

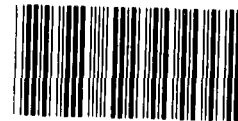
GAO

Briefing Report to the
Chairman, Subcommittee on Fossil
and Synthetic Fuels,
Committee on Energy and Commerce,
House of Representatives

June 1986

NAVAL PETROLEUM RESERVES

Preliminary Analysis of Future Net Revenues From Elk Hills Production

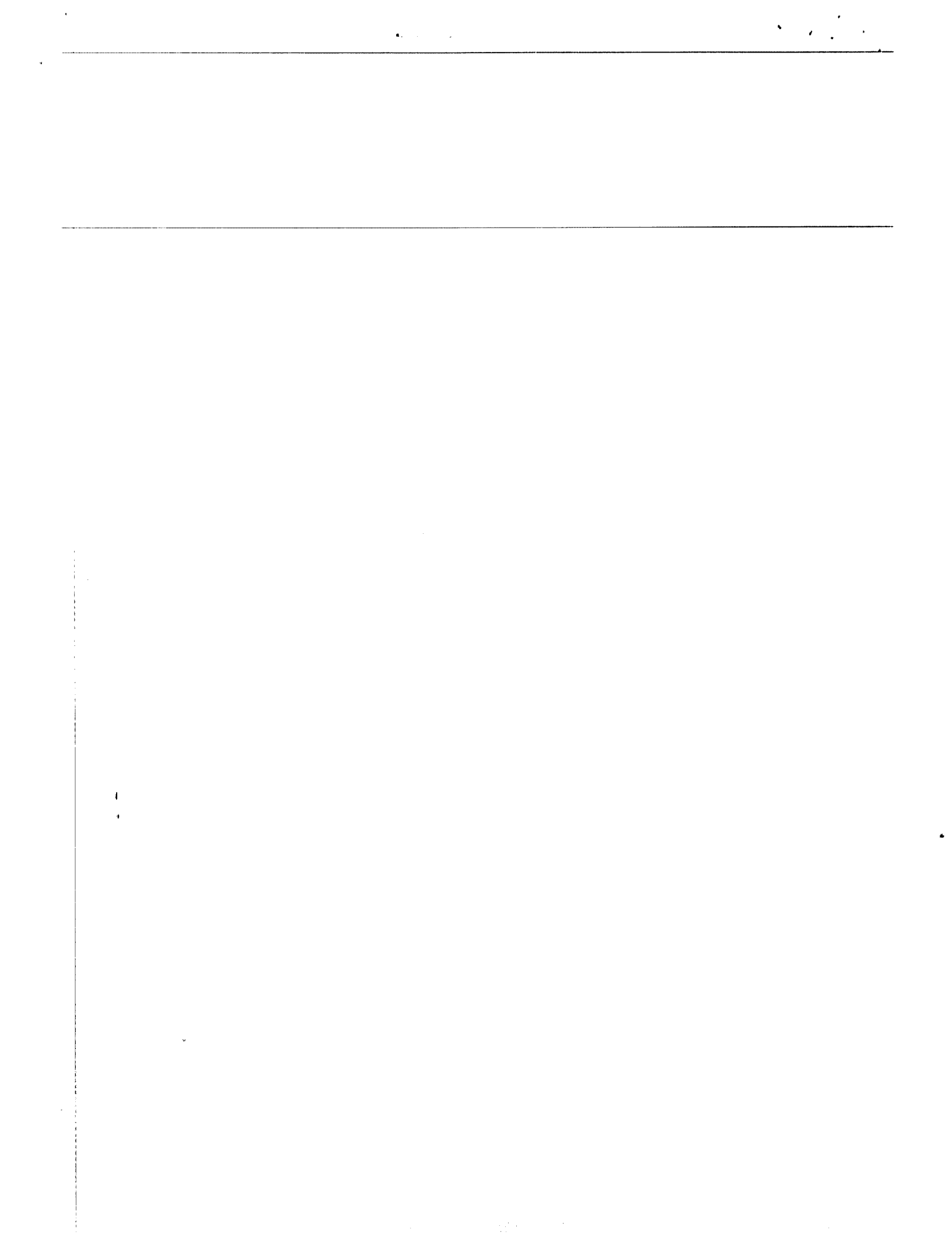


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RESOURCES, COMMUNITY,
AND ECONOMIC DEVELOPMENT
DIVISION

B-208196

June 5, 1986

The Honorable Philip R. Sharp
Chairman, Subcommittee on Fossil
and Synthetic Fuels
Committee on Energy and Commerce
House of Representatives

Dear Mr. Chairman:

In your January 29, 1986, letter, you requested an analysis of the administration's proposed sale of federal ownership interests in the Elk Hills Naval Petroleum Reserve (NPR), located near Bakersfield, California. On April 2, 1986, we briefed your office on the results of our work up to that time. At that meeting, your office requested that we provide an interim report on the present value of the net revenues from Elk Hills production. The results of our calculations and a discussion of the forecasts and discount rates used are provided in this briefing report. Our detailed analysis of the proposed sale will be provided at a later date.

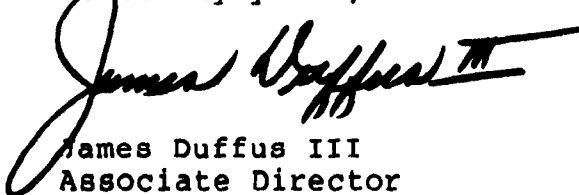
As agreed with your office, we calculated alternative present values of the net revenues using the Department of Energy's (DOE's) production volumes and project cost forecasts as a base and applying (1) low, medium, and high forecasts of future crude oil prices and (2) alternative interest rates for discounting the future net revenues to their present values. Our calculations assume a sale of Elk Hills at the beginning of 1987.

Our calculations are very sensitive to both the oil price forecasts and discount rates used. They ranged from an estimate of \$1.8 billion using a low oil price forecast and a high discount rate to an estimate of \$8.2 billion using a high price forecast and a lower discount rate. Our calculations are preliminary and should be used with caution. They do not take into account possible added tax revenues collected by the government if Elk Hills were sold nor varying production levels and practices, which could either increase or decrease the total amount of oil that can be extracted; however, they will be considered in our final report.

Information for our calculations was obtained from DOE and Data Resources, Inc. (DRI). Production and project cost forecasts and estimates of recoverable reserves were obtained from DOE. Crude oil price forecasts were obtained from DOE and DRI. We did not assess the appropriateness of DOE's reported estimates of recoverable reserves or the validity of forecasts of production volumes, project costs, or crude oil prices.

At the request of your office, we did not obtain official agency comments on this briefing report. As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this briefing report until 7 days from the date of issuance. If you have any further questions, please contact me on 275-8545.

Sincerely yours,



James Duffus III
Associate Director

PRELIMINARY ANALYSIS OF FUTURE NET REVENUES

FROM ELK HILLS PRODUCTION

BACKGROUND

The administration's fiscal year 1987 budget proposes to sell competitively the Naval Petroleum Reserves (NPR) at Elk Hills near Bakersfield, California. While no proposed sale price was included in the budget, the Department of Energy's (DOE's) testimony before the Subcommittee on March 4, 1986, included a net present valuation of Elk Hills of about \$4.4 billion. However, because of uncertainties in oil prices and other assumptions, DOE projected a \$3- to \$5-billion range of possible sales proceeds. The administration believes that the government's role, which has changed from maintaining the reserve for national security reasons to producing it at a maximum efficient rate and selling its output competitively, is better fulfilled by private industry.

Elk Hills ranks seventh among domestic producing oil fields and produced at an average daily rate of over 130,600 barrels of oil during fiscal year 1985. Based on DOE's estimate of about 700 million barrels of recoverable reserves, Elk Hills ranks sixth among domestic oil fields. The reserve is also a very large producer of natural gas and natural gas liquids.

The U.S. government owns approximately 78 percent of Elk Hills. Chevron U.S.A., Inc., owns the remaining 22 percent. Chevron and the government share production, revenues, and expenses in proportion to their ownership shares. Revenues generated from the sale of the government's share of crude oil, natural gas, and natural gas liquids from Elk Hills totaled about \$1.3 billion in fiscal year 1985; expenditures totaled about \$111 million.

OBJECTIVE, SCOPE, AND METHODOLOGY

On January 29, 1986, the Chairman, Subcommittee on Fossil and Synthetic Fuels, House Committee on Energy and Commerce, requested that we perform an analysis of the administration's proposed sale of Elk Hills. In a subsequent meeting with the Chairman's office, we were asked to prepare an interim report showing our preliminary calculations of the present value of the net revenues from future production at Elk Hills.

As agreed with the Chairman's office, we used the crude oil production, cost, and price forecasts for Elk Hills contained in DOE's March 4, 1986, testimony before the Subcommittee. We also used Data Resources, Inc.'s (DRI's) low, medium, and high price forecasts prepared in the spring of 1986. Our calculations are based on a sale of Elk Hills at the beginning of 1987. In addition, we calculated a net present value to show what the value to the government would be using last year's higher oil price forecast.

We did not assess the appropriateness of DOE's reported estimates of recoverable reserves, or the validity of forecasts of production volumes, project costs, or crude oil prices. A further discussion of the assumptions used is presented below. Our calculations do not take into account possible added tax revenues collected by the government if Elk Hills were sold. Further, they do not vary the Elk Hills production levels and practices, which could either increase or decrease the total amount of oil that can eventually be extracted.

BASIS FOR PRELIMINARY PRESENT VALUE CALCULATIONS

Calculations of the present value of the government's share of the net revenues from future production at Elk Hills depend heavily on crude oil price forecasts and the interest rates used for discounting. Estimates of future oil prices, however, are very susceptible to change, given the volatile nature of the crude oil market, and estimates of future interest rates depend on various factors that are difficult to predict. Further, all of our calculations assume a sale of Elk Hills at the beginning of 1987. A sale at a later date could result in lower values due primarily to the further depletion of the reserve. The following sections explain the basis for our calculations, which are shown in table 1 on page 6.

Production and cost forecasts

Our preliminary present value calculations use as a base DOE production and project cost forecasts for crude oil, natural gas, and natural gas liquids presented in its testimony before the Subcommittee on March 4, 1986. However, DOE's forecasts were for a 20-year period extending to 2006. We extended these production and cost forecasts to the point where it was no longer profitable to continue production at Elk Hills. The time period when this occurs varies with the oil price forecasts used.¹ In extending DOE's forecasts, we applied the same reservoir production decline rate of 10 percent per year and project cost increase of 3 percent per year that DOE used in making its 20-year forecast.

Petroleum price forecasts

We calculated the net present values using four different pricing assumptions. We used DOE's oil price forecast included in its March 4, 1986, testimony and three oil price forecasts obtained from DRI.

¹Using DOE's oil price forecast, the year is 2010; using DRI's low, medium, and high forecasts, the years are 2016, 2021, and 2023, respectively.

DOE's oil price forecast in its March 4, 1986, testimony predicted an Elk Hills oil price of \$25.58 per barrel in 1987, with an average increase of 4 percent per year to the year 2006. For our calculations, we extended DOE's price projection to the year 2010 after which time production is assumed to be no longer profitable.

We also used DRI's low, medium (referred to as DRI basic), and high oil price forecasts, which represent national average domestic refiner's acquisition costs to the year 2010. The DRI low forecast predicts a price of \$13.38 per barrel in 1987, with an average increase of 7 percent per year; the DRI medium forecast predicts a price of \$15.75 per barrel in 1987, with an average increase of 8 percent per year; and the DRI high price forecast predicts a price of \$22.80 per barrel in 1987, with an average increase of 9 percent per year.

Because Elk Hills oil prices differ from the national average, we had to establish a base 1987 Elk Hills oil price to use with the DRI forecasts. For each of the price forecasts, we obtained the average first quarter 1986 Elk Hills oil price and allowed it to decline through the remaining three quarters at the rate of oil price decline projected by DRI over the period. We then averaged the prices for all four quarters and arrived at the projected 1986 price for Elk Hills oil. For subsequent years to 2010, we allowed the 1986 calculated price to increase at the same rate as the DRI forecast for those years. For the years after 2010, for which DRI did not forecast, we applied DOE's average increase of 4 percent in oil prices used in its testimony. Using this method, we arrived at estimated low, medium, and high 1987 base prices per barrel of \$10.91, \$14.16, and \$20.50, respectively, for Elk Hills oil. These prices became the bases on which DRI's annual percentage rates of increase were applied. We followed the same procedures for adjusting Elk Hills natural gas and natural gas liquid prices so that the DRI forecasts could be applied to all of the Elk Hills operations on a consistent basis.

While DOE forecasts a price in 1987 greater than the DRI high price forecast, DRI prices exceed DOE's after 1992 as a result of DRI assuming a higher annual rate of increase in oil prices. Overall, DOE's price forecast results in net present values that fall closest to the values based on the DRI medium price forecast.

Discount rates

We used three discount rates--7.5 percent, 11 percent, and 14 percent--in calculating the present value of the net revenues from Elk Hills production. The discount rate GAO favors is the average yield on outstanding marketable Treasury obligations with remaining maturities comparable to the period of the analysis. In this case, the 7.5-percent rate approximates the current yield on long-term government securities maturing in 30

years. The 11-percent discount rate approximates the average yield on 30-year government securities recently projected by DRI under a higher energy price scenario.² The 14-percent discount rate was the rate used by DOE in its testimony. According to DOE, this rate allowed for a 10-percent real rate of return plus a 4-percent rate for inflation in accordance with Office of Management and Budget Circular A-94.

RESULTS OF PRELIMINARY PRESENT VALUE CALCULATIONS

Using the above production, project cost, and oil price forecasts and varying discount rates, we calculated the following preliminary present values of the net revenues from Elk Hills production.

Table 1

Preliminary Present Value Calculations

Discount rate (Percent)	<u>Alternative petroleum price forecasts</u>			
	<u>DRI low</u>	<u>DRI medium</u>	<u>DRI high</u>	<u>DOE testimony</u>
	------(billions)-----			
7.50	\$2.8	\$5.3	\$8.2	\$5.6
11.00	2.2	3.9	6.1	4.7
14.00	1.8	3.2	4.9	4.1

THE POTENTIAL EFFECT OF PRE-1986 OIL PRICES ON THE VALUATION OF ELK HILLS

In addition to the above net present values, we calculated a net present value of Elk Hills revenue if oil prices returned to the higher level experienced prior to 1986. To do this, we used DRI's 1985 high price forecast, which was based on the petroleum price outlook at this time last year, and a somewhat higher discount rate of 11.5 percent, which reflected the higher yields on 30-year Treasury bonds at this time last year. This resulted in a present value of \$9.1 billion for Elk Hills. This calculation underscores the significance of the timing of a potential sale of Elk Hills.

²Data Resources, Inc., Long-Term Review, The Pessimistic Projection, spring 1986.

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