, and the need to train inexperienced personnel resulted in a temporary lack of capacity to accomplish OCS evaluation programs in the most desirable and specific manner.

We are also continually refining and updating all inputs into our range of values program for pre-sale evaluation. The engineering inputs to the evaluation process are believed to be adequate and in reality have a minor effect on the pre-sale

values when compared with the geophysical and geologic inputs. The accelerated lease sale schedule with its corresponding increase in acreage offered in each sale has had a definite effect upon our geophysical and geologic input to tract evaluation.

With the personnel who have been hired and trained in FY 75, and assuming that the budget request for this work in FY 76 will be funded, the Geological Survey capacity to perform timely evaluations will be sufficient to meet lease sale schedules. In any event, sales will not be held until adequate evaluations are made.

The following analysis as of April 2, 1975, indicates current status of our OCS resource evalation staffing and an indication of future planning.

OCS Resource Evaluation Staffing

The following represents the total Conservation Division staffing on a nationwide basis authorized vs. actual strengths as of April 2, 1975.

	Authorized	Actual
Gulf of Mexico	328	328
Western Region	177	175
Central Region	308	316
Eastern Region	24	19
TOTAL	837	839

The above figures exclude headquarters positions which are primarily of a staff and policy nature and are not involved directly in the evaluation of individual tracts prior to lease sales.

Of the above figures, 232 positions are devoted to OCS Resource Evaluation. Of the 232 positions, only 3 positions are vacant.

More specifically to the situation in the Gulf of Mexico, as of April 2, 1975, there are no geoscientists positions vacant in that region. The following represents those hired since July 1, 1974.

Geophysicists	Geologists	Total
GS-12-4	GS-12- 2	GS-12- 6
GS-11-5	GS-11- 5	GS-11-10
GS-9- 3	GS-9- 16	GS-9- 19
GS-7- 1	GS-7- 6	GS-7- 7
GS-5- 1	GS-5- 2	GS-5- 3
14	31	45

The GS-5 and 7 levels equate to hires with no experience. At the GS-9 and above, the employee will have had experience in one or more phases of the geologic or geophysical work required in the Conservation Division. The only exception to this would be people with advanced degrees (MS or PhD) who have more extensive academic training thus making up for any lack of specific work experience.

The Conservation Division feels that the intensive recruiting efforts that have taken place in the past 9 months have produced a well-balanced evaluation staff fully capable of discharging our responsibilities in this area. We did not set out to hire all ex-oil company people. Neither did we attempt to hire all GS-5 entry level trainees with only minimum academic training. What we did set out to do was to achieve a balanced work force. We feel that the above statistics from our Gulf of Mexico operation reflect decided success in achieving our objective.

During the coming years, there will be a continual growth of our responsibility, both in geographic terms, and in the amount of geological and geophysical data to be interpreted for the Tract Selection and Tract Evaluation processes. Leasing is expected in the Atlantic, California and Alaskan OCS areas which will require expansion of our staff. We will also have large amounts of processed geophysical data submitted under the new terms of geological and geophysical permits. These data will have to be interpreted and maps prepared. We will also have the lessees estimates of oil and gas reserves in producing and shut-in leases submitted under proposed revised regulations. These will need to be audited and an inventory of OCS oil and gas reserves compiled to support the Department's leasing policy.

In order to meet these needs, it is proposed in the FY 1976 budget request that our Lease Tract Selection and Evaluation of OCS Oil and Gas Resources program be expanded by 44 positions and $2,520,000. A further expansion of staffing needs is anticipated in FY 1977.

Recommendation

Issue pre-leasing exploration permits which require industry to submit all geotechnical data which Survey consider necessary to adequately value Shelf oil and gas resources. Certain data gathered should be available to the public at a time determined by the Secretary of the Interior.

Response

This recommendation is presently being accomplished through issuance of geological permits for drilling on OCS lands. In the past, core drilling has been restricted to shallow tests in the order of 300-1,000 feet. More recently, the Department's policy on deep stratigraphic tests on off-structure locations provides for drilling beyond these depth limits. The two South Texas tests were accomplished under this program and several applications for similar tests in other OCS areas are under consideration. Release of data acquired under these permits has been announced as proposed rulemaking under geological and geophysical data regulations. A Secretarial Order on this subject was also published in the Federal Register on December 16, 1974.

Because of the relevance of the proposed disclosure regulations for geophysical and geological data, the exact provisions of these regs should be included in the report. A copy has been provided GAO.

Recommendation

Establish a test leasing program to evaluate, offer, and lease entire geologic structures. The program should provide for unitization of exploration and development activities.

Response

We have been advised by our Solicitor's Office that since we are restricted from issuing leases on tracts greater than 5,760 acres, the decision to accept or reject a bid cannot be made on a structure basis if the structure exceeds this acreage limitation. Despite the fact that it has been Interior's position to offer whole structures, we have no assurance that either all tracts in the structure will be bid upon or that all bids received will be accepted.

A Departmental paper indicating disadvantages, as well as advantages, of mandatory unitization has been furnished to you to add balance to your report. One of the major disadvantages

pointed out is the effect upon smaller companies unable to meet the forced capital requirements for exploratory and development drilling in a mandatory unitized operation. Mandatory unitization may also be used to hold large amounts of acreage beyond the primary lease term.

As we have previously suggested to GAO, we strongly believe that it would be better public policy to recommend that an analysis be done of the benefits and costs of both structure leasing and mandatory unitizations before any test is conducted. In fact, we plan to conduct such an analysis.

[See GAO note.]

GAO note: Deleted comments, which refer to the draft report, have been considered in this final report.

PRINCIPAL OFFICIALS

RESPONSIBLE FOR THE ADMINISTRATION OF

ACTIVITIES DISCUSSED IN THIS REPORT

	Tenure of office	
	From	To
DEPARTMENT OF THE INTERIOR		
SECRETARY OF THE INTERIOR:		
Stanley K. Hathaway	June 1975	Present
Kent Frizzell (acting)	May 1975	Present
Rogers C. B. Morton	Jan. 1971	May 1975
Fred J. Russell (acting)	Dec. 1970	Jan. 1971
Walter J. Hickel	Jan. 1969	Nov. 1970
ASSISTANT SECRETARY OF THE INTERIOR--ENERGY AND MINERALS:		
Jack W. Carlson	Aug. 1974	Present
King Mallory (acting)	May 1974	July 1974
Stephen A. Wakefield	Mar. 1973	Apr. 1974
John B. Rigg (note a)	Jan. 1973	Mar. 1973
Hollis M. Dole	Mar. 1969	Jan. 1973
ASSISTANT SECRETARY OF THE INTERIOR--LAND AND WATER RESOURCES:		
Jack O. Horton	Mar. 1973	Present
ASSISTANT SECRETARY OF THE INTERIOR--PUBLIC LAND MANAGEMENT (note b)		
Harrison B. Loesch	Apr. 1969	Jan. 1973
DIRECTOR GEOLOGICAL SURVEY:		
Vincent E. McKelvey	Dec. 1971	Present
William A. Radlinski (acting)	May 1971	Dec. 1971
DIRECTOR BUREAU OF LAND MANAGEMENT:		
Curt Berklund	July 1973	Present
Burton W. Silcock	June 1971	July 1973
Boyd S. Rasmussen	Apr. 1966	June 1971
William Pecora	Sept. 1965	May 1971

a/Deputy Assistant Secretary in charge.

b/Became office of Assistant Secretary--Land and Water Resources in March 1973 reorganization.