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APRIL 30, 1984

The Honorable Mike Synar
Chairman, Subcommittee on Environment,
Energy, and Natural Resources
Committee on Government Operations
House of Representatives

Dear Mr. Chairman:

Subject: Improvements Needed in the Department of the Interior's Measurement of Offshore Oil for Royalty Purposes (GAO/RCED-84-78)

As requested in your May 26, 1983, letter, we have reviewed the Department of the Interior's (Interior) activities relating to the measurement of oil produced on the Outer Continental Shelf. Our review focused on (1) identifying the procedures Interior used to ensure that offshore oil production is measured accurately for royalty purposes, (2) determining whether offshore operators[1] are complying with regulations concerning the accuracy of production measurement devices, (3) determining whether Interior uses production measurement data to ensure that sales volumes are reported accurately, and (4) reviewing the extent to which offshore production measurement data are being considered for inclusion in the new Automated Royalty Management Program.

Our review disclosed that Interior does not have assurance that all oil produced on offshore federal leases is accurately measured for royalty determination purposes. We estimate that during 1982, more than one-third of the oil produced in the Gulf of Mexico--about 106 million barrels with associated royalties valued at $571 million--flowed through meters which Interior was not assured were accurate. During 1982, Interior's Minerals Management Service (MMS) did not receive about one-third of the required monthly reports on sales meter accuracy in the Gulf of Mexico. In instances where the reports were received, MMS' review of the test results did not always identify whether meters were operating properly. When meters were reported or found to be operating improperly, there was little or no followup by MMS to

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[1]Companies responsible for such activities as drilling to explore, develop, and produce the oil found on the lease. In most instances, the operator will be the company, or one of the companies, awarded the lease when it was sold. A company may, however, become the operator through various types of agreements with the lease holder.

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ensure that corrective measures, including adjusting sales volumes reported for royalty purposes, were taken. MMS officials in the Gulf of Mexico Region attributed the lack of control over the receipt and review of meter test results to not enough staff. Headquarters MMS officials, however, indicated that automating the receipt, review, and followup process might provide the needed control.

Although Interior is developing two nationwide automated royalty management systems, it does not plan to include detailed meter testing data for verifying the accuracy of offshore oil sales volumes in either system. However, MMS officials plan to include this type of data, on a regional basis, in MMS' Gulf of Mexico Region's automated information system which may be used in conjunction with Interior's nationwide systems to verify the accuracy of reported sales volumes. In any event, we believe MMS should implement plans for improved receipt and review of meter testing results and make greater use of the data it receives to better assure that sales volumes are accurately reported for royalty determination purposes.

BACKGROUND

Interior's MMS has primary responsibility for federal management of offshore oil operations. MMS regulates all mineral exploration, drilling, production, and revenue collection activities related to federal offshore areas. MMS has reported that since the start of the Outer Continental Shelf program in 1953 through December 1983, offshore federal leases have produced approximately 6.4 billion barrels of oil valued at $61.9 billion and federal royalty payments of approximately $10.3 billion.[2] Inaccurate sales meters have an effect, either positive or negative, on the reported number of barrels of oil produced and, therefore, on the federal royalties received.

Oil from federal offshore leases is produced from wells located on platforms in the ocean. Because a large amount of capital is required for offshore oil production, most oil is produced by the major oil companies. These companies may retain possession of the oil, sell it to another company or refinery, or sell the oil to a division of its own company. This oil is transported onshore through pipelines that serve a single well or platform or several wells or platforms. Oil is usually measured at two locations--the point where it is produced and the point where

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[2]Minerals Revenues: The 1982 Report on Receipts From Federal and Indian Leases, U.S. Department of the Interior, Minerals Management Service, Royalty Management Program. (Preliminary figures for 1983 provided by the chief of the Reports and Statistics Branch.)

it is sold. The production point is the producing offshore well or platform. However, the point used for sales purposes, where oil is also measured for determining royalty payments, is generally located along the transportation route. In many instances, several oil wells or platforms feed into a single sales point. In other instances, sales will be measured from a single well or platform. The volume of oil sold is recorded on a "run ticket," which documents the sales transaction and provides the basis for federal royalty payments.

Interior regulations require that offshore oil sales be measured in a manner approved by MMS. MMS approves sales locations and the meters used by offshore operators to measure sales volume. Offshore operators are responsible for "proving" (testing and calibrating) each meter at least monthly. The testing determines the relationship between the true volume of liquid passing through a meter and the volume indicated by the meter. The meter factor, expressed as a four digit decimal deviation from "1," expresses this relationship. For example, a meter factor of 1.0010 means that for every 10,000 barrels of oil measured by the meter, 10,010 barrels actually passed through the meter. Sales run tickets document transactions between buyers and sellers and show the adjusted volume of oil sold, which is the basis for federal royalty payments.

Interior regulations require offshore operators to report meter test results to MMS each month. The reports must contain the meter factor obtained from the testing process and information about how the factor was derived. Interior regulations allow a meter factor to deviate no more than $\pm$ 0.0025 from the last test or repair. If the meter factor deviates from the allowable tolerance, it is considered a malfunction and the operator is required to submit a meter adjustment ticket to adjust the sales volume of oil reported for determining federal royalties.

OBJECTIVE, SCOPE, AND METHODOLOGY

Our objective in this review was to evaluate Interior's process for ensuring that offshore oil sales are accurately measured. Specifically, we sought to determine

- --how Interior ensures that offshore oil is accurately measured for royalty purposes,
- --whether offshore operators are complying with Interior regulations concerning accurate oil measurement,
- --whether Interior uses data from meter testing to adjust sales volumes for accurate reporting, and

--the extent to which Interior plans to use production measurement data in its new Automated Royalty Management Program to help verify sales data.

We conducted our review primarily at MMS' Gulf of Mexico Region in Metairie, Louisiana. The Gulf of Mexico Region was selected because it produces over 90 percent of the oil from federal offshore lease areas. We interviewed agency officials, reviewed agency files and documents, and obtained data concerning MMS and offshore operators' offshore oil measurements. We also visited MMS officials in Lakewood, Colorado, responsible for developing the Production Accounting and Auditing System (PAAS) to determine how production and sales measurement data will be used.

To determine whether offshore operators are complying with sales measurement regulations and whether MMS reviews and follows up on operators' activities, we identified all meters used to measure oil at the point it is sold from federal offshore Gulf of Mexico leases. Other meters at point of production were not reviewed because they are not used to measure oil for royalty purposes. From a universe of 441[3] sales meters used during all of calendar year 1982, we selected a statistically random sample of 58 meters to determine how MMS ensured that the volume of oil sold was properly reported for determining federal royalty payments. MMS' Platform Pipeline and Production Approval Unit, which is responsible for receiving the required monthly meter testing reports, provided us with copies of all calendar year 1982 meter testing reports that had been received for the 58 meters in our sample.

We could not determine the actual impact on sales volume or royalty payments caused by the meter testing problems primarily because MMS had not retained the run tickets necessary to make such a determination. We therefore used the following method to estimate the volume of oil which flowed through meters in the Gulf of Mexico and the related royalty payments. According to MMS, the 441 meters in our universe measured approximately 265 million barrels of oil valued at $8.5 billion, with royalties of about $1.4 billion during calendar year 1982.[4] We assumed the 265

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[3]Although approximately 500 offshore sales meters are located in the Gulf of Mexico, our universe consisted of 441 sales meters that were in operation for all of calendar year 1982. We did not include meters which were not operating for the full year. The sample of 58 meters represents a sampling error of ±10 percent at a 95 percent confidence level.

[4]Total Gulf of Mexico oil production during 1982 was approximately 293 million barrels; however, approximately 28 million barrels of oil were measured by meters not included in our universe or measured by equipment other than meters.

million barrels of oil produced were evenly distributed among the 441 meters in our universe; therefore, our sample of 58 meters (13.2 percent of the universe) would have measured approximately 34.9 million barrels of oil during calendar year 1982. We further assumed that production was evenly distributed for each of the 696 meter months (i.e., 58 meters times 12 months) represented during calendar year 1982; therefore, each meter would have measured approximately 50.1 thousand barrels of oil each month. On the basis of this assumption, we projected volumes of oil and related royalties for sales meters affected by meter testing problems in the Gulf of Mexico. (See enc. I.) All figures in the report dealing with meters, meter testing reports, oil volume, or royalty payments are estimates of the universe totals based on our sample of meters, except where noted.

Meter testing problems discussed in this report do not in themselves mean that more or less oil passed through a meter than was actually measured. However, they do mean that there is no assurance that sales volumes have been accurately measured and reported for determining federal royalty payments.

We conducted our review in accordance with generally accepted government auditing standards except that, as requested by the Subcommittee, we did not obtain official agency comments on the draft of this report. We did, however, discuss the results of our review with responsible MMS officials, including the Associate Director for Offshore Minerals Management and the Assistant Director for Program Review, and their comments have been incorporated in the report where appropriate.

MMS NEEDS TO PROVIDE BETTER OVERSIGHT OF OFFSHORE OIL SALES MEASUREMENT ACTIVITIES

Interior does not have assurance that sales volumes have been accurately measured and reported for determining federal royalty payments. Although agency regulations require monthly testing and reporting on the accuracy of sales meters, Interior's monitoring of offshore operators' compliance is not fully effective. Based on projections of the results of our sample of sales meters, MMS did not receive almost one-third of the meter testing reports that would have indicated whether sales meters were tested for accuracy. When MMS did receive meter testing results, our sample results indicated that its review of the data did not always identify whether meters operated properly. Further, Interior did not follow up when meters were reported to be operating improperly or when the data in the meter testing reports were questionable. Most importantly, Interior did not use available data regarding the accuracy or inaccuracy of meters to ensure that reported sales volumes were adjusted for royalty purposes.

Monthly meter testing reports not received

During calendar year 1982, the MMS office responsible for receiving and reviewing meter testing reports did not receive 221, or 32 percent, of the 696 monthly reports that should have been received for the 58 sales meters in our sample. Accordingly, we estimate that 1,680, or 32 percent, of the 5,292 monthly reports for the Gulf of Mexico for 1982 were not received. We estimate that these missing reports could have affected the accurate measurement of over 84 million barrels of oil--representing almost $454 million in federal royalty payments--that flowed through the sales meters.

During calendar year 1982, we estimate that all required monthly testing reports were received for only 68 of the 441 meters. Estimated reporting statistics for the other 373 meters are as follows.

Number of meters	Number of months reports received
68	0-2
53	3-6
107	7-9
145	10-11

MMS did not receive any monthly meter testing reports for two of the 58 meters in our sample during calendar year 1982, even though the meters were used during the full year to measure oil sales.

The absence of meter reports does not mean that more or less oil passed through a meter than was actually measured. However, without knowing whether meters are tested for accuracy, MMS has no assurance that reported sales volumes and federal royalty payments are accurate. According to the Chief of the Platform, Pipeline, and Production Approval Unit, MMS' Gulf of Mexico Region, there were insufficient personnel to ensure receipt of and follow up on reports not received. The unit, which is responsible for receiving and reviewing meter testing reports, had only one person assigned to review and control the receipt of reports. Along with overseeing the receipt of hundreds of reports each month, this person also had other duties that required him to be away from the office about 3 days a week. This resulted in delays in logging in reports and in following up when reports were not received. The chief of the unit told us that additional staff were requested around August 1983 to assist in this effort. We were subsequently told--in January 1984--that two additional persons were assigned to receive meter test reports and follow up on those not received.

MMS officials also said that no action was taken to obtain the missing reports for calendar year 1982 until May 1983. At that time, MMS contacted several operators by telephone who had not submitted a large number of reports and directed them to start sending in the reports. MMS officials said that during 1982, because of concerns the Linowes Commission[5] raised about the theft of oil, priority was given to ensuring that meters were not being bypassed rather than on assuring that monthly meter testing reports were received.

MMS' review of meter testing reports is limited

We analyzed the 475 meter testing reports received by MMS in our sample to determine whether (1) the meters were within prescribed tolerance and (2) MMS ensured that corrective measures were taken when meters were reported to be operating improperly. Based on our review, we made the following projections to the estimated 3,612 reports received:

--3,179, or 88 percent, of the reports received indicated that the meters affecting about 159 million barrels of oil and almost $858 million in federal royalty payments were operating within the prescribed accuracy tolerance;

--289, or 8 percent, of the reports indicated that the meters affecting approximately 14.5 million barrels of oil and about $78 million in federal royalty payments were not within the prescribed tolerance; and

--144, or 4 percent, of the reports indicated that meters affecting over 7 million barrels of oil and almost $39 million in federal royalty payments could not be properly tested to determine whether they were accurate or could not be checked for accuracy because the previous month's meter factor had not been reported or the reports received by MMS were illegible.

On the basis of these figures, an estimated 433, or 12 percent, of the 3,612 reports indicated that the meters were either (1) not operating within the prescribed tolerance, (2) not tested to determine if they were operating within tolerance, or (3) not checked for accuracy because the previous month's factor

[5]The Commission on Fiscal Accountability of the Nation's Energy Resources (Linowes Commisson) was established to advise the Secretary of the Interior about accountability for minerals revenue from federal and Indian lands. In its 1982 report, the Commission concluded that the government's royalty management system needed a thorough overhaul.

had not been reported or the reports received by MMS were illegible.

The MMS official responsible for reviewing the 289 reports, which indicated that the meters were not within the prescribed tolerance, said that because only one person was assigned to review reports, it was usually months after the reports were received before officials were aware that meter factors were out of tolerance. By that time, subsequent reports had been received. Accordingly, MMS did not know whether oil had been run through these meters before they had been repaired, retested, and a new meter factor received. It should be noted that we found no pattern either in the government's or the companies' favor where meters were out of tolerance.

In an estimated 99 of the remaining 144 reports, operators indicated that they could not test meters because of bad weather, low volume, or pumps not working. For the other 45 reports, MMS could not determine if meter factors were within tolerance, because the previous month's factor had either not been reported or the copy of the report received by MMS was not readable. Although Interior regulations allow MMS to require testing at any time, this was not done. MMS officials informed us, however, that in both situations, they closely monitored the next reports received.

In addition, not all the estimated 3,179 reports that indicated meters were within prescribed tolerances were reliable. For example, we estimate that MMS' procedures for ensuring that reliable meter factors are obtained were not followed for an estimated 122 reports. We did not find a pattern of errors favoring operators or the government. To establish a meter factor, according to Interior regulations, a specified amount of liquid must be passed through the meter and be recorded within a 0.0005-tolerance on at least five of six consecutive runs. This process is referred to as "repeatability." These five runs are averaged and used to compute the meter factor. For an estimated 122 reports, this repeatability criteria was not met before computing the meter factor. Accordingly, there was no assurance that the resulting meter factor was reliable.

The MMS official responsible for reviewing the reports said that meter testing reports are infrequently checked for repeatability of runs. Because limited resources are dedicated to reviewing meter testing reports, only the current meter test factor is compared with the prior month's factor to ensure that it is within prescribed tolerance.

Little use made of meter factor although factor is important

MMS makes little use of meter testing reports, other than for determining whether meter factors are within prescribed

tolerances. However, MMS could match run tickets with meter testing reports for out of tolerance meters to ensure that the necessary adjusted run tickets are received and sales volume and royalty payments are correctly computed.

Run tickets are submitted by offshore operators to the Royalty Compliance Office in MMS' Gulf of Mexico Region. However, meter testing data are maintained by the Platform, Pipeline, and Production Approval Unit. According to the chief of the Royalty Compliance Office, although run tickets are regularly submitted by operators to the Royalty Compliance Office, they are not reviewed nor matched to meter testing reports to determine if the proper meter factor was applied. He said that because of storage problems and the fact that this unit did not use the run tickets, they were destroyed around April 1983. He also said that MMS relies on subsequent audits, using run tickets and supporting documentation supplied by the companies, to ensure that royalty payments are correct. Such audits, however, only cover a small percentage of the transactions, and most emphasis is on matching production and sales data, not on reviewing meter testing reports. In this connection, we previously reported[6] that only 5 percent of the federal lease accounts (onshore and offshore) were audited in 1980.

According to the chief of the Platform, Pipeline, and Production Approval Unit, the unit has been receiving run tickets from the Royalty Compliance Office since April 1983 and had planned to use them to verify and follow up meter factor adjustments, but additional personnel were needed. He also said that, as of July 1983, only about 55 percent of the run tickets that were due had been received from operators but the unit had planned to request that all operators submit run tickets directly to it. Because increased lease sales in MMS' Gulf of Mexico Region had caused personnel to be assigned to other duties, plans to match testing reports and run tickets were postponed. However, the two additional persons who were assigned in January 1984 to receive meter test reports and follow up on those not received will also match meter test reports with run tickets.

NEW AUTOMATED ROYALTY MANAGEMENT PROGRAM WILL NOT INCORPORATE METER PROVING AND RUN TICKET DATA

We, the Linowes Commission, and Interior have recognized the need to improve royalty accounting and management. In December

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[6]Oil and Gas Royalty Collections--Longstanding Problems Costing Millions, AFMD-82-6, Oct. 29, 1981.

1980, Interior established a long-range approach to improve its royalty management program by developing two nationwide automated systems for accounting and distributing royalties and for collecting production data. The first system, the Auditing and Financial System, was implemented in February 1983, and although not yet fully operational, it is designed to account for, maintain records of, and distribute royalties received from the production of minerals from federal and Indian lands. The second system, the PAAS, is under development and will report and account for minerals production and sales. For offshore oil sales, the PAAS as planned, will require that operators report production and sales volumes measured at both production and sales meter locations. By matching sales volumes and royalty amounts reported under the Auditing and Financial System with production and sales volumes reported under PAAS, Interior hopes to ensure that the proper sales volumes are being reported and also that correct royalties are paid to the federal government. However, Interior does not plan to include meter testing or run ticket information in either system in order to verify the accuracy of the meter factors used or sales volumes reported.

We discussed meter measurement and reporting problems noted during our review with MMS officials responsible for developing the PAAS. According to these officials, under the PAAS, operators will identify meters and indicate the meter factor applicable to sales volume. However, MMS officials said that because of (1) varying types and significance of run tickets used in onshore and offshore operations, (2) differences in onshore and offshore operating environments, and (3) the magnitude of trying to incorporate thousands of run tickets into an automated system, run ticket information will not be included in the PAAS.

On a regional level, MMS officials indicated that detailed run ticket and meter factor information is planned for inclusion in the Gulf of Mexico Region's automated information system and may be used in conjunction with the nationwide data in PAAS to verify the accuracy of reported sales volume measurements for the Gulf of Mexico Region. However, although planned for inclusion in the regional system, the specific data elements, verification process, and report procedures have not yet been identified or established.

CONCLUSIONS

Interior has a responsibility to ensure that offshore oil sales volumes are properly reported and that the government's share in offshore resources is accurately measured and monitored. Interior's production measurement activities, however, have not assured that sales volumes--used as a basis for royalty payments to the government--are measured accurately. Based on the projections of our sample of meters examined, 32 percent of the required reports attesting to the accuracy of oil sales meters were not

received during calendar year 1982 in the Gulf of Mexico Region. Further, MMS did not identify or follow up all instances where sales meters were out of tolerance, follow up to determine if meter corrections were made, or use information available concerning meter accuracy to ensure that proper sales volumes were being reported by operators for royalty determination purposes. As a result, we estimate that during calendar year 1982 in MMS' Gulf of Mexico Region, about 106 million barrels of oil with royalty value of $571 million passed through meters that MMS had not assured were accurate.

MMS officials in the Gulf of Mexico Region attribute the lack of oversight to insufficient personnel and other priorities and said that they recently have assigned two additional persons to help ensure that future meter testing reports are received and used.

MMS has partially implemented a nationwide automated system to account for oil sales and royalties and is developing another nationwide system for reporting production. In addition, Interior plans to automate meter testing and run ticket information in MMS' Gulf of Mexico Region system. However, even with these automated systems, MMS will not be fully assured that the proper data are being used on run tickets unless they are matched with meter testing reports.

RECOMMENDATIONS

To better assure that sales volumes are accurately reported for royalty payment purposes in the Gulf of Mexico Region, we recommend that the Secretary of the Interior require the Director, MMS, to implement plans for improved receipt and review of meter testing reports and make greater use of the data it receives for this purpose. Through the use of additional staff recently assigned and adoption of automation, to the extent possible, meter testing reports should be matched with run tickets on a selective basis.

When the Auditing and Financial System and the PAAS become fully operational, we recommend that the Secretary of the Interior require the Director, MMS, to use the meter testing and run ticket data from its Gulf of Mexico Region's automated information system in conjunction with the PAAS to verify that reported sales volume measurements are accurate by matching meter testing reports with run tickets as a routine audit procedure.

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The Chairman, Subcommittee on Oversight and Investigations, House Committee on Energy and Commerce, is being provided a copy of this report because of the specific interest he has expressed in this area. Unless this report is publicy announced by you or

the Chairman, Subcommittee on Oversight and Investigations, we plan no further distribution until 30 days from the date of the report. At that time, copies will be sent to the Director, Office of Management and Budget; the Secretary of the Interior; the Secretary of Energy; other House and Senate committees and subcommittees having oversight and appropriation responsibilities for the offshore leasing and development program; and other interested parties.

Sincerely yours,

Charles A. Bowsher

Comptroller General
of the United States

Enclosure

ENCLOSURE I

COMPUTATION OF OIL VOLUMES AND ROYALTIES AFFECTED BY METER TESTING PROBLEMS

Problem category	GAO sample of 58 meters			Projection to Gulf of Mexico sales meters		
	Meter months[a]	Barrels of oil[b] (millions)	Royalties[c] ($millions)	Meter months[a]	Barrels of oil[b] (millions)	Royalties[c] ($millions)
Meter reports not received	221	11.1	$ 59.6	1,680	84.2	$ 453.7
Meter factors[d] out of tolerance	38	1.9	10.3	289	14.5	78.0
Meter factors[d] could not be obtained	19	1.0	5.1	144	7.2	38.9
Total	278	14.0	$75.0	2,113	105.9	$570.6
Total sample	696	34.9	$187.9			
Total universe				5,292	265.1	$1,429.0

[a]Meter months = number of months X meters X percent of time report was not received, the factor was out of tolerance, or the factor could not be obtained.

[b]Volume = $\frac{\text{265 million barrels}}{\text{441 meters X 12 months}}$ = 50,100 barrels per meter month

[c]Royalties = $5.39 per barrel in 1982

[d]Meter factor = a factor which defines the relationship between the true volume of oil flowing through a meter and the volume indicated by the meter.