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Testimony

Before the Subcommittee on Energy and Power,  
Committee on Energy and Commerce,  
House of Representatives

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ENERGY POLICY

Energy Policy and  
Conservation Act  
Reauthorization

Statement of Victor S. Rezendes,  
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Resources, Community, and Economic  
Development Division



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Mr. Chairman and Members of the Subcommittee:

We are pleased to discuss the results of our ongoing and recently completed work as it relates to the reauthorization of the Energy Policy and Conservation Act. Specifically, you asked us to summarize the results of our work performed at your request on (1) the relative priority that should be given to several near- and long-term options for improving the readiness and expansion of the Strategic Petroleum Reserve (SPR), (2) the evolving mission of the International Energy Agency (IEA), and (3) options for enhancing the government's revenue from the sale of crude oil from the Naval Petroleum Reserve (NPR) in Elk Hills, California, including the possibility of selling the oil to Gulf Coast and mid-continent refiners. At your request, my statement today will focus mainly on the first issue.

In summary, our work to date indicates that:

- Resolving problems that affect readiness like geothermal heat and gas buildup in stored crude oil and replacing equipment that is at the end of its design life would correct or prevent the significantly degraded ability of the SPR to respond to oil disruptions. We ranked this option as high priority. Continuing to fill the reserve to its current capacity of 750 million barrels or expanding the reserve to hold 1 billion barrels both entail much higher costs. Considering the potential benefits and competing budget demands, we gave this option a lower relative priority. The benefits of increasing the SPR's daily draw-down capability are less clear. But doing so would increase our capability to respond more flexibly to oil disruptions, and would likely entail more moderate costs. We ranked this option a medium priority.
- The mission of IEA is evolving from one focused primarily on member country responses to oil disruptions to one based on a broadened definition of energy security that gives more emphasis to the impact of energy policies on global economic development, the growing importance of the environmental impacts of energy production and use, and enhanced relations with IEA's nonmember countries. The need for enhanced relations with nonmember countries recognizes (1) the increasing interdependence between the economies and energy markets of IEA and the nonmember countries and (2) the rapid growth in energy use of the nonmember countries.
- As indicated in our recently issued report,<sup>1</sup> it will be difficult for the Department of Energy (DOE) to increase revenue

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<sup>1</sup>Naval Petroleum Reserve: Limited Opportunities Exist to Enhance Revenues From Oil Sales in California (GAO/RCED-94-126, May 24, 1994).

from NPR oil sales by selling oil to Gulf Coast or mid-continent oil refineries because this oil is of lower quality than other available crudes and shipping costs are high. DOE may be able to enhance revenues in several other ways.

BENEFITS OF ADDRESSING READINESS AND EXPANSION OPTIONS FOR THE SPR VARY

With respect to the SPR, you asked us to analyze the potential costs, benefits, and relative priority of (1) eliminating problems related to the buildup of the heat and gas content of some crude oil in the SPR; (2) replacing existing facilities and systems to extend the useful life of the reserve; (3) filling the SPR to the current 750 million barrel capacity, or expanding and filling the SPR to 1 billion barrels; and (4) increasing the daily draw-down rate from 4.5 to 6 million barrels for the SPR's current size, as well as for a 1 billion barrel reserve.

The Energy Policy and Conservation Act authorized the creation of the SPR to store up to 1 billion barrels of crude oil for use during a disruption in the oil supply. Currently DOE, which manages the reserve, has developed a capacity to store 750 million barrels of oil in Gulf Coast salt dome caverns and to drawdown the reserve at a design maximum rate of 4.5 million barrels a day. Since fiscal year 1976, Congress has appropriated about \$21 billion (or about \$33 billion when adjusted for inflation to 1994 dollars) for SPR programs and activities. As a result almost 600 million barrels of crude oil has been stored.

In conducting this analysis we held extensive interviews at DOE headquarters and the SPR program office and reviewed numerous related studies and evaluations. We also used a DOE model that is designed to examine the costs and benefits associated with a variety of size and draw-down issues. The benefits largely come from replacing oil that is unavailable because of disruptions with SPR oil, thus dampening oil price increases and their resulting impact on the nation's economy. The model allows us to make different assumptions about the probability and length of disruptions, oil prices and the quantities of oil available in the market place, market price elasticities, the impact of oil price increases on the gross national product, discount rates, and other parameters. We used the model to evaluate the net benefits of addressing the readiness and expansion issues listed above under various assumptions or scenarios. These scenarios ranged, for example, from short minor disruptions to longer, more severe disruptions. We also varied how responsive the market is in terms of price adjustment and replacement of disrupted oil.

## Correcting Heat and Gas Problems Should Be Assigned High Priority

In the SPR, the amount of oil available for drawdown and total daily draw-down rates have been lessened by elevated temperatures of the stored crude oil due to geothermal heating, and the high gas content of some of the oil, caused primarily by the intrusion of methane from the surrounding salt formations. These conditions diminish DOE's ability to drawdown the oil because as a result of the heat and gas buildup, the vapor pressure of the oil is above safety and air pollution limits. The vapor pressure must be reduced to ensure that the SPR can deliver crude oil at the proper specifications for commercial transportation and refining.

As early as 1984, DOE had indications that crude oil stored in the SPR had elevated temperatures and excessive gas content. However, early test results to determine the scope and impact of the problem were inconclusive. After becoming convinced in 1993 that the problems were significant and widespread, DOE established a Vapor Pressure Task Force consisting of SPR personnel, various contractors, and representatives of DOE's national laboratories, to define the full extent of the problem and develop corrective actions. While tests continue, DOE now estimates that about 400 million barrels, or two-thirds of the oil, are affected. Through a combination of blending of the affected and unaffected oil and observing certain operating restrictions, DOE estimates that about 520 million barrels could be drawn out of the reserve without further corrective actions, but only at a maximum daily draw-down rate of about 2 million barrels per day, which is less than half the maximum design rate for the reserve. Without these actions, DOE estimates that only about 800,000 barrels can be drawn down per day.

DOE plans to permanently install heat exchangers to dissipate the excess heat as the reserve is drawn down. DOE plans to complete this work by April 1995, at a cost of about \$19 million. To reduce the gas content of the oil to acceptable levels, DOE will bring about 144 million barrels to the surface, degas it, and then return and blend it with other oil in the caverns. DOE plans to complete this work by November 1997 at a cost of about \$45 million.

Using a DOE model, we estimate that the benefits of correcting the heat and gas problems could be substantial. The net present value of the benefits ranges from about \$2.9 billion to \$16.7 billion, depending on the extent to which draw-down capability is restricted and the various oil disruption scenarios evaluated. The benefits are substantial because the heat and gas problems significantly impair the SPR's draw-down capability and therefore limit the SPR's ability to dampen oil price increases and their economic impact. Because of the large potential benefits and relatively low total cost of this action--about \$64 million--we would assign it a high priority.

## Replacing Aging Facilities Could Avert Future Loss in the SPR's Capability

The SPR's draw-down rate is also threatened by major problems in the mechanical, civil, and electrical systems that DOE believes will become progressively worse over time. The United States has invested over \$3.7 billion (or about \$6 billion when adjusted for inflation) in SPR storage sites and related distribution systems. These systems were installed in the late 1970s and early 1980s with a designed life span of 20 years. DOE plans to replace and upgrade the draw-down and distribution systems through its Life Extension Program and at the same time simplify and standardize equipment to reduce future maintenance costs. These changes will also give DOE greater ability to test equipment under maximum usage rates.

Based on DOE's evaluation of SPR system availability without a Life Extension Program, we estimate that the daily draw-down rate could drop to about 3 million barrels per day or about 67 percent of the system's design capability, within 10 years. The most severe drop will occur at the SPR's two largest sites, the Bryan Mound, Texas, and West Hackberry, Louisiana, sites where over 420 million barrels of SPR oil are stored. DOE estimates that the Life Extension Program will take 7 years to complete and cost about \$375 million (or about \$315 million in present value terms). It will extend the useful life of the reserve to the year 2025.

Our model analysis shows that if the draw-down rate is lessened to about 3 million barrels per day, the net benefits of carrying out the Life Extension Program could be as high as \$1.6 billion across the various disruption scenarios in which the reserve would be needed. These results do not include the additional maintenance costs of keeping the present SPR facilities and systems operational if life extension projects are not done. Given the potential extent to which the SPR's capability will be degraded without the Life Extension Program, and the potential net benefits of preserving the large investment in equipment and capability to date, we would also assign this activity a high priority.

## Filling the SPR to Its Current Capacity or Expanding the Capacity Would be Costly

Because of budget constraints, DOE is not requesting any funds in fiscal year 1995 to continue to fill the reserve to its current 750 million barrel capacity. DOE estimates that filling the reserve to full capacity would cost a total of about \$4.2 billion (or \$3.7 billion in present value terms). Also, DOE has informed the Congress that because of extreme demands on the federal budget, the administration does not foresee that expansion of the reserve to the authorized 1 billion barrels will be possible within a meaningful planning horizon. DOE estimates that expanding and filling the reserve to 1 billion barrels would cost between \$10 and

\$11 billion (or between \$6.4 and \$7.1 billion in present value terms), depending on the price of oil and which sites are selected for the expansion. Any expansion of the reserve would also have to address the potential for heat and gas buildup in the expanded portion of the reserve as well.

Our model analysis shows that filling the reserve from 600 to its current 750 million barrel capacity could produce net benefits ranging from about \$1.5 to \$3.3 billion, but generally only under the more severe disruption scenarios, in which large disruptions are more likely and longer lasting. The costs exceed the benefits by as much as \$1.3 billion under a milder disruption scenario in which disruptions are shorter. Because of the very high cost of expanding and filling the reserve to 1 billion barrels, our model results show that the costs exceed the expected benefits under all but the most severe disruption scenario. Such costs exceeded the benefits by as much as \$2.8 billion. Because of the high cost of purchasing additional oil and expanding reserve capacity, and the relatively fewer disruption scenarios under which a larger reserve would produce benefits, we would assign these options lower relative priority.

In a related issue, some SPR staff believe that cost savings may be possible if the size of the SPR is officially capped at its current size of about 600 million barrels. This cap could enable DOE to consolidate and take out of operation unneeded sites and limit life extension projects to only those sites remaining. We understand that SPR staff are examining this issue but have not yet reached any conclusions.

#### Increasing the Daily Draw-Down Capability Could Increase Flexibility

DOE's cost estimates for increasing the maximum daily draw-down capability from the existing 4.5 to 6 million barrels per day as the reserve is expanded to 1 billion barrels range from \$2 million to \$196 million depending on which expansion sites DOE selects. DOE has not prepared any cost estimates for achieving the same increase in capability for the existing reserve without an expansion. SPR program officials we spoke with, however, said that such capability could be added, and that if such an addition is required, it would make sense to include it in the Life Extension Program. Any increase in draw-down capability also assumes the heat and gas buildup problem is resolved.

Our model analysis shows that increasing draw-down capability to 6 million barrels per day, either for the current or expanded reserve, produces net benefits under most scenarios only for the expanded reserve. However, we can not fully evaluate the potential advantages of increased draw-down capability because of model constraints that limit the amount of SPR oil that can be released at any given time. For example, the model will not readily allow

the user to increase, or "surge" initial draw-down and then lower it if a disruption is likely to last longer than originally anticipated. Such surge capability could offer an advantage in meeting DOE's stated intention of quickly injecting large amounts of oil into disrupted markets to dampen oil price increases. The model does show that if disruptions are relatively short, increasing daily draw-down capability provides more net benefits than increasing the current size of the reserve. The costs of increasing daily draw-down capability are likely to be comparatively lower than large additional oil purchases or expansion of the reserve, and would provide additional flexibility to respond to a wider range of disruption scenarios. As such, we would assign this option as related to the reserve's current size a medium priority.

#### MISSION OF THE INTERNATIONAL ENERGY AGENCY IS EVOLVING

Mr. Chairman, with respect to IEA, you asked us to assess (1) how IEA's mission has evolved and what its current goals are, (2) what IEA intends to achieve through its recent activities in the nonmember countries and in the environmental area, and (3) how well IEA coordinates its activities with other international organizations. You also asked us to summarize our views on the need for IEA's Emergency Oil-Sharing System.

The IEA, an organization of 23 oil-consuming, industrialized nations, including the United States, was formed in response to the 1973-74 oil embargo, to ensure the collective energy security of its members. Central to IEA's early mission was (1) encouraging member countries to provide for emergency oil stocks, such as the SPR, and (2) creating a system for sharing available oil supplies among members during an oil disruption. In 1994, the United States will contribute about \$6 million, or 25 percent, of the IEA's \$23 million budget.

#### IEA's Mission Is Changing In Response to a Broadened Definition of Energy Security

According to IEA officials, energy security is now no longer simply a matter of member countries being prepared for a disruption in the supply of oil, which was IEA's primary mission when it was formed. IEA now sees energy security as encompassing global economic development, the environmental impacts of energy production and use, and enhanced relations with nonmember countries. Energy policies can have a significant impact on the world's economies. In addition, environmental policies now have a major effect on world energy production and consumption. Also, the economies and energy markets of IEA's member and nonmember countries have become increasingly interdependent and the demand for energy is expected to continue to rapidly increase in the



nonmember countries. According to IEA officials, it is now in its members' best interest to encourage countries outside of IEA to move toward market economies and to influence how these countries address their increased demand for energy.

In response to a broadened definition of energy security, IEA updated its mission by developing new shared goals for energy policy in 1993. The new goals place greater emphasis on diversifying energy sources, rather than on reducing dependence on imported oil. Specifically, the goals encourage (1) diversity, efficiency, and flexibility within the energy sector; (2) the development of more environmentally acceptable energy sources; (3) free and open energy markets with undistorted energy prices; and (4) cooperation among all energy market participants.

#### IEA's Activities in Nonmember Countries and in the Environment Are Receiving Greater Emphasis

IEA is responding to the broadened definition of energy security in part by developing closer ties with the nonmember countries such as those in Central and Eastern Europe. DOE and State Department officials support this new orientation for IEA. IEA's assistance to nonmember countries has been mostly in the form of broad energy policy studies, including reviews of the energy sectors of Poland, Hungary, Romania, the Czech and Slovak Federal Republic, and the Republic of Korea. In addition, IEA sponsors international conferences and workshops on energy-related topics.

IEA is also placing increased emphasis on the environment by encouraging energy decisionmakers to consider the adverse environmental impacts of energy activities, just as in making environmental decisions, they account for their energy consequences. IEA has completed several studies on issues such as auto pollution and climate change, energy efficiency and the environment, and climate change policy initiatives. In addition, IEA is working with the Organization for Economic Cooperation and Development to support efforts of the United Nations to address issues related to global climate change policies. For its part, IEA is developing criteria, methodologies, and data requirements to assess (1) the comparability of national policies on greenhouse gas emissions and (2) the effectiveness of the various policies to reduce greenhouse gases.

#### IEA Coordinates With Other International Organizations on an Ad-Hoc Basis

IEA and its member countries consider the work in nonmember countries and in the environmental arena to be important for energy security reasons. Yet, the work in nonmember countries and in the environment are also the areas most likely to result in a

duplication of efforts between the IEA and numerous other international assistance and financial organizations. The World Bank, the European Bank for Reconstruction and Development, various United Nations agencies and economic commissions, and the Asia-Pacific Economic Cooperation forum, for example, all provide energy and environmental assistance--such as policy advice, technical assistance, and financial aid--to the nonmember countries. Some of IEA's energy policy assistance is similar to the assistance offered by these other organizations.

IEA officials told us that they coordinate on an ad-hoc basis with international organizations that provide energy and environmental assistance to its nonmember countries. For example, in response to concerns about Soviet-designed nuclear reactors, the World Bank, the European Bank for Reconstruction and Development, and IEA worked cooperatively to conduct a study on alternatives to nuclear power, and their costs, in Eastern Europe and the former Soviet Union.

Officials from some international organizations told us their organizations and IEA have duplicated efforts at times. For example, between 1990 and 1991, both IEA and the World Bank conducted studies of the energy sectors of Poland and the former Czechoslovakia. However, World Bank officials indicated that coordination between the bank and IEA has improved since that time. Also, officials from the State Department and some of the international organizations told us that a duplication of efforts in the nonmember countries may be beneficial as long as it provides for a diversity of views on energy-related issues. IEA officials stated that nonmember countries find its views valuable because IEA is an independent agency that has no financial or commercial interests and provides objective analysis.

#### IEA Is Less Likely to Need Its Emergency Sharing System Now

Although the mission of IEA is evolving, preparing for future oil supply disruptions remains a central objective of the organization. The Emergency Oil-Sharing System, developed in response to the 1973-74 oil embargo, is a mechanism by which IEA member countries agree to reduce their oil demand, draw down their oil stocks, and share available oil during a severe oil supply disruption. In a 1988 testimony before this Subcommittee, we concluded that IEA's Emergency Oil-Sharing System had made a genuine contribution to U.S. energy security as a standby emergency response mechanism.<sup>2</sup>

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<sup>2</sup>Renewal of Authorities for U.S. Participation in the International Energy Program, (GAO/T-NSIAD-88-32, May 17, 1988).

With the development of, among other things, an oil futures market, and with the deregulation of oil prices, a global marketplace now exists for allocating available oil. Accordingly, we believe that IEA is now less likely to need or use its Emergency Oil-Sharing System. However, State Department officials told us that several other IEA member countries favor retaining the sharing system because they view it as an "insurance policy." These officials also told us that the existence of the sharing system may dampen speculative stock building and hoarding and related price increases during a disruption. In any event, State Department officials told us that IEA's sharing system would not be used without the support of the United States.

We should note that in 1984, IEA developed a more flexible and voluntary approach called Coordinated Emergency Response Measures to respond to any disruption that it determines threatens to cause severe economic harm to its members. DOE and State Department officials favor the use of these more flexible, voluntary measures to cope with severe disruptions in the supply of oil, rather than the Emergency Oil-Sharing System. In fact, DOE's Secretary O'Leary has encouraged IEA to continue to review its oil-sharing system in light of the many changes in the world oil market over the past 20 years.

#### OPPORTUNITIES TO INCREASE REVENUE FROM NPR OIL SALES ARE LIMITED

Mr. Chairman, with respect to NPR oil sales, you asked us to examine options for enhancing revenue, including selling some portion of the NPR oil produced in Elk Hills, California, to Gulf Coast and mid-continent oil refiners. We found that it will be difficult for the government to increase revenues by selling NPR oil to these refiners, even though crude oil prices in these regions are generally higher because (1) NPR oil yields a less valuable mix of petroleum products than the comparable crude in these other refining regions, (2) NPR crude oil contains two contaminants--nitrogen and heavy metals--that make it more costly to refine than many other crudes, and (3) the cost of transporting oil from California to the other regions is substantial.

The Congress established the NPR in the early 1900s to ensure fuel supplies for the military. The reserves were largely inactive until 1976, when the Congress changed the NPR from a strategic reserve for the military to a source of oil for commercial purposes. DOE, which also manages this reserve, sells the oil produced to the highest bidders, which are generally West Coast refiners. The SPR now fills the strategic military and commercial reserve function originally envisioned for the NPR.

We did find, however, that DOE could potentially increase the bids and therefore the revenues it receives by addressing several constraints and practices it engages in as a seller of crude oil.

For example, replacing the oil price index DOE uses to adjust prices paid over its standard 6-month sales contracts so that they better reflect changing market conditions could result in somewhat higher bids. DOE currently uses an index based on the average of the spot market prices of two crude oils traded in Los Angeles as the basis for bidding and determining actual prices paid for NPR oil. However, spot transactions for the two crude oils that comprise DOE's current index are dwindling.

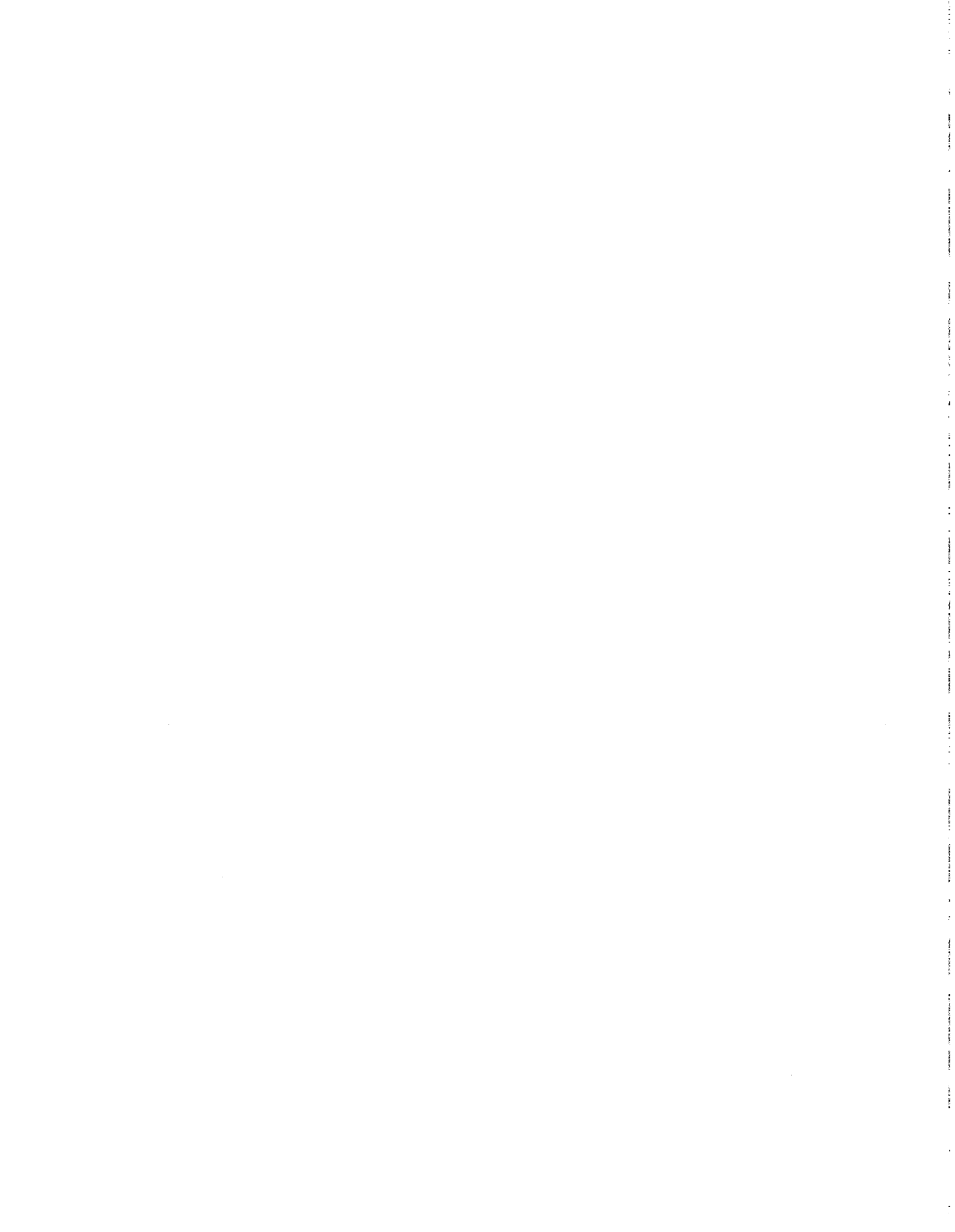
DOE could also ensure that it did not unnecessarily invoke the preference it grants to small refiners for purchasing 25 percent of its oil by first determining whether these refiners lack adequate alternative supplies of crude oil. To promote the economic viability of small refineries and ensure access to NPR oil, the Congress included a provision in the NPR Production Act allowing DOE to give a preference to small refiners in the purchase of up to 25 percent of NPR oil when it and the Secretary of the Interior determine that these refiners do not have adequate alternative supplies and selling crude oil to refiners under the preference serves the public interest.

In addition, DOE could adopt the standard industry billing practice, which requires monthly (rather than weekly) billing. DOE could minimize the risk to the taxpayer from carrying larger accounts receivable by only offering this payment option to creditworthy buyers or, alternatively, offering this option to all buyers and require a larger performance guarantee from buyers that pose a credit risk. Finally DOE could market its oil more aggressively in California, possibly resulting in more and better-informed bidders and somewhat higher winning bids for the NPR oil.

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This concludes our prepared statement, Mr. Chairman. We would be pleased to respond to any questions you or other members of the Subcommittee may have.

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