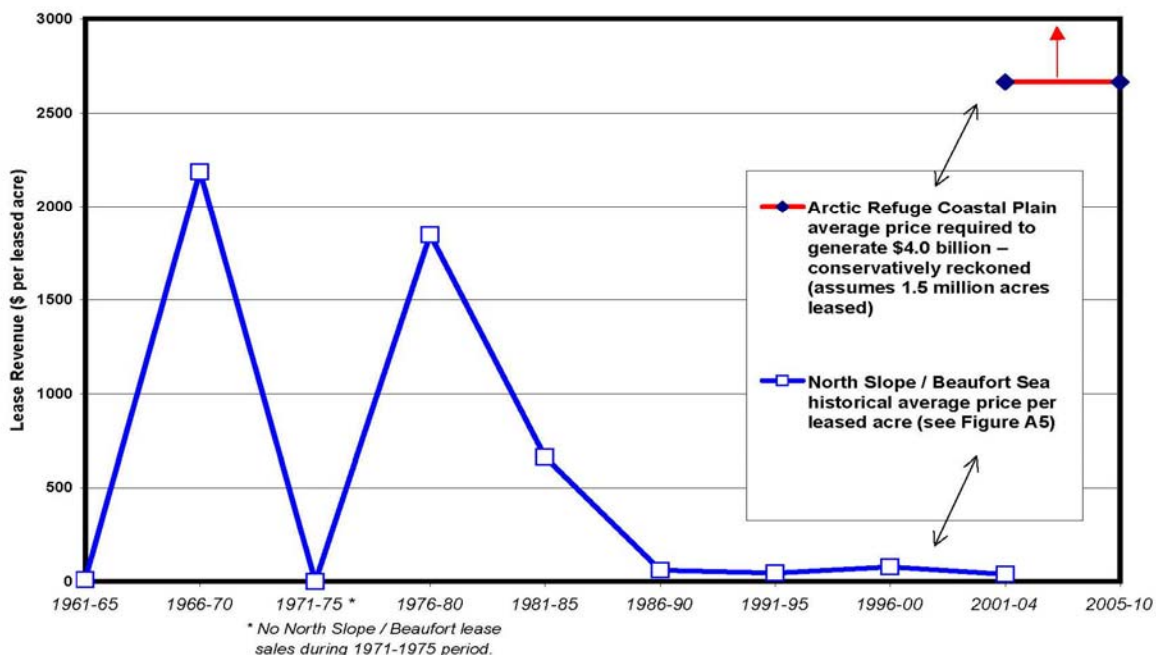


# Projected Bonus Payments from Proposed Leasing On the Arctic National Wildlife Refuge Coastal Plain Greatly Exceed North Slope Historical Trends

**Alaska North Slope Petroleum Lease Revenues, 1961 - 2010**



A Background Report to the Alaska Wilderness League

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## **Executive Summary**

During the last two decades oil companies have been willing to bid, on average, little more than \$50.00 per acre for petroleum leasing rights on Alaska's North Slope and near-shore waters. Despite high oil prices in the last four years, speculating oil companies have been willing to spend less than \$40.00 per leased acre on new northern Alaska prospects in 15 state and federal lease sales.

In sharp contrast to the recent history of relatively modest bonus bids in northern Alaska, the Congressional Budget Office (CBO) has estimated that leasing on the Coastal Plain of the Arctic National Wildlife Refuge will bring in more than \$4.0 billion in lease revenues (with half of this amount going to the federal government). To generate this sum in lease bonus payments, oil companies would have to bid an average of \$2,667.00 per acre for each acre of the 1,500,000-acre Arctic Refuge Coastal Plain. Meanwhile, the President's last two proposed budgets have contained estimates that companies will pay \$2.4 billion to lease 400,000 to 600,000 acres in the first two lease sales on the Arctic Refuge Coastal Plain – an average of \$4,000.00 to \$6,000.00 per acre.

Government lease revenue budget documents contain no explanation for the difference in their estimates, or for the extraordinary disparity between their estimates and long-term North Slope lease bonus payment trends. In considering the marked discrepancy between both government projections and historical data, it should be noted that another major domestic petroleum province, the Gulf of Mexico, has also experienced a significant drop in lease bonus payments during the last two decades, despite discoveries that have sparked major development. The congruence between North Slope and Gulf of Mexico lease bonus payments reflects broad petroleum development trends that further call into question the projections for lease bonus revenues that might be anticipated from the Arctic Refuge Coastal Plain.

Before counting on multi-billion-dollar lease bonus revenues from the Arctic Refuge Coastal Plain, policy makers should seek cogent explanations for the extreme difference between government estimates of bonus bid revenues and the well-established historical pattern of much lower lease bonus revenues from Alaska's North Slope. To the extent that estimates of lease bonus from the Arctic Refuge Coastal Plain are derived from economic models, policy makers should examine carefully the inputs and the methodology of the model or models employed in the estimate.

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## **I. Introduction**

Discussion about whether oil exists beneath the Coastal Plain of the Arctic National Wildlife Refuge (and, if so, how much of that resource might actually be feasible to bring to market)<sup>1</sup> has overshadowed the uncertainty about the revenue anticipated from bonus bids for exploration and development rights on the Coastal Plain. This report focuses on the difference between government estimates of revenue that might be received from front-end bonus bids for petroleum rights on the Arctic Refuge Coastal Plain and (2) the actual results of more than four decades of petroleum leasing on Alaska's North Slope.<sup>2</sup>

Petroleum exploration and development is a high-risk enterprise. Company decisions on whether and what to bid for the right to explore for petroleum are made in the face of unknowns. A promising prospect may turn out to contain no oil or gas, or too little to produce commercially. Even the discovery of hydrocarbons in large quantities does not guarantee that production will be economically feasible. Geologic realities, reservoir engineering and high costs are among the factors that can hinder production of discovered hydrocarbons. In light of these factors, it is not surprising that estimating the amount that companies will be willing to spend on bonus bids for drilling rights on specific tracts is an exercise forged in uncertainty.<sup>3</sup> Computer models try to deal with

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<sup>1</sup> For a comprehensive analysis of the petroleum potential of the Arctic Refuge Coastal Plain, see: ANWR Assessment Team, *The Oil and Gas Resource Potential of the 1002 Area, Arctic National Wildlife Refuge, Alaska*, 1999 (U.S. Geological Survey Open File Report 98-34 [CD]; summary fact sheet, updated in 2001, at <http://pubs.usgs.gov/fs/fs-0028-01/fs-0028-01.htm>).

<sup>2</sup> The subsequent, much smaller annual rental fees, royalties paid on production of discovered oil the disposition of government receipts are beyond the scope of this report.

<sup>3</sup> For a discussion of the risks and uncertainties associated with undiscovered oil and gas resources, see: U.S. Bureau of Land Management, *Northeast National Petroleum Reserve – Alaska, Final Integrated Activity Plan / Environmental Impact Statement*, “III. Oil and Gas Resource Assessment; Uncertainties” (III.[3]), 1998, at <http://aurora.ak.blm.gov/npra/final/html/3a1a3.html>) and U.S. Minerals Management Service, *Undiscovered Oil and Gas Resources, Alaska Federal Offshore*, December 2000 (update), p. 2 (at <http://www.mms.gov/alaska/re/uogr/uogr.pdf>). See also: Robert O. Anderson, *Fundamentals of the Petroleum Industry* (Norman: University of Oklahoma Press, 1984), ch. 6 - 10, esp. pp. 67, 93 and 101.

these uncertainties by simulating possible outcomes. But it is widely recognized that model simulations often depend on subjective inputs and do not always provide reliable prediction of future outcomes. In discussing the risks inherent in North Slope production estimates, a congressional research report pointed out that an estimate of undiscovered resources will be highly dependent on four factors: (1) information available; (2) the estimator's experience; (3) the appropriateness of the methodology; and (4) the economic assumptions used. Unfortunately, the report noted:

Resource estimation is as much art as science . . . . Often, the assumptions — e.g., oil price or state-of-the-art technology — on which North Slope resource estimates have been based are not specified or are vague. . . . often there was no compelling reason to select one source of information over another.<sup>4</sup>

When an area is opened for competitive leasing, bidding interest naturally tends to focus most heavily on those geologic structures or plays judged most likely to contain hydrocarbons. For this reason, bids are unlikely to be distributed evenly throughout a prospective area.<sup>5</sup> Bidders tend to offer the largest sums for acreage in the immediate vicinity of a good prospect, but bid prices typically drop significantly as one moves away from those desirable locations.<sup>6</sup> In light of these well established competitive bidding results, the most useful measure of total revenues from a lease sale is the average bid price per leased acre.

## **2. Alaska North Slope Lease Sale Results, 1961 – 2004**

Since 1961, federal and state lease sales for acreage on Alaska's North Slope and the adjacent waters of the Beaufort Sea (hereinafter referred to as "Alaska North Slope" or "North Slope") have generated bonus bids of nearly \$5.8

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<sup>4</sup> Office of Technology Assessment, *Oil Production in the Arctic National Wildlife Refuge: The Technology & the Alaskan Oil Context* (U.S. Government Printing Office, February 1989 [Report No. #OTA-E-394]), pp. 73, 113, 123.

<sup>5</sup> In 44 Alaska North Slope lease sales on Alaska's North Slope statehood for which relevant data were available, less than 14 percent of the acreage offered received bids that were accepted by government agencies (see Appendix Figure A1).

<sup>6</sup> In 19 lease sales in the Gulf of Mexico during the last decade, high bids were twenty times greater than the average bid per leased acre (see Appendix Figure A2).

billion. In 64 separate lease sales held during this period, petroleum companies leased 18.017 million acres at an average of approximately \$318.00 per acre. More than 90 percent of the bonus payment for North Slope acreage was generated by lease sales before 1990; during the last 15 years, northern Alaska lease sales brought in less than 10 percent of the total amount.<sup>7</sup>

More than two-thirds of the lease bonus payments on the North Slope came from just three lease sales held between 1969 and 1982, when oil companies hoped to find another super-giant field like Prudhoe Bay. Discovered in 1968, the super-giant North Slope bonanza was almost immediately recognized as the largest commercial oil field ever discovered in North America. At those three sales, petroleum companies paid an average of slightly more than \$2,752.00 per leased acre for rights to northern Alaska acreage.<sup>8</sup> But soon after Prudhoe hit peak production at 1.5 million bpd in the early 1980s, the near-shore waters of Alaska's Beaufort Sea coughed up what DOI has called "the most spectacular failure in the history of petroleum exploration." It was called Mukluk and it was thought to contain up to 10 billion barrels of recoverable oil. For the rights to Mukluk, bidders spent an estimated \$1.6 billion. They were sadly disappointed. Plugged and abandoned early in 1984, to this day Mukluk remains, by most accounts, the most expensive dry hole ever drilled.<sup>9</sup> The failure at Mukluk, coinciding with early signs of the coming oil price collapse of 1985, resulted in a severe but temporary curtailment of industry interest in northern Alaska. While industry interest in the North Slope subsequently rebounded,

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<sup>7</sup> See Appendix Figures A1 and A3.

<sup>8</sup> See Appendix Figure A1. The three sales were held in September 1969 (State of Alaska Lease Sale #23), December 1979 (MMS Lease Sale #8F and Alaska Alaska #30) and October 1982 (MMS Lease Sale #71).

<sup>9</sup> *Northeast National Petroleum Reserve – Alaska, Final Integrated Activity Plan / Environmental Impact Statement*, "III. Description of Affected Environment; (2) Petroleum Geology," 1998, at <http://aurora.ak.blm.gov/npra/final/html/3a1a2.html>.

Early in 1984, shortly after Mukluk came up dry, Texaco, a crude-short giant with a 10.7% interest in Mukluk, launched its famous battle with Pennzoil for the crude oil resources of Getty Oil. Thomas Petzinger, Jr., *Oil & Honor: The Texaco-Pennzoil Wars* (G.B. Putnam's Sons, 1987), pp. 138-9, 153, 185, 214.

lease bonus payments most emphatically did not (see Figure 1 and the appendices, below).

One reason for the striking reduction in bonus payments may be that most industry explorers no longer anticipate another Prudhoe Bay on the North Slope. Rather, industry focus has turned from untested (wildcat) geologic plays in remote areas to more modest opportunities near existing infrastructure.<sup>10</sup> The USGS 1998 analysis “precluded accumulations as large as the Prudhoe Bay field,” focusing instead on the potential of production from a combination of smaller – and therefore less economically attractive – fields that might be discovered on the Arctic Refuge Coastal Plain.<sup>11</sup> Whatever the cause, North Slope bonus bid payment never returned to anywhere near the high levels that followed the Prudhoe Bay discovery. Between 1961 and 1990, prospective lessees paid an average of \$564.07 per leased acre for approximately 9.3 million acres on the North Slope. Since that time, lease bonuses have averaged \$53.03 per leased acre for approximately 8.7 million acres. Moreover, despite rising oil prices during the last four years, 15 northern Alaska lease sales brought in an average \$38.92 per leased acre (less than seven percent of the average per leased acre paid during the thirty-year period between 1961 and 1990).<sup>12</sup>

### **3. Congressional Budget Office and Interior Department Lease Bonus Estimates**

In 2003 and 2004, the President’s budget estimated that estimated that the first lease sale on the Arctic Refuge Coastal Plain would bring in \$2.4 billion in bonus bid payments, to be divided evenly between the federal government and

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<sup>10</sup> *Northeast National Petroleum Reserve – Alaska, Final Integrated Activity Plan / Environmental Impact Statement*, “III. Description of Affected Environment; (2) Petroleum Geology.”

<sup>11</sup> Emil Attanasi and J.H. Schuenemeyer, “Frontier areas and resource assessment: Case of the 1002 area of the Alaska North Slope” U.S.G.S. Open File Report 02-119, circa 1999, p. 10.

<sup>12</sup> See Appendix Figures A3 through A5.

the state of Alaska.<sup>13</sup> This estimate is based on the Interior Department assumption that 400,000 to 600,000 acres of the Coastal Plain would be leased in the first sale.<sup>14</sup> To generate this amount in bonus bids, the average price per leased acre would have to range from \$4,000.00 per acre to \$6,000.00 per acre.

The Congressional Budget Office (CBO) projects even higher government receipts from leasing on the Arctic Refuge Coastal Plain. For example, in its March 2004 analysis of the President's budget proposals for fiscal 2005, the Congressional Budget Office (CBO) estimated that leasing a portion of the Arctic Refuge Coastal Plain would generate receipts totaling \$4.0 billion during the 2007-2009 period.<sup>15</sup> In the unlikely event that the entire 1,500,000 acres of the Coastal Plain were leased, it would require an average bid price of \$2,666.66 per leased acre to generate \$4.0 billion. This figure sets the lower limit on CBO's target for Arctic Refuge bonus payments; if bids were accepted on half of the acreage offered, it would take average bids of \$5,333.32 per leased acre to generate \$4.0 billion. The CBO estimate of Arctic Refuge bonus payments has increased since 1999, when the agency estimated bonus bid payments of \$2.3 billion from the Arctic Refuge Coastal Plain.<sup>16</sup>

CBO and DOI lease revenue budget estimates do not provide details about how they arrived at their estimates of bonus payments for acreage leased on the Arctic Refuge Coastal Plain. Nor do they discuss the marked disparity between their estimates and long-term North Slope lease revenue trends.

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<sup>13</sup> See: *Budget of the United States Government for Fiscal Year 2005*, Analytical Perspectives, pp.276 and 279; and *Budget of the United States Government for Fiscal Year 2004*, General Provisions, p. 603.

<sup>14</sup> *Budget of the United States Government for Fiscal Year 2004*, General Provisions, p. 603.

<sup>15</sup> Congressional Budget Office, *An Analysis of the President's Budgetary Proposals for Fiscal Year 2005*, March 2004, p. 12 (<http://www.cbo.gov/ftpdocs/51xx/doc5151/03-08-PresidentsBudget.pdf>).

<sup>16</sup> Congressional Budget Office, *Maintaining Budgetary Discipline: Spending And Revenue Options*, "Open the Coastal Plain of the Arctic National Wildlife Refuge to Leasing," April 1999 (Item 300-12) <http://www.cbo.gov/showdoc.cfm?index=1222&sequence=6>.

#### **4. Analysis**

Despite the persistently low lease bonus bids generated by Alaska North Slope lease sales during the last two decades, government agencies project substantial lease bonus payments from the Arctic Refuge Coastal Plain. The disparity between the government estimates in budget documents and the historical trend delineated above is extraordinary. To generate lease bonus payments projected in government documents, oil companies must make average bids 68 to 154 times greater than North Slope Alaska lease sales have generated, on average, during the last four years.<sup>17</sup>

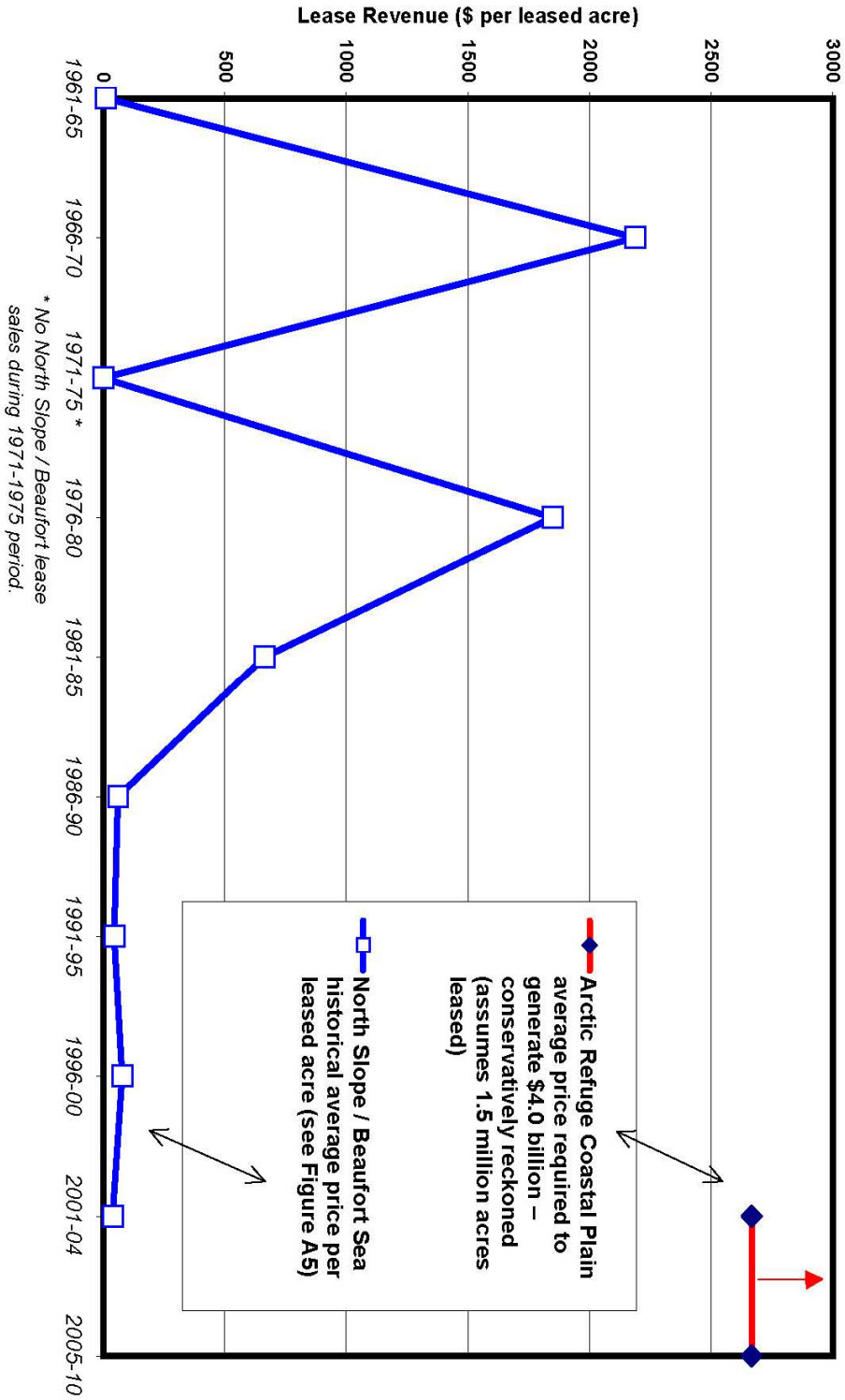
In Figure 1, on the following page, the historical average of Alaska North Slope per-acre bids during the years before the Mukluk dry hole appears as a mountain range, towering over the reduced payments of the last 15 years, which run along the bottom margin of the chart. By comparison, the most conservative government estimate of average lease bonus payments from the Arctic Refuge Coastal Plain (the \$2,666.66 estimate discussed in the previous section) is suspended far above, in the top-right corner. The Interior Department bid estimates of \$4,000.00 to \$6,000.00 per leased acre would be off the chart.

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<sup>17</sup>  $\$2,666.66 / \$38.92 = 68.5$ ;  $\$6,000.00 / \$38.92 = 154.2$ .

Figure 1.

## Alaska North Slope Petroleum Lease Revenues, 1961 - 2010



The disconnect between actual lease sale results and the government bonus bid projections shown in Figure 1 is underscored by the fact, noted above, that even though average northern Alaska lease sales bonus payments have declined during the last five years, over the same period the CBO's estimate has ratcheted anticipated Arctic Refuge lease bonus payments upwards by significant amounts.

Do the high bid results for the Arctic Refuge Coastal Plain predicted by budget documents provide a better guide to the future than the historical record? In considering this question, it might be useful to examine the leasing history of another major domestic petroleum province, the Gulf of Mexico.

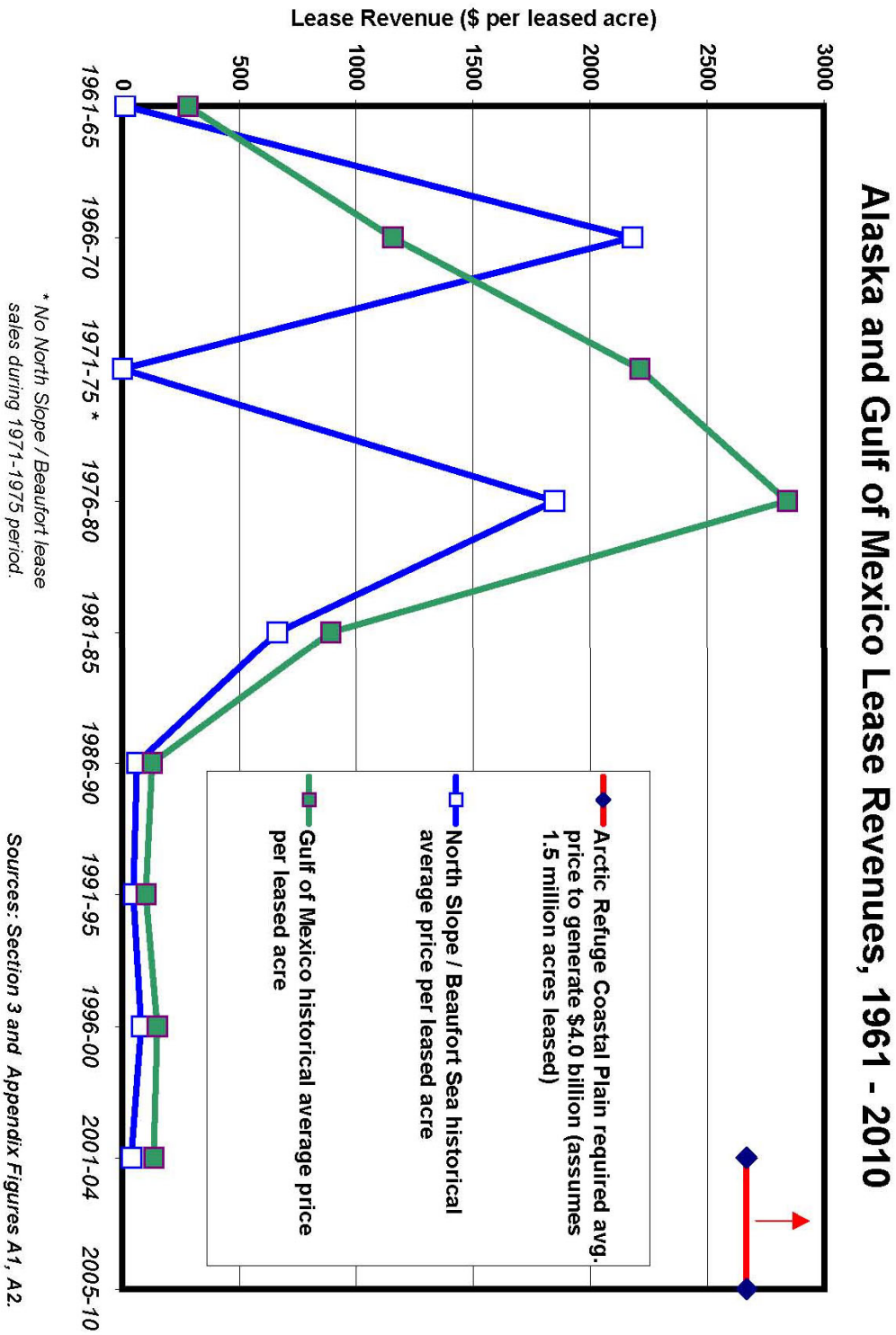
**4.1. Gulf of Mexico.** By all accounts, petroleum development in the Gulf of Mexico is booming.<sup>18</sup> Since 1991, the oil industry has paid more than \$8.0 billion for lease bonus bids in the Gulf of Mexico – 40 percent more than it has spent in northern Alaska since 1961. Nevertheless, the Gulf of Mexico has suffered a decline in the per-acre lease bids that is strikingly similar to the reduced bids on Alaska's North Slope. (See *Figure 2 on the following page.*) In the past fifteen years, Gulf of Mexico bids have averaged approximately \$134.00 per leased acre. As in Alaska, current bonus payments in the Gulf of Mexico are dramatically reduced from previous levels. For example, between 1978 and 1982, average Gulf of Mexico bonus bids ranged from approximately \$2,100.00 to \$4,800.00 per leased acre.<sup>19</sup>

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<sup>18</sup> When British Petroleum CEO Sir John Browne commented that “the most important place to go and find oil is the United States,” *60 Minutes* reporter Leslie Stahl asked him, “Now are you talking about ANWR up in Alaska?” Browne responded: “No, I'd like to first talk about the Gulf of Mexico, offshore Texas and Louisiana. . . . probably one of the greatest new oil provinces in the entire world” (CBS-TV, *60 Minutes*, Feb. 10, 2002 [from transcript]).

<sup>19</sup> For Gulf of Mexico lease sale results, see Appendix Figure A2; for periodic summaries of Gulf of Mexico sale trends, see appendix Figures A3 through A5.

Figure 2.



Apart from the general congruence with Alaska's experience, examination of recent Gulf of Mexico lease data reveals the disparity between high bids and average bids in any given lease sale. Data from 19 Gulf of Mexico sales in the last decade demonstrate that high bids were, on average, twenty-fold greater than the average bids in that sale. In the two sales showing the highest per-acre bids, average bids on leased acreage were less than four percent of those high bids.<sup>20</sup>

The reduced level of lease bonus payments in northern Alaska and the Gulf of Mexico may reflect long-term trends, such as the increasingly clear recognition of the odds against the discovery of new super-giant fields.<sup>21</sup> In any event, the congruence in lease bidding patterns in two major domestic petroleum provinces suggests that before relying on the much higher estimates of lease bonus payments from the Arctic Refuge Coastal Plain projected by some government models, policy makers might wish to identify and consider the plausibility of the specific factors that cause those estimates differ so markedly from historical trends.

#### **4.2. Alpine and the National Petroleum Reserve – Alaska (NPR-A).**

Recent North Slope bidding records confirm the common-sense notion that bid values rise with the discovery of positive prospects. But even the bright spots confirm the magnitude of the disparity between the bidding results the government analysts predict for the Arctic Refuge Coastal Plain and the actual bids received in other areas of the North Slope. For example, after the discovery

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<sup>20</sup> See Appendix Figure A2, showing the disparity between high and average bids per leased acre in 19 sales between 1996 and 2004. The two sales showing the highest bids per acre were held in August 1998 (Western Gulf of Mexico, MMS Sale #171) and March 2004 (Central Gulf of Mexico, MMS sale #190).

<sup>21</sup> Although controversial, this belief is so prevalent that it has graced the cover of *Scientific American* (Campbell C.J., and J.H. Laherrère, *The End of Cheap Oil*, March 1998, pp. 80-86) and, more recently, the front page of the *Wall Street Journal* (Jeffrey Ball, "Dire Prophecy: As Prices As Soar, Doomsayers Provoke Debate on Oil's Future – In a 1970s Echo, Dr. Campbell Warns Supply is Drying Up, But Industry Isn't Worried – Charges of 'Malthusian Bias,'" Sept. 21, 2004, p. A1).

of the Alpine field to the west of Prudhoe Bay in the mid 1990s, an increase in bonus bids was recorded in that vicinity. With an estimated 1.0 billion barrels of oil in place, Alpine is approximately one-twentieth the size of Prudhoe Bay, but still one of the largest field discovered in Alaska and one of the largest fields discovered in the U.S. in recent decades. The Alaska Department of Revenue has estimated Alpine's reserves at about 490 million barrels, with satellites expected to produce another 180 million barrels.<sup>22</sup> As the first major North Slope reservoir discovered in the Jurassic formation, Alpine heralds a new exploration play that has sparked renewed interest in the National Petroleum Reserve Alaska (NPR-A).<sup>23</sup>

The highest per-acre average received from a North Slope lease sale in the past 15 years was associated with the Alpine discovery. But that small offering – for a highly prospective acreage in the Colville Delta north of Alpine in 1996 – netted just \$343.00 per acre for exploration and development rights to 5,901 acres.<sup>24</sup> Subsequently, two larger federal sales in NPR-A near Alpine averaged approximately \$110.00 and \$120.0 per leased acre.<sup>25</sup> Altogether, the three Alpine-vicinity sales resulted in the leasing of nearly 1.5 million acres for approximately \$170.5 million –an average of approximately \$117.00 per leased acre.

In sum, it appears that the discoveries and development in the Alpine area resulted in (or contributed to) a doubling of bonus bids, on average, compared to other recent lease sales on the North Slope. But that increase in bonus bids, based on a major discovery and development, did not alter the long-term trend. Moreover, bonus bids an order of magnitude greater than the increased bids

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<sup>22</sup> See: Alaska Department of Revenue, *Revenue Sources Book: Forecast & Historical Data*, Fall 2002, p., 12; and "ConocoPhillips applies for expansion of Alpine oil pool," *Petroleum News*, August 4, 2004 (<http://www.petroleumnews.com/newsbulletin/157558886.html>).

<sup>23</sup> *Northeast National Petroleum Reserve – Alaska, Final Integrated Activity Plan / Environmental Impact Statement*, "III. Description of Affected Environment; (2) Petroleum Geology."

<sup>24</sup> Alaska North Slope Lease Sale #86A, October 1996 (see Appendix Figure A1).

<sup>25</sup> U.S. Bureau of Land Management Sales NPR-A I, 1999 and II, 2002 (see Appendix Figure A1).

inspired by the success at Alpine would still fall short of the amounts necessary to generate the multi-billion dollar lease revenues CBO and DOI have projected for the Arctic Refuge Coastal Plain.<sup>26</sup> In light of the experience at Alpine, is it reasonable to expect average bids more than an order of magnitude greater from the Arctic Refuge Coastal Plain – a province where oil has *not* been discovered and where, on top of field exploration and development costs, it would be necessary to construct of a major overland pipeline to bring any discovered oil to market?

**4.3. Badami.** Recent production success at Alpine, to the west of Prudhoe Bay, is balanced by a notable failure to the east, toward the Arctic Refuge. In June 2003, BP announced the shutdown of its Badami field, an outpost 25 miles east of the Prudhoe Bay complex and 30 miles west of the western edge of the Arctic Refuge. When Badami entered production in 1998, it was expected to produce approximately 120 million barrels of oil at a peak rate of 35,000 barrels per day. But by early 2003, Badami had produced a total of four million barrels and was pumping at a rate of 1,350 bpd when BP threw in the towel and shut Badami down. BP said one of the problems was that the field was more highly compartmentalized than had been anticipated.<sup>27</sup>

The Badami reservoir is located in a rock structure known to geologists as the Brookian Unstructured Eastern Turbidite Play.<sup>28</sup> This structure extends eastward, where it underlies an estimated 430,000 acres and accounts for approximately one-sixth of the technically recoverable oil that the U.S. Geological Survey (USGS) believes may lie beneath the Arctic Refuge Coastal Plain. According to USGS, “the Brookian rocks in this area have good potential for a number of moderate, and perhaps large, gas and oil deposits.”<sup>29</sup> One reason

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<sup>26</sup> Even if companies were to pay an average bonus of \$120.00 per acre for every acre of the Arctic Refuge Coastal Plain, total bonus bids would be less than \$200 million.

<sup>27</sup> “State approves BP’s request to mothball Badami for two years,” *Petroleum News*, June 13, 2003 (<http://www.petroleumnews.com/newsbulletin/283096752.html>).

<sup>28</sup> A play is a family of geologically related prospects.

<sup>29</sup> See: Kenneth J. Bird, “Assessment Review,” in *The Oil and Gas Resource Potential of the 1002 Area, Arctic National Wildlife Refuge, Alaska*, 1999, Ch. AO, Figures AO7 and AO 18; see

USGS gives for its optimism about the Arctic Refuge Brookian sequence is the discovery of what the agency calls “analog” fields, such as Badami and Tarn, a smaller field already producing to the west of Prudhoe Bay.<sup>30</sup>

It should be noted that the agency qualified its optimism, cautioning that the Brookian rocks were not likely to hold a super-giant field like Prudhoe Bay “because the reservoir rocks are fundamentally different. The main reservoir at Prudhoe Bay . . . is matched by few oil fields in the world.”<sup>31</sup> In contrast, the agency warned then-Senator Frank Murkowski (R-Alaska; formerly the Chair of the Senate Energy Committee and presently the Governor of Alaska) in 2001:

...most of the oil estimated to occur beneath the ANWR 1002 area is in Tertiary aged, fine-grained, quartz-poor sandstones of the Brookian sequence [including the Brookian Unstructured Eastern Turbidite Play]. These sandstones are characterized by a porosity system that is not as well connected as the Prudhoe Bay and Alpine reservoirs. In addition, the Brookian sandstones contain much larger volumes of finely dispersed clay minerals, which tend to inhibit the flow of fluid through the reservoir...<sup>32</sup>

In light of Badami’s failure and its close geologic and geographical connection to the Arctic Refuge Coastal Plain, should USGS estimates of Coastal Plain production potential be reduced? Along the same lines, what are the effects of Badami’s failure on government model-generated projections of lease bid revenues? USGS geologist Ken Bird acknowledges that if USGS were to make a reassessment of the Arctic Refuge potential, “we would take a hard look Badami.” But he gives two reasons why he is not sure that a reduction to Arctic Refuge production potential – or projected lease bids – would result. First, Bird says, during the 1998 assessment “I think we risked it (i.e., reduced the

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also: James Scherr and Peter Johnson, “Beaufort Shelf Assessment Province,” in “Alaska Federal Offshore – Descriptions of Geologic Plays,” pp. 4-5 [U.S. Minerals Management Service, *1995 National Resource Assessment*].

<sup>30</sup> “Assessment Review,” Bird, Fig. AO7.

<sup>31</sup> See: letter from Interior Secretary Gale Norton to Senator Frank Murkowski, July 11, 2001, pp. 2-3.

<sup>32</sup> Letter to Senator Frank Murkowski.

Brookian sequence potential) pretty severely.” Secondly, there isn’t enough public information on the Badami failure to know whether the causes of that failure are unique to that reservoir or applicable to other parts of the Brookian sequence. In this regard, Bird notes, Tarn is an example of a reservoir in similar rocks that has been produced successfully.<sup>33</sup> Whatever its cause, the Badami failure serves as a grim reminder that this is an uncertain business, and that the potential of the Arctic Refuge Coastal Plain should not be confused with that of Prudhoe Bay, which stands out as one of the few super-giant fields ever discovered in the United States.

**4.4. The Arctic Refuge Numbers Game.** Confusion regarding Arctic Refuge production potential has been well documented. In a peer-reviewed study aptly titled “Sorry, Wrong Number,” published in 2003, the authors concluded that the Arctic Refuge debate has suffered from what they call “mutant statistics,’ which have been twisted into new and incorrect forms.” In particular, the authors note, the failure to specify and correctly use key quantitative terms has resulted in significant and widespread overstatement of Arctic Refuge production potential. In this regard, a major problem is the critical distinction between geologic and economic analysis. The authors point out that economic analysis is a necessary – but frequently omitted – follow-up to the initial geologic assessment.<sup>34</sup>

When the USGS released the findings of its assessment of the petroleum potential of the Arctic Refuge Coastal Plain in 1998, the agency failed to make clear the importance of economic analysis, unwittingly created a pitfall into which many stumbled, fell or dove head first. An example of a headlong dive is the request, made by then-Senator Frank Murkowski in 2000, that the U.S. Energy Information Agency (EIA) prepare a production scenario for the Arctic Refuge based on the USGS estimate of technically recoverable oil from the Arctic

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<sup>33</sup> Kenneth J. Bird, telephonic communication with the author, Dec. 30, 2004.

<sup>34</sup> Jonathan G. Koomey, *et al.*, “SORRY, WRONG NUMBER: The Use and Misuse of Numerical Facts in Analysis and Media Reporting of Energy Issues,” *Annual Reviews: Energy and the Environment*, Vol. 27 [2002], pp. 119-158.

Refuge Coastal Plain. In response to Murkowski's request, EIA analysts created a set of development scenarios in which the centerpiece was the production of 10.3 billion barrels of oil in 65 years.<sup>35</sup> As "Sorry, Wrong Number" points out, only a fraction of the technically recoverable oil that might be discovered beneath the Arctic Refuge Coastal Plain is likely to be produced. To reach this level of production, EIA adopted a set of assumptions that some economists familiar with the North Slope consider highly unlikely. In the end, the EIA report did little more than *assume* discovery and production factors the Chairman, a strong drilling advocate, had asked them to adopt. The results, based on circular reasoning and therefore essentially meaningless, bore dubious relationship to reality. Nevertheless, pleased development advocates happily proclaimed the probability, blessed by agency analysis, that the Arctic Refuge was likely to produce, at peak, a conservatively estimated total of 1.0 million barrels per day, based on total production of 10.3 billion barrels of oil.

Despite its questionable significance, the 10-billion barrel estimate seems to have a life of its own. Most recently, *The Economist* declared that the Arctic Refuge "has estimated reserves of 10.4 billion barrels." The magazine failed to distinguish between economically and technically recoverable oil (and failed to note that not one drop of that oil has been discovered). The article concluded:

It is dishonest to pretend that the 10.4 billion barrels of oil in the ANWR will tip the planet's climate one way or another. . . . But it may be similarly dishonest for Alaskans to treat their federally supported tundra as their own personal piggy bank.<sup>36</sup>

The distinction between oil that is technically recoverable and oil that is economically recoverable is far from academic. One has only to look at the large volumes of oil and gas discovered on the North Slope in the immediate vicinity of a developed transportation corridor but still largely undeveloped. For example,

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<sup>35</sup> U.S. Energy Information Agency, *Potential Oil Production from the Coastal Plain of the Arctic National Wildlife Refuge: Updated Assessment*, May 23, 2000 (Report # SR/O&G/2000-02).

<sup>36</sup> "Alaska and oil: One state's free lunch," *The Economist*, Dec. 11, 2004, pp. 28-32.

the estimated 21 billion barrels of heavy oil already discovered in the Schrader Bluff and West Sak fields directly beneath the Prudhoe Bay complex, is technically recoverable, but only a small fraction has been developed.<sup>37</sup> Similarly, an estimated 30 trillion cubic feet of natural gas at Prudhoe Bay has been technically recoverable for three decades. Nevertheless, despite numerous false starts, Prudhoe Bay natural gas has yet to find its way to market. These discovered but largely undeveloped resources hold great promise. But their delayed (and still largely prospective) development also serves as a grim reminder of the importance of the dismal science. Could the extraordinary disparity between historical lease bonus trends and the much higher bonus payments projected by the CBO and DOI be a harbinger of an Alaskan dream that is not grounded in economic reality?

## **5. Conclusion**

The President's 2004 budget and the Congressional Budget Office have asserted that CBO and DOI that leasing on the Arctic Refuge Coastal Plain will generate from \$2.4 to \$4.0 billion from estimated front-end bonus bids averaging, at the minimum, \$2,667.00 per leased acre. However, during the past fifteen years, 36 Alaska North Slope lease sales have generated bonus bids averaging approximately \$53.00 per acre; the average for the last four years has dropped to less than \$40.00 per leased acre.

This review has identified four distinct reasons to question the high government estimates: (1) the steep decline of bonus bids on the North Slope following the failure of the Mukluk well two decades ago; (2) the striking congruence between the bonus bid levels received on the North Slope and from the booming Gulf of Mexico; (3) recent developments on the North Slope, such

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<sup>37</sup> Alaska's two major North Slope producers recently announced plans to spend \$500 million on "the largest-ever heavy oil development program in Alaska" at West Sak. The companies plan to spend \$500 million to increase West Sak oil production from a current level of 10,000 bpd to 45,000 bpd by 2007. "ConocoPhillips, BP Announce West Sak Heavy Oil Expansion" (ConocoPhillips new release), Aug. 10, 2004 ([http://www.conocophillips.com/news/nr/081004\\_westsack.asp](http://www.conocophillips.com/news/nr/081004_westsack.asp)).

as the relatively modest increase in bids resulting from the Alpine discovery west of Prudhoe Bay and the effects of the failure of the Badami field, east of Prudhoe Bay; and (4) confusion about the potential volumes of oil that might be discovered and produced from the Arctic Refuge Coastal Plain resulting from the use of misleading data whose relationship to reality may be tenuous at best.

Before counting on multi-billion-dollar lease bonus revenues from the Arctic Refuge Coastal Plain, policy makers should seek cogent explanations for the extreme difference between government estimates of bonus bid revenues and the well-established historical pattern of much lower lease bonus revenues from Alaska's North Slope. To the extent that estimates of lease bonus payments from the Arctic Refuge Coastal Plain are derived from economic models, policy makers should examine carefully the inputs and the methodology of the model or models employed in those estimates.

## **Appendices**

- A1. Alaska North Slope and Near-Shore Lease Sales, % Leased and Bonus Received Per Acre, 1961 - 2004
- A2. MMS Gulf of Mexico Lease Sales, % Leased and Bonus Received per Acre, 1961 - 2004
- A3. Average Received per Leased Acre, 1961-1990 and 1991 - 2004
- A4. Average Received per Leased Acre By Decade, 1961 - 2004
- A5. Average Received per Leased Acre By Five-Year Period, 1961 - 2004

Figure A1.

**Alaska North Slope and Near-Shore Lease Sales, % Leased and Bonus Received per Acre, 1964 - 2004**

<i>Date</i>	<i>Sale (Leasing Agency and Sale No.)</i>	<i>Acreage Offered</i>	<i>Acreage Leased</i>	<i>Acreage Leased (% of Acreage Offered)</i>	<i>Bonus Received (\$)</i>	<i>Received per Acre Leased (\$/acre)</i>
<i>(Sheet 1 of 2; see notes on following page.)</i>						
12/64	Mixed (Alaska #13) <sup>(1)</sup>	1,194,373	721,224	60.39%	\$5,537,100	\$7.68
07/65	North Slope (Alaska #14)	754,033	403,000	53.45%	\$6,145,473	\$15.25
09/69	North Slope (Alaska #23)	450,858	412,548	91.50%	\$900,041,605	\$2,181.67
12/79	Beaufort (MMS #BF / Alaska #30) <sup>(2)</sup>	514,383	382,084	74.28%	\$1,056,082,635	\$2,764.01
09/80	North Slope (Alaska #31)	196,268	196,268	100.00%	\$12,387,470	\$63.12
01/82	NPR-A (BLM #821) <sup>(3)</sup>	1,462,355	643,436	44.00%	\$57,100,000	\$88.74
05/82	NPR-A (BLM #822) <sup>(3)</sup>	3,500,000	252,000	7.20%	\$9,700,000	\$38.49
05/82	Beaufort Sea (Alaska #36)	56,882	56,882	100.00%	\$32,583,452	\$572.83
09/82	North Slope (Alaska #34)	1,231,517	571,954	46.44%	\$26,713,018	\$46.70
10/82	Beaufort (MMS #71)	1,825,770	662,860	36.31%	\$2,055,632,336	\$3,101.16
05/83	Beaufort Sea (Alaska #39)	211,988	211,988	100.00%	\$20,998,101	\$99.05
07/83	NPR-A (BLM #831) <sup>(3)</sup>	2,195,000	419,018	19.09%	\$16,657,000	\$39.75
05/84	Beaufort Sea (Alaska #43)	298,074	281,784	94.53%	\$32,214,794	\$114.32
05/84	North Slope (Alaska #43A)	76,079	76,079	100.00%	\$1,612,583	\$21.20 ?
07/84	NPR-A (BLM #841) <sup>(3)</sup>	(n.a.)	0	0	\$0	\$0.00
08/84	Beaufort (MMS #87)	7,773,447	1,207,714	15.54%	\$866,860,327	\$717.77
09/85	North Slope (Alaska #45A)	606,385	164,885	27.19%	\$4,657,478	\$28.25
09/85	North Slope (Alaska #47)	192,569	182,560	94.80%	\$11,645,003	\$63.79
02/86	North Slope (Alaska #48)	526,101	266,736	50.70%	\$2,444,342	\$9.16
02/86	North Slope (Alaska #48A)	42,053	42,053	100.00%	\$510,255	\$12.13
01/87	North Slope (Alaska #51)	592,142	100,832	17.03%	\$289,625	\$2.87
06/87	Beaufort Sea (Alaska #50)	118,147	118,147	100.00%	\$6,621,723	\$56.05
01/88	North Slope (Alaska #54)	421,809	338,687	80.29%	\$4,683,388	\$13.83
03/88	Beaufort (MMS #97)	18,277,806	1,110,764	6.08%	\$115,267,636	\$103.77
09/88	Beaufort Sea (Alaska #55)	201,707	96,632	47.91%	\$14,700,602	\$152.13
09/88	North Slope (Alaska #69A)	775,555	368,400	47.50%	\$6,119,135	\$16.61
01/89	Beaufort Sea (Alaska #52)	175,981	52,463	29.81%	\$1,737,513	\$33.12
01/89	North Slope (Alaska #72A)	677	677	100.00%	\$454,977	\$672.05
01/91	North Slope (Alaska #70A)	532,153	420,568	79.03%	\$27,707,541	\$65.88
06/91	Beaufort (MMS #124)	18,558,976	277,004	1.49%	\$16,807,025	\$60.67
06/91	North Slope (Alaska #64)	754,542	34,143	4.52%	\$242,389	\$7.10
06/91	Beaufort Sea (Alaska #65)	491,091	172,865	35.20%	\$6,993,949	\$40.46
01/92	North Slope (Alaska #61)	991,087	260,550	26.29%	\$2,429,561	\$9.32
06/92	Beaufort Sea (Alaska #68)	143,445	0	0.00%	\$0	\$0.00
12/92	North Slope (Alaska #75)	217,205	124,832	57.47%	\$9,750,111	\$78.11
05/93	North Slope (Alaska #77)	1,260,146	45,727	3.63%	\$1,164,565	\$25.47
05/93	North Slope (Alaska #70A-W)	37,665	28,065	74.51%	\$1,358,027	\$48.39
09/93	North Slope (Alaska #57)	1,033,248	0	0.00%	\$0	\$0.00
09/93	North Slope (Alaska #75A)	14,343	14,343	100.00%	\$449,847	\$31.36
12/95	North Slope (Alaska #80)	951,302	151,567	15.93%	\$3,337,485	\$22.02

Figure A1.

**Alaska North Slope and Near-Shore Lease Sales, % Leased and Bonus Received per Acre, 1964 - 2004**

<i>Date</i>	<i>Sale (Leasing Agency and Sale No.)</i>	<i>Acreage Offered</i>	<i>Acreage Leased</i>	<i>Acreage Leased (% of Acreage Offered)</i>	<i>Bonus Received (\$)</i>	<i>Received per Acre Leased (\$/acre)</i>
<i>(Sheet 2 of 2)</i>						
09/96	Beaufort (MMS #144)	7,282,795	100,025	1.37%	\$14,429,363	\$144.26
10/96	North Slope (Alaska #86A)	15,484	5,901	38.11%	\$2,026,047 <sup>(4)</sup>	\$343.34
11/97	Beaufort Sea (Alaska #86)	385,054	323,835	84.10%	\$27,985,125	\$86.42
06/98	North Slope (Alaska #87)	(Areawide)	518,689	(n.a.) <sup>(5)</sup>	\$51,794,173	\$99.86
08/98	North Slope (MMS #170)	920,983	88,361	9.59%	\$5,327,093	\$60.29
02/99	North Slope (Alaska Areawide)	(Areawide)	174,923	(n.a.) <sup>(5)</sup>	\$2,596,838	\$14.85
05/99	NPR-A (BLM # 1)	3,898,612	867,721	22.26%	\$104,635,728 <sup>(6)</sup>	\$120.59
11/00	Beaufort Sea (Alaska Areawide)	(Areawide)	25,804	(n.a.) <sup>(5)</sup>	\$338,922	\$13.13
11/00	North Slope (Alaska Areawide)	(Areawide)	657,520	(n.a.) <sup>(5)</sup>	\$10,117,367	\$15.39
10/01	Beaufort Sea (Alaska Areawide)	(Areawide)	36,331	(n.a.) <sup>(5)</sup>	\$3,447,734	\$94.90
10/01	North Slope (Alaska Areawide)	(Areawide)	434,938	(n.a.) <sup>(5)</sup>	\$6,911,572	\$15.89
10/01	N. Slope Foothills (Alaska Areawide)	(Areawide)	858,811	(n.a.) <sup>(5)</sup>	\$9,799,277	\$11.41
06/02	NPR-A (BLM #II [ <i>preliminary data</i> ])		579,269	(n.a.) <sup>(5)</sup>	\$63,811,496 <sup>(6)</sup>	\$110.16
10/02	Beaufort Sea (Alaska Areawide)	(Areawide)	19,226	(n.a.) <sup>(5)</sup>	\$506,405	\$26.34
10/02	North Slope (Alaska Areawide)	(Areawide)	32,315	(n.a.) <sup>(5)</sup>	\$579,728	\$17.94
10/02	N. Slope Foothills (Alaska Areawide)	(Areawide)	213,374	(n.a.) <sup>(5)</sup>	\$2,889,532	\$13.54
05/03	N. Slope Foothills (Alaska Areawide)	(Areawide)	5,760	(n.a.) <sup>(5)</sup>	\$36,576	\$6.35
05/03	North Slope (Alaska Areawide)	(Areawide)	210,006	(n.a.) <sup>(5)</sup>	\$3,586,400	\$17.08
05/03	Beaufort Sea (Alaska Areawide)	(Areawide)	36,995	(n.a.) <sup>(5)</sup>	\$1,358,187	\$36.71
09/03	Beaufort Sea (MMS #186)	9,459,743	181,810	1.92%	\$8,903,568	\$48.97
05/04	N. Slope Foothills (Alaska Areawide)	(Areawide)	19,796	(n.a.) <sup>(5)</sup>	\$106,305	\$5.37
06/04	NPRA (BLM 2004 [ <i>preliminary data</i> ])		1,403,561	(n.a.)	\$53,904,491 <sup>(6)</sup>	\$38.41
10/04	North Slope (Alaska Areawide) <sup>(6)</sup>	(Areawide)	225,280	(n.a.) <sup>(5)</sup>	\$9,447,757	\$41.94
10/04	Beaufort Sea (Alaska Areawide) <sup>(6)</sup>	(Areawide)	125,440	(n.a.) <sup>(5)</sup>	\$5,280,384	\$42.09
ANS + Beaufort Sea Subtotal (1961 - 1990)			9,341,675		\$5,269,397,571	\$564.07 <sup>(8)</sup>
ANS + Beaufort Sea Subtotal (1991 - 2004)			8,675,355		\$460,060,567	\$53.03 <sup>(8)</sup>
<b>Total (64 North Slope and Beaufort Sea Lease Sales)</b>			<b>18,017,030</b>		<b>\$5,729,458,138</b>	<b>\$318.00 <sup>(8)</sup></b>

**Notes:**

- (1) Includes non-North Slope acreage.
- (2) Joint State-Federal sale 12/12/79. Federal portion -- 85,776 acres leased ( 49.5%) @ \$5,697.29 per acre; State portion -- 296,308 acres leased (86.7%) @ \$1,914.87 per acre
- (3) Sale data taken from U.S BLM, NE NPR-A Final Environmental Impact Statement (<http://aurora.ak.blm.gov/npra/final/html/3a1a2.html>)
- (4) Arctic Slope Regional Corp. received \$1,786,812 of this total.
- (5) Sale of previously offered acreage.
- (6) Bonus revenue split 50-50 with Alaska.
- (7) Preliminary totals
- (8) Weighted Average

**Sources:**

"Summary of State Competitive Lease Sales," in Alaska Department of Natural Resources, Division of Oil and Gas *2000 Annual Report*, pp. 105-107, and U.S. Department of the Interior, Minerals Management Service, "List of Alaska Region Lease Sales," updated April 27, 2001 [on-line]; additional information from Alaska Dept. of Natural Resources and U.S. Interior Department web sites.

**Figure A2.**

**MMS Gulf of Mexico Lease Sales, % Leased and Bonus Received per Acre, 1961 - 2004**

<b>Date</b>	<b>Sale (MMS Sale No.)</b>	<b>Acreage Offered</b> <sup>(1)</sup>	<b>Acreage Leased</b>	<b>Acreage Leased</b> <i>(% of Acreage Offered)</i>	<b>Bonus Received</b> <i>(\$)</i>	<b>Bonus Received per Acre Leased</b> <i>(\$/acre)</i>	<b>High Bid per Acre Leased</b> <i>(\$/acre)</i>
<i>(Sheet 1 of 2)</i>							
03/13/62	LA (9)	1,808,276	956,407	52.89%	177,260,305	\$185.34	
03/16/62	TX, LA (10)	1,875,964	956,592	50.99%	268,333,397	\$280.51	
10/09/62	LA (11)	33,855	16,178	47.79%	43,887,359	\$2,712.78	
04/28/64	LA (12)	34,028	32,671	96.01%	60,340,626	\$1,846.92	
03/29/66	LA (14)	35,993	35,056	97.40%	88,845,963	\$2,534.40	
10/18/66	LA (15)	227,898	104,717	45.95%	99,164,930	\$946.98	
06/13/67	LA (16)	971,489	744,456	76.63%	510,079,178	\$685.17	
05/21/68	TX (18)	728,551	541,304	74.30%	593,899,046	\$1,097.16	
11/19/68	LA (19)	46,824	29,679	63.38%	149,868,759	\$5,049.66	
01/14/69	LA (19A)	96,389	48,504	50.32%	44,037,339	\$907.91	
12/16/69	LA (19B)	93,764	60,153	64.15%	66,908,196	\$1,112.30	
07/21/70	LA (21)	73,360	44,642	60.85%	97,769,013	\$2,190.07	
12/15/70	LA (22)	593,485	553,898	93.33%	847,295,760	\$1,529.70	
01/14/71	LA (23)	55,872	37,222	66.62%	96,304,526	\$2,587.30	
09/12/72	LA (24)	366,682	290,321	79.18%	585,827,925	\$2,017.86	
12/19/72	LA (25)	604,029	535,874	88.72%	1,665,519,631	\$3,108.04	
06/19/73	TX, LA (26)	697,643	547,173	78.43%	1,591,397,380	\$2,908.40	
12/20/73	MAFLA (32)	817,297	485,397	59.39%	1,491,065,231	\$3,071.85	
03/28/74	LA (33)	930,918	421,218	45.25%	2,092,510,854	\$4,967.76	
05/29/74	TX (34)	1,355,678	565,112	41.68%	1,471,851,831	\$2,604.53	
07/30/74	TX, LA (S1)	1,298,739	100,241	7.72%	30,236,800	\$301.64	
10/16/74	LA-ROY (0)	51,515	40,755	79.11%	1,018,875	\$25.00	
10/16/74	LA (36)	1,370,031	634,832	46.34%	1,427,242,455	\$2,248.22	
02/04/75	TX (37)	2,870,344	626,585	21.83%	274,690,955	\$438.39	
05/28/75	TX, LA (38)	1,346,432	406,942	30.22%	232,916,050	\$572.36	
07/29/75	TX, LA (38A)	1,772,958	336,301	18.97%	163,214,006	\$485.32	
02/18/76	GOM (41)	687,604	161,286	23.46%	175,976,493	\$1,091.08	
11/16/76	TX, LA (44)	254,488	178,127	69.99%	379,148,962	\$2,128.53	
06/23/77	GOM (47)	1,074,536	605,427	56.34%	1,170,093,432	\$1,932.67	
04/25/78	TX, LA (45)	709,727	438,756	61.82%	733,656,893	\$1,672.13	
10/31/78	GOM (65)	511,709	201,295	39.34%	61,176,730	\$303.92	
12/19/78	TX, LA (51)	643,987	412,416	64.04%	871,464,998	\$2,113.07	
07/31/79	GOM (58)	577,517	391,183	67.74%	1,247,489,022	\$3,189.02	
11/27/79	GOM (58A)	588,601	421,519	71.61%	1,913,337,938	\$4,539.15	
09/30/80	GOM (A62)	909,575	551,654	60.65%	2,676,927,673	\$4,852.55	
11/18/80	GOM (62)	458,308	383,323	83.64%	1,417,961,511	\$3,699.13	
07/21/81	GOM (A66)	1,077,931	799,912	74.21%	2,649,628,752	\$3,312.40	
10/20/81	GOM (66)	1,081,364	508,301	47.01%	1,243,468,752	\$2,446.32	
02/09/82	GOM (67)	1,219,847	590,265	48.39%	1,193,654,719	\$2,022.24	
11/17/82	GOM (69[1])	732,570	281,213	38.39%	609,178,223	\$2,166.25	
03/08/83	GOM (69[2])	665,478	58,120	8.73%	37,570,900	\$646.44	
05/25/83	CGOM (72)		3,089,872		3,367,606,134	\$1,089.89	
08/24/83	WGOM (74)		2,246,005		1,501,712,517	\$668.61	
01/15/84	EGOM (79)		897,786		310,586,261	\$345.95	
04/24/84	CGOM (81)		2,278,179		1,323,036,649	\$580.74	
07/18/84	WGOM (84)		1,949,213		844,850,488	\$433.43	
05/22/85	CGOM (98)		2,076,908		1,079,377,760	\$519.70	
08/14/85	WGOM (102)		1,075,189		359,175,656	\$334.06	
12/18/85	EGOM (94)		421,464		119,097,298	\$282.58	
04/30/86	CGOM (104)		504,814		130,276,757	\$258.07	
08/27/86	WGOM (105)		229,613		56,817,990	\$247.45	

**Figure A2.**

**MMS Gulf of Mexico Lease Sales, % Leased and Bonus Received per Acre, 1961 - 2004**

<b>Date</b>	<b>Sale (MMS Sale No.)</b>	<b>Acreage Offered</b> <sup>(1)</sup>	<b>Acreage Leased</b>	<b>Acreage Leased</b> <i>(% of Acreage Offered)</i>	<b>Bonus Received</b> <i>(\$)</i>	<b>Received per Acre Leased</b> <i>(\$/acre)</i>	<b>High Bid per Acre Leased</b> <i>(\$/acre)</i>
<i>(Sheet 2 of 2)</i>							
04/22/87	CGOM (110)		1,539,626		262,971,486	\$170.80	
08/12/87	WGOM (112)		1,908,199		234,275,520	\$122.77	
03/30/88	CGOM (113)		3,416,759		388,730,457	\$113.77	
08/31/88	WGOM (115)		1,412,764		125,352,889	\$88.73	
11/16/88	EGOM (116[1])		657,348		41,582,298	\$63.26	
03/15/89	CGOM (118)		2,892,535		388,393,077	\$134.27	
08/23/89	WGOM (122)		2,688,394		257,224,333	\$95.68	
03/21/90	CGOM (123)		2,604,259		424,334,314	\$162.94	
08/22/90	WGOM (125)		1,659,187		159,967,604	\$96.41	
03/27/91	CGOM (131)		2,224,284		256,286,186	\$115.22	
08/21/91	WGOM (135)		753,059		58,646,034	\$77.88	
05/13/92	CGOM (139)		693,079		54,373,022	\$78.45	
08/19/92	WGOM (141)		327,840		30,463,793	\$92.92	
03/24/93	CGOM (142)		906,587		63,897,083	\$70.48	
09/15/93	WGOM (143)		807,871		62,570,163	\$77.45	
03/30/94	CGOM (147)		1,749,480		274,335,726	\$156.81	
08/17/94	WGOM (150)		1,025,534		57,031,346	\$55.61	
05/10/95	CGOM (152)	31,228,295	2,896,426	9.28%	\$303,772,054	\$104.88	
09/13/95	WGOM (155)	28,471,385	1,445,239	5.08%	\$110,235,596	\$76.27	
04/24/96	CGOM (157)	30,322,792	4,641,292	15.31%	\$511,555,568	\$110.22	\$1,935.94
09/25/96	WGOM (161)	28,389,057	3,407,403	12.00%	\$352,180,828	\$103.36	\$2,258.00
03/05/97	CGOM (166)	27,159,926	5,234,895	19.27%	\$810,843,418	\$154.89	\$1,482.27
08/27/97	WGOM (168)	25,809,126	4,392,513	17.02%	\$599,567,041	\$136.50	\$1,582.12
03/18/98	CGOM (169)	22,548,869	4,100,377	18.18%	\$784,120,709	\$191.23	\$4,862.00
08/26/98	WGOM (171)	20,637,942	2,155,053	10.44%	\$530,885,109	\$246.34	\$6,629.26
03/17/99	CGOM (172)	20,368,705	972,221	4.77%	\$159,109,825	\$163.66	\$2,878.11
08/25/99	WGOM(174)	19,850,625	802,617	4.04%	\$90,147,805	\$112.32	\$1,958.85
03/15/00	CGOM (175)	22,285,092	1,709,289	7.67%	\$292,771,205	\$171.28	\$3,993.06
08/26/00	WGOM (177)	20,608,737	1,210,631	5.87%	\$149,027,269	\$123.10	\$1,830.00
03/28/01	CGOM (178-1)	23,185,334	2,702,412	11.66%	\$499,683,478	\$184.90	\$4,533.85
03/28/01	EGOM (178-2)	250,786	0	0.00%	\$0	\$0.00	(n.a.)
08/22/01	WGOM(180)	22,370,704	1,754,860	7.84%	\$163,627,562	\$93.24	\$1,445.00
12/05/01	EGOM (182)	1,342,080	547,200	40.77%	\$340,474,113	\$622.21	\$4,516.50
03/20/02	CGOM (182)	23,422,552	2,465,836	10.53%	\$355,792,253	\$144.29	\$3,032.29
08/21/02	WGOM(184)	22,270,482	1,727,068	7.75%	\$148,556,145	\$86.02	\$1,450.26
03/19/03	CGOM (185)	23,353,043	2,717,819	11.64%	\$297,598,165	\$109.50	(n.a.)
08/20/03	WGOM (187)	21,705,925	1,867,847	8.61%	\$145,917,314	\$78.12	\$3,923.61
12/10/03	EGOM (189)	794,880	80,640	10.14%	\$8,376,765	\$103.88	\$386.33
03/17/04	CGOM (190)	22,727,885	2,718,753	11.96%	\$364,024,583	\$133.89	6,126.89
08/18/04	WGOM (192)	21,205,116	1,970,949	9.29%	\$169,928,999	\$86.22	\$1,176.28
<b>GOM SUBTOTAL (1961-1990)</b>			<b>48,683,141</b>		<b>41,927,590,876</b>	<b>\$861.23</b> <sup>(2)</sup>	
<b>GOM SUBTOTAL (1991-2004)</b>			<b>60,009,074</b>		<b>8,045,799,157</b>	<b>\$134.08</b> <sup>(2)</sup>	
<b>GOM TOTAL (1961-2004)</b>			<b>108,692,215</b>		<b>49,973,390,033</b>	<b>\$459.77</b> <sup>(2)</sup>	

**Notes:**

(1) Includes re-offered acreage.

(2) Weighted averages.

**Sources:**

U.S. Dept. of the Interior (Minerals Management Service, Gulf of Mexico OCS Region), *Table 2. Gulf of Mexico Oil & Gas Lease Offerings* ([www.gomr.mms.gov/homepg/lseale/SWILER/tABLE\\_2.PDF](http://www.gomr.mms.gov/homepg/lseale/SWILER/tABLE_2.PDF); accessed 12/21/04); 8/18/04 sale from MMS, "Final Bid Recap (All Bids by Area/Tract)," Sale No. 192, Nov. 29, 2004 (<http://www.gomr.mms.gov/homepg/lseale/192/192BRfin.pdf>); high bids from various MMS reports.

**Alaska North Slope and MMS Gulf of Mexico Average Received per Leased Acre, 1961-2004 (by Selected Periods)**

*Figure A3.*

**Average Received per Leased Acre, 1961 - 1990 and 1991 - 2004**

Period	Alaska North Slope and Near-Shore Lease Sales		MMS Gulf of Mexico Lease Sales	
	No. of Sales	Weighted Average Received per Acre Leased (\$ / Acre)	No. of Sales	Weighted Average Received per Acre Leased (\$ / Acre)
1961 - 1990	28	\$564.07	60	\$861.23
1991 - 2004	36	\$53.03	31	\$134.08
1961 - 2004 Total	64	\$318.00	91	\$459.77

Source: Data compiled from MMS, BLM and State of Alaska Division of Oil and Gas web sites (see Figures A1, A2).

*Figure A4.*

**Average Received per Leased Acre By Decade, 1961 - 2004**

Period	Alaska North Slope and Near-Shore Lease Sales		MMS Gulf of Mexico Lease Sales	
	No. of Sales	Weighted Average Received per Acre Leased (\$ / Acre)	No. of Sales	Weighted Average Received per Acre Leased (\$ / Acre)
1961 - 1970	3	\$593.27	13	\$738.97
1971 - 1980	2	\$1,847.44	23	\$2,481.61
1981 - 1990	23	\$455.16	24	\$478.09
1991 - 2000	21	\$67.44	20	\$133.92
2001 - 2004	15	\$38.92	11	\$134.42
1961 - 2004 Total	64	\$318.00	91	\$459.77

Source: Data compiled from MMS, BLM and State of Alaska Division of Oil and Gas web sites (see Figures A1, A2).

*Figure A5.*

**Average Received per Leased Acre By Five-Year Periods, 1961 - 2004**

Period	Alaska North Slope and Near-Shore Lease Sales		MMS Gulf of Mexico Lease Sales	
	No. of Sales	Weighted Average Received per Acre Leased (\$ / Acre)	No. of Sales	Weighted Average Received per Acre Leased (\$ / Acre)
1961 - 1965	2	10.39	4	\$280.26
1966 - 1970	1	2187.67	9	\$1,155.13
1971 - 1975	0	0	13	\$2,212.38
1976 - 1980	2	1847.44	10	\$2,843.06
1981 - 1985	13	662.92	13	\$899.62
1986 - 1990	10	61.24	11	\$126.58
1991 - 1995	12	\$45.92	10	\$99.12
1996 - 2000	9	\$79.36	10	\$149.52
2001 - 2004	15	\$38.92	11	\$134.42
1961 - 2004 Total	64	\$318.00	91	\$459.77

Source: Data compiled from MMS, BLM and State of Alaska Division of Oil and Gas web sites (see Figures A1, A2).

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