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Congressional Requesters

Subject: *Oil and Gas Royalties: Litigation over Royalty Relief Could Cost the Federal Government Billions of Dollars*

Oil and gas production from federal lands and waters is critical to meeting the nation's energy needs. This production provided about 31 percent of all oil and 29 percent of all natural gas produced in the United States in fiscal year 2007. Every five years, the federal government decides the areas in the offshore waters of the United States it will offer for leasing and establishes a schedule for individual lease sales. The Department of the Interior's Minerals Management Service (MMS) has conducted these sales at least once per year for at least the past 30 years. During the sales, oil and gas companies bid for the rights to explore and develop the oil and gas resources on these leases and also agree to pay the federal government royalties on the resources produced.

In 1995, a time when oil and natural gas prices were significantly lower than they are today, Congress passed the Outer Continental Shelf Deep Water Royalty Relief Act (DWRRA), which authorized MMS to provide "royalty relief" on oil and gas produced in the deep waters of the Gulf of Mexico from certain leases issued from 1996 through 2000.[1] This "royalty relief" waived or reduced the amount of royalties that companies would otherwise be obligated to pay on the initial volumes of production from leases, which are referred to as "royalty suspension volumes."[2] The DWRRA also authorized the Secretary of the Interior to provide royalty relief to promote oil and gas development or to increase production from leases in the Gulf of Mexico.

In implementing the DWRRA for leases sold in 1996, 1997, and 2000, MMS specified that royalty relief would be applicable only if oil and gas prices were below certain levels, known as "price thresholds," with the intention of protecting the government's royalty interests if oil and gas prices increased significantly. MMS did not include these same price thresholds for leases it issued in 1998 and 1999, and this action raised Congressional concerns that the federal government would lose billions of

[1]These leases are covered under Section 304 of the act, which applies to leases issued between November 28, 1995 and November 28, 2000. However, since no leases were issued in 1995, we refer to these leases as DWRRA leases issued from 1996 through 2000.

[2]Royalty suspension volumes establish cumulative production volumes above which royalty relief no longer applies. Royalty suspension volumes vary according to depth, ranging from a minimum of 17.5 million barrels of oil equivalent in water depths of 200 to 400 meters to a minimum of 87.5 million barrels of oil equivalent in water depths greater than 800 meters.

dollars in forgone revenues.[3] In addition, the Kerr-McGee Corporation—which was active in the Gulf of Mexico and is now owned by Anadarko Petroleum Corporation—filed suit challenging the Department of the Interior's authority to include price thresholds in DWRRA leases issued from 1996 through 2000. Recently, the U.S. District Court for the Western District of Louisiana granted summary judgment in favor of Kerr-McGee concerning the application of price thresholds to those leases.[4] The court held that the DWRRA did not provide MMS with the authority to impose price thresholds on production below the royalty suspension volumes for leases issued under the DWRRA from 1996 through 2000. Interior officials disagree with the court's decision, and in December 2007 the Department of Justice filed notice to appeal this decision. In response to the possible loss of future royalty revenues on these leases, Congress has been considering legislative action.

We reported in April 2007 that MMS's failure to include price thresholds on leases issued in 1998 and 1999 under the DWRRA would likely cost the federal government billions of dollars in forgone royalties, but precise costs were impossible to determine because of uncertain future prices and production levels.[5] However, we developed a number of scenarios to illustrate how different prices and production levels will influence these costs. We determined that, in addition to the $1 billion that had already been forgone, future costs could range between $4.3 billion and $10.5 billion over about 25 years, depending on the future prices of gas and oil and the volumes produced on these leases. MMS also estimated that the Department of the Interior faced losing an additional $60 billion in forgone royalties if it lost legal challenges to its application of price thresholds in all the DWRRA leases issued in 1996, 1997, and 2000. We noted, however, that MMS made this estimate in October 2004 and that this estimate may have included overly optimistic assumptions about the amount of oil and gas production that could occur over the lifetime of the leases. In light of the recent rise of oil prices to more than $100 per barrel and natural gas to $8 per thousand cubic feet and the recent judgment against MMS-imposed price thresholds, you asked us to: (1) update our scenario that illustrates the potential loss of royalties because of the absence of price thresholds in leases issued in 1998 and 1999 and (2) provide an update of the possible consequences of Kerr-McGee's legal challenge on royalties already collected and evaluate the potential for additional forgone royalties if price thresholds no longer apply to future production from the 1996, 1997, and 2000 DWRRA leases.

To update our scenario illustrating the potential loss of royalties from leases issued in 1998 and 1999, we increased the upper bounds of oil and gas prices to $100 per barrel

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[3]By forgone royalties, we mean royalties that would be payable if Congress had not authorized royalty relief under the DWRRA.

[4]*Kerr-McGee Oil and Gas Corp. v. Allred*, No. 2: 06-CV-0439, 2007 U.S. Dist., Lexis 83424 (W.D. La. Oct. 18, 2007).

[5]GAO, *Oil and Gas Royalties: Royalty Relief Will Cost the Government Billions of Dollars but Uncertainty Over Future Energy Prices and Production Levels Make Precise Estimates Impossible at this Time*, GAO-07-590R (Washington, D.C.: Apr. 12, 2007).

and $8 per thousand cubic feet, respectively, well above the levels of our high-price scenario in the April 2007 report. We did not, however, revise our lower bounds for prices. To update the consequence of the Kerr-McGee challenge to royalties already collected, we interviewed MMS officials, reviewed legal documents, and reviewed MMS's estimate on royalties paid to date. To evaluate the potential for forgone royalties on future production from the 1996, 1997, and 2000 leases, we reviewed estimates made by MMS in October 2004 and its more recent estimates released in February 2008. Specifically, we reviewed the methodology and assumptions MMS used to estimate the amount of future oil and natural gas production from DWRRA leases. To assess the likelihood of future oil and gas discoveries on DWRRA leases, we reviewed statistical data on field sizes, discovery success rates, and the availability of drilling rigs in the deep waters of the Gulf of Mexico. We determined that the data were sufficiently reliable for the purposes of this report. We also developed a series of scenarios to illustrate the uncertainty of prices and future production and their effect on the amount of future forgone royalties. A more detailed description of our scope and methodology is provided in enclosure 1. We conducted our review primarily from November 2007 through April 2008 in accordance with generally accepted government auditing standards. These standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe the evidence we obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Summary

Regarding the 1998 and 1999 leases, which included no price thresholds, the cost to the federal government could be significantly more than the upper bound we reported in April 2007 if higher oil and natural gas prices are sustained over the lives of these leases. In April 2007, we developed scenarios that illustrated the federal government could sustain losses of between $4.3 billion and $10.5 billion, depending on production levels and oil and gas prices over about the next 25 years. Assuming similar oil production levels but higher oil and natural gas prices of $100 per barrel and $8 per thousand cubic feet, respectively—prices that are closer to current prices than the maximum prices used in our 2007 scenarios—the upper bound of these scenarios could climb to as high as $14.7 billion, a 40 percent increase. There are no guarantees, however, about what future prices will be. For example, oil prices have topped $130 per barrel since we did the analysis for this report, but it is also possible that prices could fall below our lower price assumptions. Thus, these scenarios should not be viewed as probabilistic estimates of what actual forgone royalties will be, or even firm boundaries within which forgone royalties will fall. Rather, the scenarios reflect reasonable possibilities based on recent experience and possible future prices.

With regard to the 1996, 1997, and 2000 leases, because the U.S. District Court for the Western District of Louisiana ruled in October 2007 that price thresholds do not apply to DWRRA leases, the federal government may have to refund over $1.13 billion in royalties that have already been collected from DWRRA leases issued in 1996, 1997,

and 2000, if the government loses on appeal. The government also faces forgoing additional royalty revenues, which will likely be in the billions of dollars, on future production from these leases. We developed a number of scenarios that illustrate the magnitude of possible forgone royalties at different price levels. For example, our scenarios ranged from $15.1 billion of lost revenue for a low production scenario with $70 per barrel of oil and $6.50 per thousand cubic feet of gas to as high as $38.3 billion for high production levels and prices of $100 per barrel of oil and $8 per thousand cubic feet of natural gas over about the next 25 years. The same caveats apply to interpreting these scenarios as those for the 1998 and 1999 leases.

Overall, our work illustrates that the value of future forgone royalties is highly dependent upon oil and gas prices, production levels, and the ultimate outcome of litigation over price thresholds. Assuming that the District Court's ruling in the Kerr-McGee case is upheld, future forgone royalties from all the DWRRA leases issued from 1996 through 2000 could range widely–from a low of about $21 billion to a high of $53 billion. The $21 billion figure assumes low production levels and oil and gas prices that average $70 per barrel and $6.50 per thousand cubic feet over the lives of the leases. The $53 billion figure assumes high production levels and oil and gas prices that average $100 per barrel and $8 per thousand cubic feet over the lives of the leases.

Not Including Price Thresholds in 1998 and 1999 Leases Could Cost the Government More in Forgone Royalty Payments Should Recent Increases in Oil and Natural Gas Prices Be Sustained

In February 2007, MMS estimated that in addition to the $1 billion in revenues already forgone the range of future forgone revenues is between $6.4 billion and $9.8 billion from not including price thresholds in leases issued in 1998 and 1999. MMS calculated these estimates under a range of assumptions about oil and natural gas prices and future production levels. MMS used two price assumptions—one employing a constant price of $45 per barrel of oil equivalent and the other using the Office of Management and Budget's (OMB) projected oil and gas prices, which escalate through time.[6] For future production volumes from the 1998 and 1999 leases, MMS made low and high estimates. The low estimate did not allow for expected growth in oil and natural gas reserves, while the high estimate included expected growth in reserves based on past experience with oil and natural gas leases in the Gulf of Mexico.[7] Reserves are the amount of oil and natural gas that is believed to be economically recoverable with current technology and prices. Reserve growth is the tendency of the initial reserve estimates to increase in the future as more becomes known about the oil and gas field. We reviewed MMS's assumptions and methodology for estimating the potential forgone revenue from 1998 and 1999 leases and found them to be reasonable.

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[6]One barrel of oil equivalent equals one barrel of oil or 5.62 thousand cubic feet of natural gas.

[7]As oil and gas reserves are developed and more knowledge of the field is obtained, proven reserves generally experience some growth.

In order to provide further perspective on just how much these future costs may vary, we developed and analyzed different scenarios in April 2007 that illustrate how the cost to the federal government is sensitive to changes in both oil and natural gas prices and future production volumes.[8] Accordingly, our scenarios used a range of values for oil and natural gas prices and future production volumes to illustrate the uncertainty surrounding future forgone federal royalty revenues.[9] Because oil and natural gas prices have historically been volatile, at the time we made our initial estimates we selected a variety of prices, including $50 and $70 per barrel of oil and $6.50 per thousand cubic feet of natural gas. In our analyses, we assumed that price thresholds would rise 2.1 percent per year, based on their average annual increase over the past 12 years. Similarly, our scenarios included low and high volume estimates for future oil and natural gas production from these leases. In these scenarios, the estimated forgone royalty revenues vary significantly. For example, an oil price of $50 per barrel and a natural gas price of $6.50 per thousand cubic feet and low production volumes resulted in $4.3 billion in forgone royalties.[10] Alternatively, with $70 per barrel of oil and $6.50 per thousand cubic feet of natural gas, the high production volume assumption yielded $10.5 billion.

In June 2007, MMS also provided an update on the loss of potential royalties from not including price thresholds on the leases issued in 1998 and 1999. MMS used oil and natural gas prices cited within OMB's *Economic Assumptions for the 2008 Budget.* Based on an average oil price of $60.78 per barrel and an average natural gas price of $7.52 per thousand cubic feet, MMS estimated that between $5.3 billion and $7.8 billion may be lost in future royalties. The low estimate assumes that reserves do not grow, and the high estimate assumes that reserves do grow over time.

Because oil and natural gas prices increased substantially since the study we completed in 2007, we developed an additional scenario with higher oil and natural gas prices. We used the same methodology as that in our April 2007 study, updating only the oil and natural gas prices.[11] At an oil price of $100 per barrel and a natural gas price of $8 per thousand cubic feet, a low production level yields potential losses of $8.7 billion. With the same prices and a high production level, potential losses climb to $14.7 billion. It is important to note, however, that there is no assurance

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[8]These scenarios are not probabilistic estimates of what may actually happen with royalty revenue. Rather, they are illustrative examples using estimates of future oil and natural gas production that we believe are reasonable based on the history of leases in the Gulf of Mexico and using oil and gas prices that are within the range of prices that have existed in the past 3 years. As such, we believe the scenarios are reflective of plausible possibilities, but we do not assign any probabilities to any of the scenarios.

[9]The royalty rate for DWRRA leases in less than 400 meters of water is 16.67 percent, and the royalty rate for leases in waters greater than 400 meters is 12.5 percent.

[10]It should be noted that if prices were to fall and remain at or below $36.40 per barrel for oil and $4.68 per thousand cubic feet for natural gas in real 2007 dollars, no royalties would be due even if the price thresholds that were imposed on the 1996, 1997, and 2000 leases were applied to the 1998 and 1999 leases.

[11]See enclosure II in GAO-07-590R.

these recent high oil and natural gas prices will be sustained over the lives of the leases, about 25 more years. For more information on this scenario, see enclosure II.

Kerr-McGee's Challenge of Interior's Authority to Include Price Thresholds in DWRRA Leases Could Result in Refunding Royalty Payments

As of September 30, 2007, leases issued under the DWRRA in 1996, 1997, and 2000 have generated $1.13 billion in royalties for the U.S. government, according to MMS. If the Kerr-McGee decision is upheld on appeal and is applied to all 1996, 1997, and 2000 DWRRA leases, the federal government may be required to refund these royalties. As of November 2007, 57 of the leases issued in 1996, 1997, and 2000 under the DWRRA have produced oil and natural gas upon which royalties have been paid. Only eight of the leases issued in 1996, 1997, and 2000 are expected to produce oil and gas in excess of their royalty suspension volumes. The amount of this excess production is expected to be about 14 percent of the total production from all the leases issued in 1996, 1997, and 2000 that are producing or expected to produce.

In early 2006, Kerr-McGee filed the suit challenging the Department of the Interior's authority to include price thresholds in its DWRRA leases. In effect, this suit sought to remove price thresholds from leases issued in 1996, 1997, and 2000 because Interior did not include price thresholds on leases issued in 1998 and 1999. In June 2006, Kerr-McGee agreed to enter into mediation with Interior in an attempt to resolve the issue; however, the mediation was unsuccessful and litigation resumed. In October 2007, the U.S. District Court for the Western District of Louisiana ruled in favor of Kerr-McGee.

The court held that price thresholds in leases issued under the DWRRA from 1996 through 2000 to Kerr-McGee for oil and gas production below a threshold volume were unlawful. According to the court, "The Interior has no discretion to enact a price threshold requirement that applies to volumes below the minimum volume of royalty-free production." The DWRRA specifies that royalties are not due on certain amounts of production, referred to in the ruling as "the minimum volume of royalty-free production" and referred to by others as royalty suspension volumes. The court agreed with Kerr-McGee's interpretation that the section of the DWRRA that requires mandatory royalty relief prevents Interior from enacting price thresholds for volumes below the royalty suspension volumes.

Senior Interior officials and many congressional leaders disagree with the decision. They believe that Congress intended for royalty relief to apply only during times of low oil and natural gas prices and that the DWRRA grants Interior the authority to set price thresholds for new leases. In December 2007, the Department of Justice filed a notice to appeal the decision.

Congressional leaders are seeking legislative remedies for the absence of price thresholds in DWRRA leases issued in 1998 and 1999. Sections 7502 and 7504 of H.R. 3220, the New Direction for Energy Independence, National Security and Consumer Protection Act, would provide legislative avenues for addressing the absence of price

thresholds. Section 7502 proposes that holders of leases issued in 1998 and 1999 under the DWRRA can request the Secretary of the Interior to amend these leases to include price thresholds. This would formally allow Interior and the lessees to renegotiate these leases. Interior and some companies began negotiations in late 2006 to apply price thresholds to future production from 1998 and 1999 leases. To date, 6 companies have formally agreed to terms, but 44 have not agreed to terms. Section 7504 would exclude parties that hold an interest in DWRRA leases issued from 1996 through 2000 from acquiring new oil and gas leases in the Gulf of Mexico unless the party renegotiates the leases to include price thresholds. This section would also impose a fee on oil and gas production from the Outer Continental Shelf lands in the Gulf of Mexico if these leases are not subject to price thresholds. Section 223 of S. 701, the Strategic Energy Fund Act of 2007, contains an identical provision, as do H.R. 2809 and several other bills.

Kerr-McGee's Challenge Could Also Cost the Government Billions in Future Forgone Royalty Payments

If the Kerr-McGee ruling is upheld on appeal and applied to all DWRRA leases issued in 1996, 1997, and 2000, the potential loss of royalties from future production is likely to be in the billions of dollars, but the exact amount will depend on future energy prices and production levels. MMS estimated in October 2004 that forgone royalties on the 1996, 1997, and 2000 leases could be as high as $60 billion. In 2006, we reviewed MMS's assumptions and methodology for estimating the potential forgone revenue and found them to be reasonable. However, because much has been learned about the productivity of the leases since that initial estimate and because oil and natural gas price expectations have changed, we believe that this estimate needed to be updated. In particular, we found that estimates for reserve growth were overly optimistic in light of a more recent MMS study on reserve growth in the Gulf of Mexico. MMS's 2004 estimates on the size and number of future discoveries also appeared overly optimistic, given historical statistics on field size, a 2006 assessment of the availability of drilling rigs in the Gulf of Mexico, and a smaller number of leases available to drill in 2008 than were available in 2004. MMS concurred with our observations.

In February 2008, MMS released an update on its October 2004 estimate of potential losses from the 1996, 1997, and 2000 leases. MMS estimated a range of potential future forgone revenue between $15.7 billion and $21.2 billion, based on assumptions about oil and natural gas prices and future production levels. MMS used OMB's prices of $80.92 per barrel of oil and $8.70 per thousand cubic feet of natural gas, as cited in OMB's *Economic Assumptions for the 2009 Budget*. For future production levels, MMS made low and high estimates. The low estimate did not allow for expected growth in oil and natural gas reserves, while the high estimate included expected growth in reserves. We reviewed these assumptions and the methodology and found them to be reasonable.

Nonetheless, in order to provide further perspective on just how much these future costs may vary, we developed and analyzed different scenarios that illustrate how the

cost to the federal government is sensitive to changes in both oil and natural gas prices and future production volumes. These scenarios are similar to those we used to illustrate forgone royalty revenue from the 1998 and 1999 leases. To illustrate the uncertainty surrounding potential forgone federal royalty revenues, our scenarios use a range of values for oil and natural gas prices and future production volumes. Because oil and natural gas prices have been volatile and high during 2007 and 2008, we selected oil prices of $70 and $100 per barrel of oil and $6.50 and $8 per thousand cubic feet of natural gas. In our analyses, we assumed that price thresholds would rise 2.1 percent per year, based on their average annual increase over the past 12 years. Similarly, our scenarios included low and high volume estimates for future oil and natural gas production from these leases. In these scenarios, as might be expected, the estimated forgone royalty revenues vary significantly. For example, an oil price of $70 per barrel and a natural gas price of $6.50 per thousand cubic feet and low production volumes result in $15.1 billion in forgone royalties. With the same prices but higher production volumes, this estimate increases to $27.2 billion. Alternatively, with $100 per barrel of oil and $8 per thousand cubic feet of natural gas, the low production volume assumption yields forgone royalties of $21.2 billion and the high production volume assumption yields $38.3 billion. For more detailed information on each of the scenarios and the estimated potential forgone royalty revenue, see enclosure III.

Of the 84 leases issued in 1996, 1997, and 2000 that are currently producing or are capable of producing in the future, 76 do not appear capable of producing amounts of oil and gas that will exceed the royalty suspension volumes. The total amount of oil and gas for these 76 leases below the royalty suspension volumes represents about 86 percent of the estimated amounts that the1996, 1997, and 2000 leases will collectively produce over their productive lives. Thus, only about 14 percent of the production from leases issued in 1996, 1997, and 2000 would be royalty bearing should Interior lose on appeal and the ruling in the Kerr-McGee suit is applied to DWRRA leases issued from 1996 through 2000. In addition to the impact on receiving fewer royalties in the future from the 1996, 1997, and 2000 leases, losing the appeal could also adversely affect the government's negotiation of price thresholds for the 1998 and 1999 leases. Some companies have suspended or delayed negotiations, pending outcome of the Kerr-McGee suit.

Ha!

Agency Comments

We provided a draft of this report to the Department of the Interior and the Minerals Management Service (MMS) for review and oral comments. In commenting on the report, they generally agreed with GAO's methodology and conclusions. In response to their comments, we added clarification as to why the potential for future forgone royalties from the 1996, 1997, and 2000 leases with grown reserves appeared higher than they anticipated. We also incorporated their technical comments as appropriate.

We are sending copies of this report to appropriate congressional committees, the Secretary of the Interior, the Director of the Minerals Management Service, the Director of the Office of Management and Budget, and other interested parties. We will also make copies available to others upon request. In addition, the report will be available at no charge on GAO's Web site at http://www.gao.gov.

If you or your staffs have any questions about this report, please contact me at (202) 512-3841 or ruscof@gao.gov. GAO staff who made contributions to this report include Ron Belak, Glenn C. Fischer, Mark Gaffigan, Dan Haas, and Barbara Timmerman.

Frank Rusco

Frank Rusco
Acting Director, Natural Resources and Environment

Enclosures

List of Requesters

The Honorable Jeff Bingaman
Chairman
Committee on Energy and Natural Resources
United States Senate

The Honorable Carl Levin
Chairman
The Honorable Norm Coleman
Ranking Member
Permanent Subcommittee on Investigations
Committee on Homeland Security and Governmental Affairs
United States Senate

The Honorable Ron Wyden
Chairman
Subcommittee on Public Lands and Forests
Committee on Energy and Natural Resources
United States Senate

The Honorable Nick J. Rahall
Chairman
Committee on Natural Resources
House of Representatives

The Honorable Darrell E. Issa
Ranking Member
Subcommittee on Domestic Policy
Committee on Oversight and Government Reform
House of Representatives

The Honorable Daniel K. Akaka
United States Senate

The Honorable Maria Cantwell
United States Senate

The Honorable Thomas R. Carper
United States Senate

The Honorable Byron L. Dorgan
United States Senate

The Honorable Richard J. Durbin
United States Senate

The Honorable Russell D. Feingold
United States Senate

The Honorable Dianne Feinstein
United States Senate

The Honorable Tim Johnson
United States Senate

The Honorable John F. Kerry
United States Senate

The Honorable Jon Kyl
United States Senate

The Honorable Frank R. Lautenberg
United States Senate

The Honorable Robert Menendez
United States Senate

The Honorable Barbara A. Mikulski
United States Senate

The Honorable Patty Murray
United States Senate

The Honorable Barack Obama
United States Senate

The Honorable Jack Reed
United States Senate

The Honorable Ken Salazar
United States Senate

The Honorable Charles E. Schumer
United States Senate

The Honorable Carolyn B. Maloney
House of Representatives

Enclosure I: Scope and Methodology

To update our scenario that illustrates the potential loss of royalties from leases issued in 1998 and 1999, we revised oil and gas prices upward to $100 per barrel and $8 per thousand cubic feet. The methodology is similar to that described below for leases issued in 1996, 1997, and 2000 under the Outer Continental Shelf Deep Water Royalty Relief Act of 1995 (DWRRA).[12]

To determine the fiscal impacts of price thresholds that may no longer apply to oil and gas leases issued in 1996, 1997, and 2000 under the DWRRA, we first met with Minerals Management Service (MMS) personnel in the Economics Division in Herndon, Virginia. We reviewed their October 2004 estimate of royalties that could be forgone if price thresholds did not apply to 1996, 1997, and 2000 DWRRA leases. We concluded that they followed standard engineering and financial practices and that they had generated the estimate in good faith. Since this estimate, however, additional information became available, and we believed their estimate needed to be updated. MMS concurred. Differences between our current estimates and MMS's 2004 estimate are due to changes in oil and gas prices, updated information on the size of deep water oil and gas fields that have been discovered but are not yet producing, the growth of oil and gas reserves over time, and the availability of drilling rigs in the Gulf of Mexico. MMS updated its 2004 estimate to address these issues and released this updated estimate in February 2008. We also reviewed this estimate and similarly found that it followed standard engineering and financial practices and was done in good faith. During the course of our work, we visited MMS's Gulf of Mexico regional office in New Orleans and interviewed engineers and geologists about technical aspects of oil and gas production in the deep waters of the Gulf of Mexico. In addition, we contacted industry representatives for their opinions on oil and gas exploration and development in the deep waters of the Gulf of Mexico.

Within MMS's Technical Information Management System (TIMS), we identified all 3,401 leases issued under the DWRRA, 2,369 of which were issued in 1996, 1997, and 2000. From this database, we were able to identify the status of these leases, the extent to which they had been explored and developed, and the production that had occurred on some of them. As of April 2008, a total of 94 of the leases issued in 1996, 1997, and 1999 have produced, are currently producing, or are expected to produce oil and gas in the future under DWRRA provisions. Ten of the 94 leases have either stopped producing or appear to be no longer capable of producing significant amounts, 47 are still producing, and 37 are expected to commence production at some future time. As of January 1, 2008, we estimate that about 135 of the additional 1996, 1997, and 2000 leases were still active but had not yet been tested for oil and gas. We also collected pertinent information from TIMS, current through September 2006, on the estimated reserves of leases that are currently producing and leases capable of producing but not yet connected to infrastructure (producible leases). We interviewed MMS personnel in New Orleans to better understand how these reserve estimates were made. For producing and producible leases, we corroborated lease

[12]See GAO-07-590R, enclosure 1, page 8.

information in TIMS with MMS's final bid results. We also obtained recent information on reserve growth for each producing or producible lease and obtained monthly oil and gas production volumes through July 2006 from MMS's Oil and Gas Operations Reports (OGOR). We updated these production data with additional production amounts through December 2007 when these data became available. We reviewed production data for characteristic decline patterns, questioned MMS personnel on how they verified these data and on reasons for periods of time with zero production (predominantly the result of hurricane activity), and compared each lease's cumulative production with reserve estimates in TIMS. We found the data in TIMS and in OGOR to be sufficiently reliable for the purposes of our analysis.

We considered the timing of future production to identify and exclude from our analysis the possible production volumes that will be royalty free when sales prices drop below anticipated price thresholds in the future. However, because only the sales price of $6.50 for natural gas is expected to fall below price thresholds during the time frame of our scenarios, this time is projected to be January 2024, and royalty revenue from gas production after January 2004 is anticipated to be less than 1 percent of total gas royalty revenue, we did not adjust production volumes.

To project production from future discoveries on 1996, 1997, and 2000 leases, we examined MMS projections for future drilling activity, historic discovery rates, average field sizes, and anticipated lease expiration dates for DWRRA leases in waters deeper than 800 meters, where MMS anticipates all the future DWRRA discoveries will occur. First, we assumed that the range for the number of possible untested leases drilled in all of the deep waters of the Gulf of Mexico would be between 30 and 60. This assumption was based on the availability of rigs to drill exploratory wells in waters deeper than 800 meters and MMS projections in the 2006 deep water report. Second, we assumed the success rate of future deep water lease discoveries would be the same for such deep water leases drilled from 1974 through 1995, which was 28 percent. Third, we scheduled the expiration dates of the 1996, 1997, and 2000 leases for each year through 2010 and calculated for each of these years the percentage of all untested deep water leases below 800 meters that would be 1996, 1997, and 2000 leases. We assumed that there would be 3,700 total active deep water leases each year. Fourth, we assumed that each new field discovery would consist of two leases because 97 percent of the existing 198 fields in Gulf of Mexico waters deeper than 800 meters are composed of from one to four leases, with two leases being the average field size. Finally, for 2008 through 2010, we assumed the number of field discoveries on 1996, 1997, and 2000 leases would be between zero and five. This assumption was derived by multiplying the estimated range of untested leases that could be drilled in all Gulf of Mexico deep waters (30 to 60 per year) by an estimated percentage of all deep water leases that will be active untested 1996, 1997, and 2000 leases, and by also multiplying by the assumed historical success rate of 28 percent. We doubled this number in order to account for the average field consisting of two leases and rounded the resulting high number to five. For these new discoveries, we converted these numbers into oil and gas production volumes by multiplying them by the average of the reserves for all producing and producible DWRRA leases.

With these assumptions, we developed several scenarios that illustrate that the potential for forgone royalties is highly dependent upon prices and production volumes. We chose prices of $70 for oil and $6.50 for gas because these were in the range of common prices during late 2007. We also chose prices of $100 for oil and $8 for gas because these prices are close to prices common in early 2008. We did not escalate oil and gas prices over the time period of our scenario. To illustrate the impact of changing production volumes on forgone royalties from producing and producible leases, we assumed low and high production levels. Our low production assumption is equal to MMS's estimated reserves, which we corrected in several instances when cumulative production through December 2007 exceeded estimated reserves projected in July 2006. Our high production assumption is equal to the sum of the estimated reserves for each lease multiplied by its corresponding growth factor. To illustrate the impact of changing production volumes on forgone royalties from future discoveries, we also selected low and high assumptions. Our low production assumption is zero discoveries, and our high assumption is five discoveries. We did not multiply production assumptions from future discoveries by growth factors, but such growth is possible.

Enclosure II: Scenario Illustrating the Sensitivity of Forgone Royalties to Changes in Future Production Volumes from 1998 and 1999 DWRRA Leases at High Oil and Natural Gas Prices

Scenario 1 illustrates possible forgone federal royalty payments resulting from MMS's omission of price thresholds in leases issued in 1998 and 1999 when oil and natural gas prices exceed price thresholds. This scenario updates the upper limit of prices chosen for our previous scenarios that we published in April 2007. In those scenarios, we used oil prices of $36, $50, and $70 per barrel and natural gas prices of $4.50 and $6.50 per thousand cubic feet.

Scenario 1 uses an oil price of $100 per barrel and a natural gas price of $8 per thousand cubic feet and retains these prices over the lives of the leases (see table 1). We illustrate the forgone royalties with both low and high volume estimates of future oil and gas production. In this scenario, the productive time frame is from August 2006 through the lives of the leases, which are about 25 years. In the low production volume estimate, we use MMS's "ungrown reserve" estimates and assume five additional leases are discovered to be productive in the future. Our scenario results in $8.7 billion in forgone royalties. This estimate increases to $14.7 billion in the high production volume case, which uses MMS's "grown reserves" and 10 future discoveries.

Table 1: Scenario 1 Assumes That from 1998 and 1999 Leases, Oil Would Be Sold for $100 per Barrel and Natural Gas Would Be Sold for $8 per Thousand Cubic Feet.

	Ungrown reserves and five future discoveries	**Grown reserves and 10 future discoveries**
Forgone royalties on future production from producing and producible leases	$7.3 billion	$11.3 billion
Additional forgone royalties on future production from leases with new discoveries	$1.4 billion	$3.4 billion
Total forgone royalties	**$8.7 billion**	**$14.7 billion**

Source: GAO.

Enclosure III: Scenarios Illustrating the Sensitivity of Forgone Royalties to Changes in Oil and Natural Gas Prices and Future Production Volumes from DWRRA Leases Issued in 1996, 1997, and 2000

The following two scenarios illustrate the range of possible forgone royalties that could result if price thresholds are no longer applicable to leases issued in 1996, 1997, and 2000.

Scenario 2 illustrates possible future forgone federal royalty payments if price thresholds are no longer applicable to these leases during times when oil and natural gas prices exceed the price thresholds (see table 2).[13] Specifically, we selected an oil price of $70 per barrel and a natural gas price of $6.50 per thousand cubic feet to illustrate the forgone royalties with both low and high volume estimates of future oil and gas production. In this scenario, the production time frame is from January 2008 through the lives of the leases, which is about 25 years. In the low production volume estimate, we use MMS's "ungrown reserve" estimates and assume that no additional leases are discovered in the future. This scenario results in $15.1 billion in forgone royalties. The estimate increases to $27.2 billion in the high production volume case, which uses MMS's "grown reserves" and five future discoveries.

Table 2: Scenario 2 Assumes That from 1996, 1997, and 2000 Leases, Oil Would Be Sold for $70 per Barrel and Natural Gas Would Be Sold for $6.50 per Thousand Cubic Feet.

	Ungrown reserves and no future discoveries	Grown reserves and five future discoveries
Forgone royalties on future production from producing and producible leases	$15.1 billion	$26.2 billion
Additional forgone royalties on future production from leases with new discoveries	$0	$1.0 billion
Total forgone royalties	**$15.1 billion**	**$27.2 billion**

Source: GAO.

Scenario 3 illustrates possible forgone royalties with higher oil and natural gas prices. Using similar assumptions on production volumes as in Scenario 2, $100 per barrel of oil and $8 per thousand cubic feet of natural gas yield $21.2 billion in forgone future royalties for the low production estimate and $38.3 billion in forgone future royalties for the high production estimate (see table 3).

[13]In scenario 2, gas prices drop below price thresholds in the latter years of the producing lives of the leases, but this revenue is anticipated to be less than 1 percent of total gas royalty revenue.

Table 3: Scenario 3 Assumes That from 1996, 1997, and 2000 Leases, Oil Would Be Sold for $100 per Barrel and Natural Gas Would Be Sold for $8 per Thousand Cubic Feet.

	Ungrown reserves and no future discoveries	Grown reserves and five future discoveries
Forgone royalties on future production from producing and producible leases	$21.2 billion	$36.9 billion
Additional forgone royalties on future production from leases with new discoveries	$0	$1.4 billion
Total forgone royalties	**$21.2 billion**	**$38.3 billion**

Source: GAO.

The $36.9 billion in forgone royalties on future production in table 3 is $15.7 billion greater than MMS's highest estimate of $21.2 billion released in February 2008. About half of this difference is attributed to the higher oil and gas prices we used in table 3. The other half of the difference is because we anticipate greater reserve growth than MMS.

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