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Received through the CRS Web

## **The Strategic Petroleum Reserve: Possible Effects on Gasoline Prices of Selected Fill Policies**

**April 19, 2004**

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# The Strategic Petroleum Reserve: Possible Effects on Gasoline Prices of Selected Fill Policies

## Summary

The Strategic Petroleum Reserve (SPR), authorized by the Energy Policy and Conservation Act (P.L. 94-163), was originally intended to provide a domestic stock of crude oil to be used in emergency situations when the supply of crude oil to the United States is disrupted. In November 2001, President Bush ordered that the SPR be filled to its current capacity with royalty-in-kind (RIK) oil, the government's share of oil produced from federal leases. In the face of high prices for crude oil and gasoline, the policy has been challenged as a contributing cause of higher prices. Some policymakers have been urging suspension of RIK deliveries to the reserve for the remainder of 2004, arguing that it would help to lower the cost of gasoline.

This report examines the factors that are currently influencing crude oil and gasoline prices, and reviews the extent to which prices might be correlated with SPR fill policy. If RIK oil was released to the market, gasoline prices might be affected. Since crude oil is a raw material in the production of gasoline, a reduction in the price of oil might pass through to the price of gasoline. To the extent that the capacity to refine additional barrels of crude directed to the market exists, and the diverted RIK oil is not offset by reduced crude oil imports, consumers might benefit. However, the amount of RIK oil, relative to the total market, is small, and when coupled with other market dynamics, the effect of changes in SPR fill policy on crude and product prices could be only minimal.

Conditions in the gasoline market, including strong demand, high refinery capacity utilization rates, fragmented regional gasoline specifications, scarce, high cost imports as well as low current inventory levels point to the continuation of high gasoline prices even if oil prices decline somewhat. Although the price of oil influences, and is a component of, the price of gasoline, a complex interaction of many factors determines price.

A drawdown of the SPR — in addition to a deferral of RIK fill — is a further policy option, but not analyzed in depth here. Benefits might vary, depending upon the ability of refineries to absorb additional crude, and the amount of additional crude made available. However, if one considers that refining capacity is already strained and unlikely to benefit from extra crude supply, any softening in oil prices from a drawdown would be unlikely to be passed along in full to consumers. This report will not be updated.

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# The Strategic Petroleum Reserve: Possible Effects on Gasoline Prices of Selected Fill Policies

The price of gasoline reached nominal record levels in March 2004. The price of crude oil surged to over \$38 per barrel, before receding during the first week of April 2004. During the week of April 5, prices rose to \$37 per barrel on news of a broadened insurgency in Iraq. These high prices have raised concern among consumers and policy makers. Crude oil prices are an important component of gasoline prices, but not the only one. Conditions within the gasoline market itself, including strong demand, as well as supply restrictions, are also adding upward pressure to the price. This report analyzes one strategy that has entered public debate as a strategy to mitigate gasoline prices: the diverting of scheduled deliveries of royalty-in-kind (RIK) oil to the SPR.

## **SPR Background**

Congress authorized the Strategic Petroleum Reserve (SPR) in the Energy Policy and Conservation Act (EPCA, P.L. 94-163) to help prevent a repetition of the economic dislocation caused by the 1973-74 Arab oil embargo. Physically, the SPR comprises five underground storage facilities, hollowed out from naturally occurring salt domes, located in Texas and Louisiana. Although authorized to a level of one billion barrels, current storage capacity is 700 million barrels, and current fill levels are approximately 650 million barrels.

Until 1995, Congress appropriated funds for purchase of SPR oil, and what was then known as the Defense Fuel Supply Center contracted for deliveries. Crude oil from Mexico and the United Kingdom accounted for roughly 65% of purchases from 1978 to 1995. Volumes and fill rates varied over the years, reaching a peak exceeding 300,000 barrels per day (b/d) during the Reagan Administration. The urgency attached to the SPR program during the 1980s and 1990s often tracked broader energy concerns. Periods of volatility in energy prices drew a focus on SPR fill policies. During times of relatively low prices and adequate supply, the SPR fill rate declined, or was even suspended. Congress and the Clinton Administration agreed to suspend purchases after FY1994.

From 1995 until the latter part of 1998, sale of SPR oil, not acquisition, was at the center of debate. There were three sales of SPR oil initiated during 1996, totaling 28.1 million barrels. The first of these sales was for the purpose of financing the decommissioning of the SPR storage site at Weeks Island. Other sales were directed by Congress for the purpose of budget deficit reduction. By the late 1990s, following a reduction of the annual federal budget deficit, and a major drop in crude oil prices, there was new interest in replenishing the SPR to further energy security objectives,

and as a possible means of providing price support to domestic producers who were struggling to keep higher-cost, marginal production in service. Secretary of Energy Bill Richardson requested that the Office of Management and Budget (OMB) include \$100 million in the FY2000 budget request for oil purchases. The proposal was rejected.

When OMB turned down the Department of Energy's (DOE's) request to fund purchases for SPR oil in FY1999, DOE suggested as an alternative that a portion of the royalties owed to the government from oil leases in the Gulf of Mexico be accepted "in kind" (in the form of oil) rather than as cash payments. The Department of the Interior (DOI) was reported to be unfavorably disposed to the royalty in kind (RIK) proposal, but a plan to proceed with such an arrangement was announced on February 11, 1999. The intention was to replace the 28 million barrels sold in the mid-1990s. It was estimated that, at a rate of 100,000 b/d, it would take about 10 months to replace this volume. At its inception, the RIK plan was greeted by the oil industry as a well-intended and helpful first step.

The initial contracts were signed at the end of March 1999 with Texaco, Shell, and BP-Amoco for a total of 3.5 million barrels, and they provided for an adjusted volume of oil reflecting the quality differential between the oil to be delivered and the oil produced from the lease tracts. Competitive bids were invited for a second round, and contracts were awarded in mid-June 1999 for an additional 9.3 million barrels.

The terrorist attacks on the United States on September 11, 2001 accelerated interest in acquiring crude for the SPR. Some thought that, depending on the nature of the U.S. response and potential reprisals, the possibility existed that a politically driven interruption in oil exports bound for the United States might occur. On November 13, 2001, President Bush ordered the filling of the SPR to its full capacity of 700 million barrels, relying on RIK oil. During 2002, nearly 40 million barrels of oil were delivered to the SPR, some of which was oil returned under the terms of a "swap" in the fall of 2000.<sup>1</sup>

Deposit of 40 million barrels into the SPR during 2002 was criticized in a report released on March 3, 2003, by Senator Levin, prepared by the minority staff of the U.S. Senate Permanent Committee on Investigations. The study argued that this increment of SPR fill had been a major contributor to oil price increases during that

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<sup>1</sup> Stocks of home heating oil were low as the end of summer 2000 approached, and there was concern about the fresh pressure that escalating crude prices, colder weather, and anticipated refinery maintenance might have on home heating price and supply during the winter. On September 22, 2000, President Clinton announced a swap of 30 million barrels of oil from the SPR, and contracts were awarded on October 4, 2000. Interested parties bid to borrow quantities of not less than 1 million barrels. Contracts were awarded on the basis of how much oil bidders offered to return to the SPR.

year.<sup>2</sup> A number of industry analysts dismissed the study, arguing that the quantity of SPR fill was not significant enough to have driven the market.<sup>3</sup>

However, in light of tightness in world oil markets and increasing prices (due in some measure to an interruption in roughly 1.5 million b/d in oil exports from Venezuela), the Bush Administration agreed to delay deliveries scheduled for late 2002 and the first months of 2003. The Administration had intended to accept a total of 3.9 million barrels of RIK crude oil during April 2003, an average of 130,000 b/d. On March 4, 2003, DOE delayed delivery of all but 15,000 b/d. With the end of the military phase of the war in Iraq and little effect on oil markets, deliveries of RIK oil were resumed in the spring of 2003, as was delivery of oil still owed from the swap in 2000.<sup>4</sup> In early August 2003, Senator Levin reiterated his charges in a letter to Secretary of Energy Abraham, requesting that DOE suspend purchases for the SPR until crude oil prices declined.<sup>5</sup>

On March 11, 2004, during debate on the FY2005 budget resolution, the Senate called for a suspension of deliveries and a sale, instead, of 53 million barrels of RIK oil.<sup>6</sup> Proceeds (estimated at \$1.7 billion) would be used for deficit reduction and increased homeland security funding for states. The Administration has indicated that it is continuing with RIK fill, and on March 24, 2004 announced the signing of contracts for the delivery of 18 million additional barrels. In this instance, and during the remainder of the contract, the DOE will be furnishing slightly more than 100,000 b/d to the signatories and receiving a slightly lower volume of higher quality crude oil in return. Deliveries of RIK crude oil to the SPR are currently scheduled through October 2004 and are to vary from month to month, ranging between 1 to 6 million barrels.<sup>7</sup>

## Oil Markets and Price

Determining whether the cancellation, delay, or market sale of the scheduled delivery of approximately 25 million barrels of RIK crude oil to the SPR between April 2004 and October 2004 will have an effect on gasoline prices requires analysis of the link between the price and supply of crude, as well as the link between crude oil and gasoline prices in U.S. markets.

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<sup>2</sup> U.S. Congress. Senate. *U.S. Strategic Petroleum Reserve: Recent Policy Has Increased Costs To Consumers But Not Overall U.S. Energy Security*. Report prepared by the Permanent Subcommittee on Investigations. Committee on Governmental Affairs. S.Rept. 108-18. March 5, 2003. p. 2.

<sup>3</sup> See, for example: Petroleum Industry Research Foundation, Inc. *The SPR, the Royalty in Kind Program, and Oil Prices*. August 2003.

<sup>4</sup> Obligations to the SPR from the “swap” were completely covered by January 2004.

<sup>5</sup> Platts *Inside Energy*, August 11, 2003: p. 3.

<sup>6</sup> This is roughly the volume of oil yet to be delivered to the SPR to reach capacity.

<sup>7</sup> The current delivery schedule may be monitored at <http://www.fe.doe.gov/programs/reserves/> under the link for “Current Inventory.”

Net imports of petroleum to the United States averaged an estimated 11.2 million barrels per day (mbd) during 2003, while total daily petroleum consumption exceeded 20 million barrels.<sup>8</sup> While daily volumes will fluctuate, scheduled deliveries of RIK oil to the SPR between April and the end of October 2004 will average roughly 125,000 b/d. If diverted to the market, this would represent less than 1% of U.S. demand for oil. The amount of oil potentially entering the market, relative to the size of the market, is the reason that some analysts discount the practical importance of altering the planned SPR fill.<sup>9</sup>

Other analysts have made broader assertions that stockpiling and policies governing drawdown of the SPR — along with strategic stocks held elsewhere in the world — have added to the price of oil in world markets. In a statement before a California panel discussion on gasoline prices, Philip Verleger estimated that SPR fill policy had raised crude oil [prices between \$5-\$10/barrel by the end of 2003].<sup>10</sup>

The March 2003 study by the minority staff of the Permanent Subcommittee on Investigations, of the relationship between SPR fill policy and price argued that the addition of 25 million barrels to the SPR during late 2001 and early 2002 contributed to oil price increases. During a one-month period in mid-2002, the study concludes, crude oil price increases stemming from deposits to the SPR imposed an additional energy price burden on consumers ranging between 500 million and one billion dollars.<sup>11</sup> The study predicted that maintenance of the Administration's fill policy would contribute to higher prices in 2003 as well.

Consistency between links in the oil supply chain, from the oil market, to the refineries, to the gasoline market, might also be important in determining the extent to which oil, and ultimately gasoline, prices would be affected by rescheduling RIK deliveries to the SPR. For example, if refining capacity were not readily available to process released oil, because refineries were near maximum capacity, the result might be that U.S. imports of crude oil would decline as refiners substitute RIK oil, yielding no additional new product supply on the market.

The other side of these arguments is that in a tight oil market, even a relatively small change in supply could have a disproportionate effect on price. The Organization of Petroleum Exporting Countries (OPEC) however, asserts that the market is not experiencing supply tightness. They point to plentiful supplies of heavy, sour crude,

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<sup>8</sup> U.S. Department of Energy. Energy Information Administration. *Monthly Energy Review*. March 2004.

<sup>9</sup> American Petroleum Institute, "API Update to Congress on Fuel Supplies, Market Conditions." April 2, 2004.

<sup>10</sup> *Goldman-Sachs Commodities Weekly*, January 16, 2004, p. 5. Philip K. Verleger, Jr., "Statement for Attorney General Lockyer's Panel Discussion on California Gasoline Prices." March 11, 2004. Verleger asserts that SPR policy since the fall of 2001 has resulted in increases in crude oil prices of as much as \$8 per barrel.

<sup>11</sup> U.S. Congress. Senate. *U.S. Strategic Petroleum Reserve: Recent Policy Has Increased Costs To Consumers But Not Overall U.S. Energy Security*, p. 2.

the type sold by many OPEC producers, while recognizing the market for light, sweet crude oil is tighter.<sup>12</sup>

Isolating the effect of any single causal factor in the workings of the oil market is difficult. The market is characterized by complex multi-causality that reflects both long and short run influences. Daily market price perturbations suggest that it is likely that any change in energy policy, including one on SPR fill rates, could have some immediate effect on the price of crude oil, due to the price sensitivity of spot and near term futures prices to changing expectations. Whether the initial price response would last long enough to translate into a change in gasoline prices for consumers would depend on whether the underlying demand and supply fundamentals were tipped in the direction of excess supply. But, it would also be difficult to separate out the effect of other developments during the same period that also may have had some bearing on oil and product prices.

The events of March 31, 2004, provide a good example of the complex, and sometimes contradictory, short term effects of changing market forces on price. On March 31, 2004, the price of oil, measured by the May delivery, light, sweet crude futures contract traded on the New York Mercantile Exchange (NYMEX), closed lower by \$0.49 per barrel, or a decline of about 1.5%, at \$35.76. On the same day, OPEC ministers, meeting in Vienna, reaffirmed their intent to lower their production limit to 23.5 million barrels per day on April 1, a decline of 1 million barrels per day, which, if effective, might tighten oil supply and push prices upward. However, other factors also affected the market that day. The EIA announced that stocks of crude oil held by refiners unexpectedly rose by 5.7 million barrels, to 294.3 million barrels, for the week ended March 26, the highest value attained since August 2002. This news seemed to offset the OPEC actions, yielding the fall in price.<sup>13</sup>

Longer term demand and supply factors also filter into the price setting process. The persistently high price of crude oil in 2004, above the stated OPEC target price range of \$22 to \$28 per barrel, has been widely attributed to demand growth that has exceeded forecasts, especially in the United States and China.

Expectations and psychological factors also play a role in price formation. When the Senate passed a bipartisan sense-of-the-Senate resolution (sponsored by Senators Levin and Collins) to the 2005 budget resolution that would direct the government to cancel delivery of RIK oil and divert 53 million barrels to the market, the price of crude oil futures fell \$0.59/barrel. The futures price then rose \$0.40/barrel only a week later on the day that the administration announced that it intended to keep filling the SPR as planned, even though prices were at a near record high level. How much of these price movements should be attributed to the Senate action or the Administration response is arguable in light of the many other factors cited here that may bear on daily movements in market prices.

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<sup>12</sup> *Oil Daily*, "Opec Looks Set to Stick to April Target." Vol. 54, No. 61, March 31, 2004. p.1.

<sup>13</sup> Some also argue that speculation plays some part in the movement of crude and product prices, and that these observed prices may not always be a strict measure of current or anticipated supply.

A drawdown of the SPR — in addition to a deferral of RIK fill — is a further policy option, but one not analyzed in depth here. Depending upon the ability of refineries to absorb additional crude, and the volume of the drawdown, the benefits might vary. However, it could be argued that refining capacity is already strained and unlikely to benefit from a deferral in SPR fill. Thus, in this circumstance, any softening in the price of crude from a drawdown is unlikely to be passed along in full to consumers.

## Gasoline Markets and Price

According to the Energy Information Administration (EIA), crude oil accounts for approximately 40% of the cost of gasoline at the pump.<sup>14</sup> The remaining components of the price per gallon are federal and state taxes (about 30%), distribution and marketing costs (about 13%), with refining costs and profits accounting for a variable residual. Along with the price of crude oil, refining profit margins and costs have been volatile in recent years.<sup>15</sup> Conditions may now exist in the gasoline market that would tend to keep prices high, independent of crude oil prices.<sup>16</sup>

Since no new refinery has been built in the United States in over 25 years, expansion of capacity to meet growing product demand has come from incremental expansion of existing facilities and increasing the rate of capacity utilization. Over the past decade, capacity utilization, on average, has been greater than 90%. The most recent data for 2004 show the normal seasonal dip in capacity utilization as refiners prepare for the summer driving season and perform scheduled maintenance, with capacity utilization averaging 90.6% in January and 89% in February 2004, higher values than the 87.2% and 87.3% for January and February 2003.<sup>17</sup> High utilization rates imply very little flexibility in the system to expand production if a bottleneck appears anywhere else in the supply chain or if market supply of crude oil increases.

If RIK crude oil entered the market and did not displace supply from other sources, and if refinery capacity were available to produce more gasoline for the market, it is likely that consumers would gain. Increased supply would likely help reduce price, and this additional supply could be used to replace high cost imported gasoline.

Adding to the tightness in regional gasoline markets is the specialized nature of gasoline specifications. In 2003 there were 20 different gasoline blends marketed in

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<sup>14</sup> Energy Information Administration, “Primer on Gasoline Prices.” September 2003. p 2.

<sup>15</sup> See CRS Report, RL32248, *Petroleum Refining: Economic Performance and Challenges for the Future*, March 1, 2004, for a more complete analysis of the refining industry.

<sup>16</sup> For a more detailed treatment of the factors and dynamics affecting gasoline prices, see CRS Report RL32343, *Gasoline Price Surge: Revisited Crude Oil and Refinery Issues*, by Lawrence Kumins and Robert Bamberger.

<sup>17</sup> Energy Information Administration, “Weekly Petroleum Status Report.” March 31, 2004. Table 2, p. 2.

the United States to meet air quality standards.<sup>18</sup> This variety of gasoline blends makes it difficult to transfer product from areas of available supply to those in shortage. Importing fuel also becomes more expensive because a foreign refinery has to tailor a relatively small run of product for a regional U.S. market. In some cases, relatively small product volumes and lower profit expectations may induce foreign refiners not to invest in the processes necessary to produce specific blends for U.S. regional markets. If this outcome were to occur it might mean localized price spikes and shortages.

Imports of finished gasoline and blending components now account for about 10% of total gasoline supply on the U.S. market.<sup>19</sup> Because of more stringent requirements on sulfur content, additives such as MTBE, and vapor pressure, finding supplies of imported gasoline on the international market that meet U.S. and state fuel specifications, and that are available at prices less than or equal to domestic supplies, has been difficult. As a result, it may be that the more expensive import component of gasoline supply is raising the price of gasoline in the U.S. market. This could happen if the price of gasoline is determined by the cost of acquiring the incremental supply necessary to meet market demand and avoid market disruptions.

Low inventories of both crude oil and gasoline products have also influenced near-term futures prices, as well as prices faced by consumers. Total motor gasoline inventories have been declining in recent years. It has been estimated that a minimum stock level of 185 million barrels of gasoline is needed simply to keep the distribution system running. However, gasoline stocks averaged about 211 million barrels in 2002. They declined further to about 202 million barrels on average in 2003, a 4.5% decline from the 2002 level. Data for the first three months of 2004 shows an additional 0.6% decline compared to the first three months of 2003.<sup>20</sup> Although U.S. motor gasoline supplied to the market has averaged about 9 million barrels per day, an inventory level of slightly above 200 million barrels translates into available supply of less than two day's consumption when the necessary volumes required to keep the system flowing are factored into the analysis.<sup>21</sup>

## Conclusion

Crude oil is an input into a production process that yields motor gasoline as a retail product. For the suspension of RIK deliveries of crude oil to the SPR to have an effect on gasoline prices this oil would have to alter the demand and supply balance in the production process. At least two obstacles exist that might prevent the RIK oil from having a significant effect. First, the amount of oil is small, less than 1%, of U.S. requirements, and even less of the world market. If any other oil producer chose to reverse the effect of the RIK oil on the market, that could be accomplished with an offsetting reduction in supply. Second, refineries in the United States, the link between

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<sup>18</sup> D.J.Peterson and Sergej Mahnovski, *New Forces at Work in Refining, Industry Views of Critical Business and Operations Trends*, RAND Science and Technology, 2003, p. 26.

<sup>19</sup> Ibid. Table 8, p. 14.

<sup>20</sup> Ibid. Table 4, p. 6.

<sup>21</sup> Energy Information Administration, "Petroleum Supply Monthly." Table S4. p. 17.

the crude oil and the gasoline markets, are operating at nearly full capacity, making it unlikely that additional supplies of crude oil, in the form of the RIK volumes, could be refined and distributed as a net increase in motor gasoline.

High crude oil prices in the world market are influenced by political as well as economic forces. The high gasoline prices facing U.S. consumers reflect those high world crude oil prices and are sustained by a number of conditions in the gasoline market. The high utilization rate of refineries, the fragmented specification of regional gasoline blends, the low inventory balances, and the scarcity and high cost of conforming imported gasolines suggest that the gasoline market might remain tight even if additional crude oil appeared on the market.