**TESTIMONY OF JOHN D. SHAGES**

**DEPUTY ASSISTANT SECRETARY FOR PETROLEUM RESERVES**

**BEFORE THE SUBCOMMITTEE ON AVIATION**

**COMMITTEE ON TRANSPORTATION & INFRASTRUCTURE**

**U.S. HOUSE OF REPRESENTATIVES**

**February 15, 2006**

Mr. Chairman and members of the Subcommittee, I am pleased to be here today to discuss the current status of the jet fuel market. I will also discuss airline industry and infrastructure trends and their implications for the future aviation fuel market. Finally, I will address our Strategic Petroleum Reserve, its characteristics and how it has been used to protect the Nation from disruptions in petroleum supplies.

Jet Fuel

Jet fuel is refined from crude oil and is one of the products in the portion of the barrel called the middle distillates. During the most basic refining process of simple distillation, crude oil is heated in a distillation column to separate components according to their boiling points. The light products -- liquefied petroleum gases (LPG), naphtha, and so-called "straight run" gasoline – with the lowest boiling points are recovered at the top of the column. Middle distillates -- jet fuel, kerosene, diesel fuel and heating oil -- come next in the middle section of the distillation column. Middle distillates comprise about 34 percent of the total barrel in the United States, with jet fuel accounting for between four and ten percent. In the United States, Jet fuel is the third-highest product in demand

behind gasoline and diesel fuel. In addition to its primary use as a transportation fuel there is limited use as a stationary turbine fuel, and occasionally it is used to blend into heating oil to stretch supplies during periods of peak demand and very cold weather. Today almost all commercial and military jet fuel is kerosene based.

The United States domestic refining industry, which has the capacity to refine about 17 million barrels of crude oil per day, has historically been able to provide virtually all of the jet fuel needed to satisfy both commercial and military demand. However, in the aftermath of Hurricanes Katrina and Rita, as much as 5 million barrels per day of refining capacity was closed for a short time, and the U.S. refining industry was not capable of satisfying demand for major products.

Jet Fuel Markets

Commercial airlines can buy their jet fuel in several ways, including direct purchases, through consortiums or from an airport distributor. The method used depends upon the size of the airport, the extent of the airline's presence at any given location and institutional requirements at the airport. Airlines are subject to volatility in the price of fuel. In the case of airlines, fuel is usually the second biggest portion of their cost after labor, but at times it may become the biggest portion of cost, as occurred last September with the surge in jet fuel prices. The airlines can accept the risk of price volatility or they can manage the cost uncertainty by buying petroleum futures or financial derivatives.

Because gasoline and diesel fuel are the major components of demand, they drive the world's demand for crude oil, and the price of crude oil is the major determinant of the

price of jet fuel as well as those other products. Obviously, the price of crude oil is subject to many diverse forces, has been volatile, and is not easily predictable.

Although an airline might like to eliminate cost volatility by buying jet fuel for future delivery, there is no established market for jet fuel futures. The closest product to jet fuel traded on the New York Mercantile Exchange (NYMEX) is heating oil, which is not a perfect proxy for the jet fuel market. In the northern hemisphere, heating oil price fluctuates by season with an obvious winter peak. While it is not self-evident that peak jet fuel demand should coincide with peak heating oil demand, during the winter months, as refiners maximize heating oil production, the prices of all middle distillates move in relation to the severity of the winter weather. Consequently, airlines may use the NYMEX heating oil contract to hedge their jet fuel price and partially protect themselves from price volatility. Whether this is a good strategy will depend on how markets perform. For example, if an airline bought futures contracts in early 1997, it would have locked itself into relatively high costs when prices collapsed in late 1997 and 1998. However, once markets recovered and started moving up in 1999, futures prices shifted lower than current prices and remained so for five years. During that entire period, a strategy of buying heating oil futures would not only have reduced price volatility, but would have proved to be a winning strategy for reducing costs relative to simply buying jet fuel at current market prices.

Unfortunately for many of the Nation's airlines, after the events of September 11, 2001, the ability of their managers to choose to hedge was constrained by their strained financial conditions. Media reports indicated that many of the legacy carriers were not

hedged during 2003 and 2004, thus leaving them exposed to price volatility and financial risks. This exposure, along with other factors, hurt their competitive positions.

Logistics

Much domestic jet fuel and other products move from major refinery centers through multi-product pipelines to end use destinations. The largest refinery center is on the Gulf Coast, with most remaining capacity concentrated near Philadelphia, Chicago, Seattle, and California. The West Coast is isolated from the supply and distribution infrastructure of the rest of the country. As such, local refiners supply most of the jet fuel to the West Coast. The Gulf Coast refiners account for about 70 percent of the jet fuel supplied to the rest of the country outside of the West Coast. About 80 percent of Gulf Coast jet fuel production is moved out of the region, mostly via pipeline, into the Midwest and East Coast. More than three-fourths of East Coast jet fuel demand is satisfied by refiners outside of the region, mainly from the Gulf Coast, and 7 percent of East Coast demand is met from imports. Over one-third of Midwest jet fuel demand is met from Gulf Coast refiners.

The movement of jet fuel and other refined products is normally very reliable; pipeline stoppages are infrequent and short-lived. However, when much of the Central Gulf Coast was left without power following Hurricane Katrina, both the Colonial and Plantation Pipelines were incapacitated. Within weeks of the time power was restored and the pipelines were operable, Hurricane Rita caused the closure of so many refineries that there was not enough available product to fill the reopened pipelines. Fortunately, despite very low inventories at some airports, at no time did outages of jet fuel occur.

While pipeline outages are capable of causing major problems in gasoline and diesel supply, the nature of the airline industry provides some insulation from regional shortages of jet fuel. The range of modern aircraft along with their fuel storage capabilities works to limit the risk of absolute regional shortages. Airlines have shown their ability to forgo fueling their planes at airports where supplies may be low or prices too high, by carrying additional fuel for their outbound journeys. Although this may prove to be expensive for airlines and passengers, in the event of a regional supply disruption it provides an alternative to an absolute outage.

Looking towards the future, the introduction of ultra-low-sulfur-diesel fuel (ULSD) scheduled to begin this coming summer, raised concerns over the degree to which high-sulfur jet fuel might increase contamination potential for this new clean fuel. At this time, all pipelines are still planning on carrying jet fuel, but should contamination be a larger problem than anticipated, jet fuel logistics may become an issue down the road. We note the European Union required a similar change to ULSD, and while the changeover was accompanied by a price increase while the distribution system was being adjusted, the price increase was short lived. However, Europe does not rely on the extensive pipeline systems and long-distance travel from refineries to end users that the United States does.

2005 – The Hurricanes

The petroleum situation during 2005 was much different from what we have grown to expect. Recent world economic growth caused a surge in oil demand that outstripped

forecasts. Worldwide investment in oil exploration and production over the last ten years has been insufficient to maintain the wide margin of production capability above demand that we have been used to. In addition, investment in refining has lagged demand growth, in large part because of the low returns on capital that beset the industry for many years. Excess capacity has shrunk to a minimal level, and Saudi Arabia and other member countries of the Organization of Petroleum Exporting Countries currently have limited ability to increase production and rapidly stabilize or reduce oil prices. During the summer of 2005, everyone realized that fuels for heating, including distillates, would be expensive this winter. However, inventories were building and we expected to go into the winter with the best inventory picture in years.

Hurricane season changed that. In late August, Hurricane Katrina devastated the Central Gulf Coast. Barely three weeks later, Hurricane Rita did the same to the Western Gulf Coast. The impact on the domestic oil industry was significant. At its worst points, virtually all production of oil and gas from the Gulf of Mexico was halted.

The Administration responded immediately to the hurricanes by taking a number of measures to minimize the impact of the storm on energy supply including:

- The Departments of Energy and Transportation worked to get power to the interstate pipelines that were essential to ensuring adequate supplies of refined products to the southeast and east coast.
- The Environmental Protection Agency provided temporary waivers allowing the early use of winter blend gasoline.

- The Department of Homeland Security suspended legal restrictions on the use of foreign tankers in transportation of fuel supplies between U.S. ports.
- The Department of the Interior's Minerals Management Service immediately began to streamline processes for various permit approvals to resume production and expedited reviews of requests for temporary barging of oil until pipelines could be repaired.
- The Treasury Department increased the flexibility available to fuel distributors to meet diesel fuel demand by waiving penalties for highway use of "dyed" diesel fuel normally restricted to off-highway use.
- The Navy and Coast Guard worked to clear shipping channels in the Gulf and the Lower Mississippi River.

Additional facilities were subsequently shut-in due to Hurricane Rita. Approximately 100 platforms and rigs were destroyed by the storms. Shut in oil production as of February 8, was 364 thousand barrels per day, or 24.3 percent of expected daily production from the Gulf. Similarly, shut in gas production from the Gulf is 1.55 billion cubic feet per day, equal to 15.5 percent of expected production. At last report from the Minerals Management Service, the country has experienced a delay in the production of 120 million barrels of oil and 610 billion cubic feet of gas since late August 2005.

On shore, hurricane damage to refineries, gas processing plants, and power lines was equally serious. Immediately after Rita struck about 5 million barrels of daily refining capacity was shut down. While onshore pipelines were not damaged, the widespread

lack of power meant drastically reduced operations. And when the pipelines came back into service there was not enough refined product to keep them operating at capacity.

The U.S. petroleum industry has since made tremendous progress in recovering from the hurricanes, and it is a tribute to the workers in the Gulf region, many of whom lost their homes and possessions, that they have done so much to restore electricity, pipelines, refineries and producing operations to service so quickly. At this time there are still 2 refineries with about 557 thousand barrels of daily capacity that have not returned to production.

All crude and petroleum product pipelines that were affected by the Gulf Coast hurricanes are back to normal operations. While crude oil production in the Gulf of Mexico is still not back to full force, imports are more than sufficient to meet demand, and inventories of crude oil are above the average range for this time of year. Furthermore, as refineries have come back on line and product imports have continued at a high rate, gasoline and distillate stocks are now also above the average range for this time of year. In all, supply, demand and prices have largely recovered from the hurricanes.

The Strategic Petroleum Reserve Response

The experience of the 2005 hurricane season has highlighted the vulnerabilities of the Gulf Coast crude oil and product infrastructure and the value of holding strategic stocks. After Katrina came ashore on the Louisiana/Mississippi coast, the President and the

Secretary of Energy made the decision to use the Strategic Petroleum Reserve. First the Secretary used his authority to loan 9.8 million barrels of crude oil to individual refineries that were not damaged by the storms, ensuring they had timely supplies to continue operations. In addition, on September 2, 2005, the President authorized the drawdown and sale of oil from the Reserve and the Department offered 30 million barrels of crude oil for competitive sale, and eleven million barrels of oil were sold. This was the United States share of the International Energy Agency coordinated response which made 63.6 million barrels of petroleum in total available to the markets. In concert with this drawdown, the Department of Commerce waived the 30-day export licensing requirement for the corresponding import of refined product if there were a need for Strategic Petroleum Reserve crude oil to be exported for refinement.

The refined products released by the other member countries of the International Energy Agency had a very direct impact on the United States as our imports surged. This was in large part because the release of those products from strategic storage in Europe and Asia, as well as increased refinery runs in those locations, created the necessary price differentials for traders to export the products to the United States. These product imports were crucial in September to replace the products normally supplied to the East Coast from the Gulf Coast, and demonstrate the importance of cooperative responses among consuming countries.

The Strategic Petroleum Reserve

The Strategic Petroleum Reserve is comprised of four Government-owned sites storing nearly 700 million barrels of crude oil in caverns created in underground salt domes along the U.S. Gulf Coast. All sites are connected to the commercial pipelines serving the Gulf Coast and Midwest. They are also connected to marine terminals that allow the SPR oil to reach 95 percent of the Nation's refining capacity. The location of the caverns approximately 2000 feet below the earth's surface provides a secure storage environment with little vulnerability to natural or man-made dangers. The surface facilities are designed with the susceptibility of the region to hurricanes in mind. All of the critical systems are designed to withstand 150 mile per hour winds. Although Hurricane Katrina dealt a glancing blow to our storage site near Baton Rouge, that site was prepared to deliver oil within 48 hours of the hurricane passing, and most of the 9.8 million barrels of loans were delivered from that location. More seriously, Hurricane Rita passed very close to our West Hackberry, Louisiana site near Lake Charles, Louisiana, completely devastating local towns and the homes of our employees. Nevertheless, damage to the site was minimal, and as soon as roads were reopened and electricity restored, that site delivered the preponderance of the 11 million barrels of oil sold in response to Hurricane Katrina.

The Reserve's existing storage caverns were developed at a cost of $2-3 per barrel, and annual cost for operations and maintenance is $0.20-0.25 per barrel. Salt dome cavern storage is far more physically secure and cost efficient than other media such as above ground steel tanks, which cost $15-25 per barrel to construct or at least $2.50 per barrel per year to lease. All SPR sites are operational and capable of physically moving oil to

industry in as little as 24 hours. When a competitive sale is required in response to a Presidential directive, the oil can usually begin flowing in less than two weeks.

While there are periodic proposals to create strategic reserves of various refined products, the benefits of such reserves do not compare favorably to a crude oil reserve in the Gulf coast. Regional product stocks were required in the 1975 legislation that authorized the Strategic Petroleum Reserve. However, the original plan to develop the SPR prepared in 1976 substituted crude oil in central storage. The substitution was justified on the basis of cost savings.

Periodic reviews of this issue by the Office of Petroleum Reserves have found the original decision to store only crude oil continues to be valid. The low cost and flexibility of a crude oil reserve, together with a robust refining industry and logistics network to process and move stocks where most valued, are a superior strategic configuration compared to alternatives.

In general, product reserves are difficult and costly to maintain and administer, and may be ill-suited to address a supply shortage for a particular product due to specific events. While the Office of Petroleum Reserves does maintain the two-million barrel Northeast Home Heating Oil Reserve, that reserve is very small, is maintained in private facilities, and satisfies a very specific requirement for a geographically small part of the country. Crude oil strategic storage in the Gulf is the most flexible, cost effective option to protect against an array of disruption scenarios.

While the effect of the hurricanes of 2005 was devastating beyond any expectations, the Strategic Petroleum Reserve performed very well. In addition, a new appreciation of the importance of commercial power to restoring the whole petroleum industry infrastructure after disasters of this type, will cause systems to be hardened and backup systems to be in place to lessen the effect of any such future event.

This concludes my prepared testimony and I will be happy to answer any questions you may have.