

**Report on the Effect the Low Enriched Uranium Delivered
Under the Highly Enriched Uranium Agreement Between
the Government of the United States of America and the
Government of the Russian Federation has on the
Domestic Uranium Mining, Conversion, and Enrichment
Industries and the Operation of the Gaseous Diffusion Plant**

2007



Information Date: December 31, 2007

Introduction

The Agreement Between the Government of the United States of America and the Government of the Russian Federation Concerning the Disposition of Highly Enriched Uranium Extracted from Nuclear Weapons (HEU Agreement) was signed on February 18, 1993.

The HEU Agreement provides for the purchase over a 20-year period (1994–2013) of 500 metric tons (MT) of weapons-origin highly enriched uranium (HEU) converted to commercial-grade low enriched uranium (LEU) from the Russian Federation (Russia). The Russian LEU is sold in the U.S. nuclear fuel market to commercial nuclear power plants through the United States Enrichment Corporation (USEC), the U.S. Executive Agent for the commercial agreement. The LEU, in the form of uranium hexafluoride (UF₆), contains the equivalent of almost 400 million pounds of natural uranium concentrates (U₃O₈), 150 million kilograms of uranium (kgU) conversion services, and approximately 92 million separative work units (SWU) of uranium enrichment services. This is enough fuel to satisfy about seven years of domestic demand for uranium concentrates, conversion, and enrichment.

Under the Agreement, USEC had received 322 MT of Russian weapons-grade HEU that had been converted to LEU by the end of 2007. That is the equivalent of 12,885 nuclear warheads according to International Atomic Energy Agency definitions.

The HEU Agreement is a key element of U.S. nonproliferation policy serving mutual U.S. and Russian interests. The HEU Agreement provides incentives for Russia to blend down HEU from its nuclear warheads into LEU for use and sale as fuel in commercial nuclear power plants. The revenue stream from the HEU Agreement provides an ongoing financial incentive for Russia to reduce its HEU inventory derived from surplus nuclear weapons. The Agreement also provides a structured mechanism to permit the sale of Russian enrichment and uranium products into a historically restricted U.S. market.

Report Summation

The successful implementation of the HEU Agreement remains a high priority of the U.S. Government as well as serving United States and Russian commercial interests. HEU Agreement deliveries are an important source of supply in meeting requirements for U.S. utility uranium, conversion, and enrichment. With higher and increasingly unstable market prices for uranium and declining uranium supply from secondary markets, HEU Agreement deliveries help to provide an adequate uranium supply at reasonable prices. In addition, the predictability of measured uranium product deliveries under the HEU Agreement has reduced uncertainty for U.S. producers and suppliers who are moving to expand uranium, conversion, and enrichment capacity to meet future demands from a potential increase in domestic nuclear power generation capacity.

While initial uranium deliveries under the HEU Agreement had a limited effect on the commercial nuclear fuel markets, mitigating actions subsequently taken by the U.S. Department of Energy (DOE) and Congress to avoid an adverse material market impact from future HEU Agreement deliveries have been effective. Successful implementation of the HEU Agreement to date is also attributable to the efforts of the U.S. and Russian Executive Agents for the Government-to-Government Agreement (DOE and Rosatom, respectively), and the Executive

Agents for the commercial agreement (USEC and Tenex), and the U.S. industry. Recognizing the vital importance of the nuclear fuel cycle to U.S. energy and national security, DOE will continue to work with Congress and industry to ensure the HEU Agreement's continued success in stabilizing increasingly tight nuclear fuels markets.

Purpose of Report

The 1996 USEC Privatization Act (Privatization Act), Public Law 104-134 (42 U.S.C. 2297h), requires the President to "report to the Congress not later than December 31 of each year on the effect the low-enriched uranium delivered under the Russian HEU Agreement is having on the domestic uranium mining, conversion, and enrichment industries, and the operation of the gaseous diffusion plants." The report also must provide a description of Government actions taken or proposed to be taken to prevent or mitigate any adverse material impact on such industries or any loss of employment at the gaseous diffusion plants (GDPs) as a result of the HEU Agreement. Prior year reports are available on http://nuclear.gov/pdfFiles/2006_HeuReport.pdf.

Implementation of the HEU Agreement

A contract implementing the terms of the HEU Agreement was signed on January 14, 1994, with USEC, acting as the Executive Agent on behalf of the U.S. Government, and Techsnabexport (Tenex), as the Executive Agent for the Russian Federation. The terms provided for the sale of the enrichment component of the LEU resulting from the blended down HEU to USEC's customers. The contract also provides for the Russian Government to receive revenues from USEC based on an average of market indices for enrichment.

The 1999 Commercial Feed Agreement provides revenue to Russia for the natural uranium and conversion components of the LEU delivered under the HEU Agreement. The Feed Agreement establishes an allocation of the natural uranium and conversion among Tenex and the Western Consortium (Cameco, Cogema (now part of AREVA NC), and Nukem) based upon a provision in the USEC Privatization Act. Section 3112 of the Act sets an annual quota that restricts the total quantity of natural uranium imported into the United States for domestic end use. Natural uranium as UF₆ not purchased by Tenex or the Western Consortium is shipped to Russia. The Feed Agreement is important to the overall success of the HEU Agreement.

Status of Deliveries

Table 1 shows the estimated number of Russian warheads dismantled: HEU and LEU quantities

Table 1: Status of LEU Deliveries under the HEU Agreement

Contracted Year	Estimated Dismantled Warheads*	HEU (MTU)	LEU (MTU)	Natural UF ₆ Uranium Concentrate Component (million lb U ₃ O ₈)	Natural UF ₆ Conversion Component (million kgU)	Uranium Enrichment Component (million SWU)
1995	244	6.1	186.0	4.8	1.9	1.1
1996	479	12.0	370.9	9.5	3.7	2.2
1997	534	13.4	358.5	10.2	3.9	2.4
1998	764	19.1	571.5	15.0	5.8	3.5
1999	970	24.3	718.7	19.0	7.3	4.5
2000	1,462	36.6	1,037.8	28.3	10.9	6.7
2001	1,201	30.0	904.3	23.7	9.1	5.5
2002	1,201	30.0	879.0	23.5	9.0	5.5
2003	1,203	30.1	906.0	23.7	9.1	5.5
2004	1,202	30.1	891.0	23.6	9.1	5.5
2005	1,206	30.1	846.0	23.3	9.0	5.5
2006	1,207	30.2	870.0	23.4	9.0	5.5
2007	1,212	30.3	840.0	23.3	9.0	5.5
Total Delivered Through 2007	12,885	322.1	9380.0	251	97.0	59
Total Expected over Life of Agreement	20,000	500	15,258.6	395.8	152.2	92.1

* Based on the International Atomic Energy Agency's definition of significant quantities (1987 IAEA Safeguards Glossary).

as well as the equivalent natural uranium, conversion services, and enrichment components that have been delivered to date; and projected totals through the remaining life of the HEU Agreement. The HEU Agreement allowed for up to 30 metric tons of uranium (MTU) of HEU to be blended down to LEU for delivery in 1999. However, only 21.3 MTU (14.7 MTU in calendar year (CY) 1999 and 6.6 MTU in CY 2000) of the 1999 order was actually delivered. As of December 31, 2007, 292 MTU of Russian HEU was converted to LEU and delivered to the United States. To reach the total goal of 500 MTU of HEU, 30 MTU of deliveries are scheduled annually from 2008 through 2012. These deliveries, together with the undelivered 8.7 MTU from 1999 and a delivery of 19.2 MTU in 2013, will reach the 500 MTU of HEU. A listing of milestones associated with the HEU Agreement is shown in Table 2.

Table 2: HEU Agreement Milestones

- February 18, 1993 – The HEU Agreement signed.
- January 14, 1994 – Executive Agents for the United States and Russia (USEC and Tenex) executed the Implementing Contract to the HEU Agreement.
- June 1995 – The first delivery of LEU that was derived from HEU arrived in the United States.
- April 26, 1996 – The USEC Privatization Act, P.L. 102-486, was signed by President Clinton. This Act, in part, established the annual amount of natural uranium that can be imported for sale within the United States.
- October 21, 1998 – President Clinton signed P.L. 105-277 that, in part, provided for the United States to purchase, for up to \$325 million, the unsold natural uranium associated with the 1997 and 1998 deliveries of Russian LEU.
- March 24, 1999 – The Transfer of Source Material Agreement was signed by the United States and Russian Governments. In addition, the Western Consortium and Tenex signed a Commercial Feed Agreement. These agreements were instrumental in introducing the natural uranium component into the market in a non-disruptive manner.
- November 16, 2001 – The Western Consortium and Tenex signed an amendment to the Commercial Feed Agreement that exercised the Western Consortium's options to purchase the natural uranium for the period 2002 through 2013.
- June 19, 2002 – The U.S. and Russian Governments approved the latest amendment to the contract between USEC and Tenex that implements the HEU Agreement. Under this new amendment, a market-based pricing structure for the SWU is used for the remaining term of the HEU Agreement.
- June 16, 2004 – The Western Consortium and Russia announced an amendment to the Commercial Feed Agreement that ensures there is sufficient natural uranium in Russia to blend down the HEU to commercially usable LEU through the remaining term of the Agreement.
- September 2004 – Deliveries of LEU reach the equivalent level of 9,000 nuclear warheads eliminated.
- August 2005 – LEU downblended from 250 MTU of HEU was delivered to the United States. This represents one-half of the 500 MT of HEU and is equivalent to 10,000 nuclear warheads eliminated.
- September, 30, 2005 – The U.S. Departments of State and Energy, and the Russian Federation Ministry of Foreign Affairs, and the Federal Atomic Energy Agency issued a joint statement marking the successful midpoint of the implementation of the HEU Agreement.
- June 28, 2006 – USEC announced that 275 MTU of HEU was converted to LEU. This is equivalent to 11,000 nuclear warheads.
- September 21, 2007 – A Federal Circuit Court dismissed a U.S. government appeal of an earlier ruling that SWU provided by the European company Eurodif was a service and therefore not subject to anti-dumping legislation.
- September 26, 2007 – The U.S. Court of International Trade (CIT) ruled in a suit by Tenex and the Ad Hoc Utilities Group that Russian Suspension Agreement limitations no longer applied to Russian-originated enrichment services, based on the Eurodif ruling. The Commerce Department was instructed by the CIT to rewrite its findings on the Suspension Agreement in light of the Eurodif findings. This ruling effectively permits the unrestricted import of conventional Russian enrichment services into the United States.
- November 27, 2007 – The United States and Russia initialed an agreement to amend the U.S.-Russian Suspension Agreement. The Agreement would allow Russia to import LEU equal to roughly 20 percent of U.S. uranium demand each year between 2014 and 2020, after the conclusion of the HEU Agreement. Smaller levels of imports above deliveries occurring under the HEU Agreement would be permitted during 2011 to 2013.
- February 1, 2008 – The United States and the Russian Federation signed the amended U.S.-Russian Suspension Agreement

Events Impacting the HEU Agreement During 2007

Russia met its 2007 commitment under the HEU Agreement with deliveries to USEC of 840 MTU of LEU down-blended from 30.3 MTU of HEU. However, in 2007, the Russian Government expressed an interest to increase uranium sales in the United States and gain direct access to the U.S. commercial nuclear fuel market. The following provides an overview of activities that have taken place during recent years.

Russian Uranium Suspension Agreement

The Russian Uranium Suspension Agreement, signed October 1992, suspended the investigation by the U.S. Department of Commerce (DOC) of Russia dumping uranium products into the U.S. market. The Suspension Agreement avoided dumping duties, recommended by DOC, of 115.8 percent on Russian uranium product imports. Russia can only sell uranium product into the United States under the HEU Agreement and only to USEC, which sells the SWU (enrichment) component to its customers and returns the uranium component to Tenex. The uranium component can then be sold subject to an annual quota in the United States. No direct Russian sale of commercial uranium or SWU in the United States was permitted. Grandfathered and match-sale contracts were originally allowed, but these contracts have since expired.

During 2006, the U.S. International Trade Commission (ITC) and DOC conducted a “sunset” review of the Suspension Agreement to determine whether termination of the Suspension Agreement is likely to lead to (1) a continuation or recurrence of dumping of Russian uranium products or (2) a continuation or recurrence of material injury to the U.S. uranium industry, including USEC. On May 30, 2006, DOC completed its review and recommended the Suspension Agreement remain unchanged. On July 18, 2006, by a four to one vote, the ITC ruled that terminating the Suspension Agreement would materially injure the domestic uranium industry. As a result of the affirmative DOC and ITC findings, the Russian Uranium Suspension Agreement continued with the next sunset review to take place in 2011.

On August 7, 2006, Tenex and the Ad Hoc Utilities Group submitted separate complaints in the Court of International Trade (CIT) that constitutes an appeal of DOC’s final results of the five-year sunset review. On September 21, 2007, the U.S. Court of Appeals, in a separate case, *Eurodif v. United States*, ruled that uranium enrichment is a service and therefore not subject to U.S. antidumping laws that apply only to the importation of products. On September 26, 2007, CIT ruled that, based on *Eurodif*, DOC must review the Russian Uranium Suspension Agreement. This effectively removed Russian enrichment from import limits set under the Suspension Agreement and has opened the possibility that Russian SWU might gain unrestricted access to U.S. markets prior to the conclusion of the HEU Agreement.

U.S. and Russian Government officials met several times during 2006 and 2007 to discuss Russia’s interest in amending the Suspension Agreement to allow for such imports. An agreement to amend the Suspension Agreement was initialed by the United States on November 27, 2007. The amendment would allow Russian uranium product imports into the United States equivalent to 20 percent of the U.S. LEU product market during the period 2014-2020, after the conclusion of the HEU Agreement. Smaller quantities of imported Russian LEU or the product equivalent would be permitted during the period 2011-2013. The agreement was signed on February 1, 2008, subsequent to the period covered by this report. A press release summarizing the amended agreement is available on http://www.commerce.gov/NewsRoom/PressReleases_FactSheets/PROD01_005136

Effect of the HEU Agreement on Domestic Industries

The following sections discuss the supply and demand for the domestic uranium mining, conversion, and enrichment markets as well as prices.* The period covered ends on December 31, 2007. This period thus does not include any assessment of the impact of the signing on March 11, 2008, of the Secretary of Energy's Policy Statement on Management of the Department's Excess Uranium Inventory. Discussion of the policy's impact on domestic industry, as they interact with the HEU Agreement, will be included in next year's report.

It is important to recognize that the uranium, conversion, and enrichment markets continued to experience a fundamental shift in supply sources during 2007. The shift results from increasing supply from primary production and a reduction of supply from U.S. Government and commercial inventories (commonly called secondary supplies) available to the markets. There has also been an increase in secondary markets for uranium with a new futures market having been developed and with growing volumes of uranium being held by financial institutions that do not directly process uranium. This shift has resulted in fluctuating prices at many stages of the fuel supply industry. A general trend during the present market, notably for uranium, has been toward increasing prices, a situation that would not occur if fuel markets were oversupplied. As demand and price increase, U.S. producers and suppliers are expanding their capacity in the mining, conversion, and enrichment markets. The trade press continues to report new exploration plans for uranium resources in a number of countries including the United States. The conversion suppliers inside and outside the United States seek to expand their capacity. Two companies--USEC Inc. and Louisiana Energy Services (LES)-- received Nuclear Regulatory Commission (NRC) licenses and are constructing new enrichment facilities in the United States. Two additional companies--AREVA NC and GE Hitachi Nuclear Energy Americas Inc. (GE Hitachi)--plan to apply for construction and operating licenses for new enrichment facilities in the near future.

Utilities are also anticipated to optimize their purchases of uranium and enrichment by taking into account the higher price of uranium relative to the price of enrichment. Many utilities have flexibility under their existing enrichment contracts to vary the tails assay (within a contracted range) under which they purchase enrichment. The tails assay is the percent Uranium 235 contained in the depleted uranium produced during the uranium enrichment process. At a lower tails assay, a utility will deliver less uranium feed to an enrichment supplier and will purchase additional enrichment. The net effect is an increase in enrichment demand and a decrease in demand for natural uranium. Should enrichment prices increase, the opposite effect would occur as utilities seek the most economical cost level between uranium and enrichment purchases. The lowering of tails assays selected by utilities has put a strain on enrichment suppliers. However, new contracts no longer allow as much flexibility in tails selection by the utility. As a result, enrichment suppliers should be able to better anticipate their future production requirements and determine the amount of new enrichment capacity required.

As supply and demand remain closely in balance, investor buying and holding of uranium oxide and UF₆ could reduce the uranium supply available for nuclear power plants. The anticipated global growth in nuclear power generation from new plants, plant upgrades, and license renewals is anticipated to further increase future demand in the nuclear fuel market.

* The reference for market prices provided in this section is the Ux Consulting Company, LLC. The reference for uranium production and demand information is Energy Resources International, Inc.

One outgrowth of the recent dramatic price fluctuations in spot uranium markets has been that any term sellers of uranium have not yet received higher spot-equivalent prices for their product under older existing term contracts. Uranium buyers (nuclear plant operators) have likewise often paid less than spot market rates for the fuel products and services that they receive. As a consequence, recent term contracts have included clauses that include some adjustments for variations in spot uranium markets.

Uranium Mining

World nuclear plant uranium demand during 2007 is estimated to be about 157.8 million pounds U_3O_8 . World uranium production from mines is estimated to be 109.0 million pounds U_3O_8 during 2007, an increase of 6.7 million pounds U_3O_8 from the 2006 level of about 102.3 million pounds U_3O_8 . Current worldwide production from mines thus supplies 68 percent of demand. Additional uranium supply from secondary market sources such as Government and commercial inventories, re-enriched uranium tails, and reprocessed uranium, as well as the natural uranium component of the HEU Agreement, meet the balance of uranium requirements. Uranium demand in the United States for 2007 was 47.2 million pounds U_3O_8 equivalent compared to 51.7 million pounds U_3O_8 equivalent in 2006. Domestic uranium concentrate production in 2007 is estimated to increase 10 percent from 4.1 million pounds U_3O_8 in 2006 to 4.5 million pounds U_3O_8 . The increase in domestic concentrate production over the past several years reflects an increase in uranium exploration, development, and drilling that has coincided with higher U_3O_8 prices. Energy Information Administration numbers report that employment in the U.S. uranium production industry also increased 63 percent between 2006 and 2007.

Spot market uranium prices began 2007 at \$72 per pound U_3O_8 representing an accelerating increase in spot prices since the end of 2002 when prices were just over \$10 per pound U_3O_8 . The uranium market had seen a dramatic rise in prices during 2006 and 2007 driven partly by tightening supply and demand, investor interest in uranium as a market commodity, and by disruptions at existing mines and at mines under development. The October 2006 flood at Canada's Cigar Lake mine was a notable example. The Cigar Lake mine, with an anticipated production of 18 million pounds per year, had been originally scheduled to start up early in 2008. It is now anticipated to be delayed several years. There were additional production disruptions in early 2007 due to flooding at the large Ranger Mine in Australia and in late 2007 at Rabbit Lake in Canada.

Spot uranium prices showed considerable instability during 2007, rising to as high as \$136 per pound U_3O_8 in June 2007 before dropping to \$75 per pound U_3O_8 in October 2007. Prices closed 2007 at \$90 per pound U_3O_8 . Much of this fluctuation might be attributed to continued investor activity in the uranium market. A uranium futures market was created in the United States during 2007, and there was increased interest in uranium markets on the part of hedge funds and other investors. The price fluctuations also reflect the uncertainties in the market due to the slow growth of the uranium mining industry and to uncertainties regarding longer term fuel supplies in anticipation of the end of the U.S.-Russian HEU Agreement in 2013. Additional uncertainties relate to continued delays in the timing of Cigar Lake recovery and also the timing and scale of anticipated increases in demand for nuclear power in the coming decade.

While near-term markets for uranium have not seen rapid increases in supply, high uranium prices have stimulated exploration for and development of uranium mining facilities worldwide. This includes activities within the U.S. mining industry. In early October 2007, NRC received an application for an in situ recovery (ISR) uranium recovery facility in Wyoming. This was the first application for a new uranium recovery facility that NRC had received since 1988 though

applications for facility expansion and restarts had been received during the period. NRC anticipates receiving as many as 13 or more additional applications for new ISR facilities in South Dakota and Wyoming by the end of fiscal year 2009.

Following the initial implementation of the 1999 HEU Commercial Feed Agreement, the measured sale of the Russian uranium to the Western Consortium and by Tenex has been an important source of supply for the U.S. commercial market. In spite of declining supply availability from other secondary sources, the HEU Agreement deliveries have helped to provide a stable supply at reasonable prices.

Uranium Conversion Services

World demand for UF₆ conversion during 2007 is estimated to be 60.3 million kgU as UF₆. Conversion services demand for 2007 in the United States is estimated to be 18.9 million kgU as UF₆. In June 2007, the sole U.S. conversion company, ConverDyn (Honeywell), announced that following a month-long shutdown for annual maintenance, it planned to expand its Metropolis, Illinois, conversion plant to a nameplate capacity of 15,000 MTU as UF₆ by the fourth quarter of 2008. Annual production during 2007 was approximately 10,000 MTU as UF₆ during 2007 with an anticipated production of 12,000 MTU as UF₆ during 2008. The gap between production and demand during 2007 was made up from a combination of the conversion services equivalent contained in the feed component of the uranium under the HEU Agreement and other commercial UF₆ sources located outside of the United States. It is at present unclear how the cessation of production at Canada's Port Hope, Ontario, facility will affect U.S. conversion markets. AREVA is expanding its conversion capacity in France, and ConverDyn is investigating building a new facility in Europe.

From a market perspective, the conversion component of the HEU Agreement is equivalent to almost 9 million kgU per year of production capacity, which is comparable in size to many existing conversion production facilities. Because the USEC Privatization Act does not restrict the sale of Russian conversion services entering the United States, the unfettered introduction of the 9 million kgU of conversion from HEU Agreement deliveries into the market initially impacted the conversion services market. However, with the already existing shortfall in production, the HEU Agreement has become an essential source of conversion supply.

Spot conversion service prices reached a low of \$2.25 per kgU as UF₆ in July 2000, but by the beginning of 2006, they had increased over 500 percent. Spot conversion prices were \$11.50 per kgU as UF₆ at the end of 2006. The North American spot market price for conversion services declined in 2007 with prices at \$9.50 per kgU as UF₆ at the end of December 2007. This was a drop of 17.4 percent.

Uranium Enrichment

World demand for enrichment during 2007 is estimated to be 45.3 million SWU, which is almost a 3.2 percent increase over the 2006 level of 43.9 million SWU. Demand has increased as utilities have lowered the enrichment tails assay by exercising contract tail assay flexibility options. In addition, some utilities have lowered tails beyond their economic optimums to conserve uranium and build inventory. Overall world enrichment production and world demand for enrichment, including the LEU resulting from the HEU Agreement, have come into very close balance. The enrichment market is expected to have little or no excess supply capacity for the near future.

Demand in the United States during 2007 is estimated to be 14.2 million SWU, nearly a 6 percent increase above the 13.4 million SWU reported in 2006. The Paducah GDF, operated by USEC, is the single domestic source of enrichment in the United States. Paducah's estimated production in 2007 is about 5.7 million SWU per year or about 40 percent of domestic demand. The international character of the enrichment market is such that some of Paducah's enrichment is exported and additional enrichment is imported. The enrichment component of the HEU Agreement provides the equivalent of 5.5 million SWU per year. Most of the SWU purchased by USEC under the HEU Agreement are used to meet U.S. demand. The HEU Agreement is likely to remain an essential source of enrichment supply through the remaining years of the Agreement.

Spot market prices for enrichment have increased noticeably since 2006. The spot price began 2006 at \$135 per SWU and increased 5.9 percent to \$143 per SWU by December 31, 2007. The price increase has been attributed to a lack of excess enrichment supply and to the high power costs of enrichment suppliers using GDF technology. Additionally, there has been an increase in demand for enrichment to compensate for higher uranium prices.

Plans for new enrichment technology deployment in the United States are growing. LES received a commercial license from NRC, and in August 2006, began building on the National Enrichment Facility in Eunice, New Mexico. The 3 million SWU per year enrichment plant will use the Enrichment Technology Corporation's (ETC) gas centrifuge technology and expects to begin initial production in 2009. It is expected to reach full capacity by 2013, around the time of the conclusion of the HEU Agreement. The ETC technology is the same technology used in Urenco's European facilities. ETC is a 50-50 joint venture of AREVA NC and Urenco. Urenco is owned by the United Kingdom, Netherlands, and German Governments.

USEC plans to deploy a 3.8 million SWU per year gas centrifuge enrichment plant by 2012 based on an updated version of DOE's gas centrifuge technology developed in the 1980s. This start up is around the time of the conclusion of the HEU Agreement. On August 23, 2004, USEC submitted a license application to NRC to build and operate its American Centrifuge Plant in Piketon, Ohio. NRC granted USEC its commercial license in April 2007. USEC initiated operations at its demonstration Lead Cascade facility at Piketon in late 2007.

In early 2007, the French company, AREVA NC, stated its intention to submit a license application during 2008 to NRC to build and operate a 3 million SWU per year gas centrifuge enrichment facility in the United States. The plant would use technology from ETC. Initial production would be attained in 2014 with full capacity targeted for 2019. As of the end of 2007, no location has been identified for the facility.

In October 2006, GE Hitachi submitted a letter of intent to NRC indicating that GE Hitachi was investigating the licensing of a demonstration laser enrichment facility. A test loop license application was submitted during June 2007. Additional meetings between NRC and GE Hitachi took place during 2007 to prepare for an application for a full-scale laser enrichment plant now apparently targeted for 2008. The full-scale project would have a projected start up in 2012, with a target capacity of at least 3.5 million SWU per year. As of the end of 2007, no location has been publicly identified for the full-scale facility. Commercial laser enrichment technologies have yet to be established worldwide, successful implementation of the facility could have major implications for the enrichment and uranium supply industries.

Overseas, AREVA NC has moved forward on announced plans to replace its existing enrichment plant in France with a new 7.5 million SWU per year facility that will use Urenco's gas centrifuge technology. To that end, during 2007, AREVA NC has purchased a 50 percent share of Urenco's centrifuge equipment manufacturing subsidiary, ETC. Delays in Governmental approvals of AREVA NC's investment in ETC did result in an approximately two-year delay in the new enrichment plant's schedule. The new plant is now slated to begin operation in 2009 and to achieve full production by 2016. The site of the new plant would be at AREVA NC's existing gaseous diffusion enrichment site in Tricastin, France. Urenco is also planning to expand its gas centrifuge capacity in Europe.

Urenco is also expanding capacity at its European enrichment plants, which are expected to total 11 million SWU by the end of 2010. Russia, which had previously been prohibited from making enrichment sales in the United States outside of the HEU Agreement, is now permitted access under the September ruling of CIT. Russia will not extend the current HEU Agreement past 2013. Enrichment buyers have been concerned about potential supply shortfalls after 2013, and as a result, have often increased contracting lead times. Additionally, the 2013 end of the HEU Agreement clearly has influenced the timing of new enrichment facilities in the United States.

Overall, the uranium enrichment market in 2007 continued to see supply and demand in close equilibrium and spot prices settling at about \$90 per SWU at the end of the year. The HEU Agreement deliveries remain important to the U.S. enrichment market as it accounts for approximately half of U.S. demand according to Energy Information Administration statistics, but those deliveries have also permitted potential enrichment suppliers to target their proposed investments within the United States.

Actions Taken to Avoid Potential Impacts to the Nuclear Fuel Industry

Recognizing the vital importance of the nuclear fuel cycle to U.S. energy markets and national security, Congress, DOE, and industry have worked diligently to help avoid any adverse material impacts of the HEU Agreement deliveries upon commercial nuclear fuel markets. Historically, actions taken include:

- Congress provided, under the USEC Privatization Act, a graduated level of quotas that allowed the natural uranium component of the HEU Agreement to enter into the U.S. market in a measured and stable manner.
- The USEC Privatization Act also provided for the purchase and transfer of the 1995 and 1996 natural uranium component of the HEU Agreement deliveries to DOE. DOE has responsibly managed the uranium to avoid an adverse material impact to the market.
- Congress provided the authority and funding for DOE to purchase and hold until March 24, 2009, the 1997 and 1998 natural uranium component of the HEU Agreement deliveries to avoid oversupplying the uranium and conversion markets.
- Russia and the Western Consortium have successfully implemented the Commercial Feed Agreement to ensure the reliable and stable supply of uranium and conversion into the market.

- USEC has ensured the successful introduction of the enrichment component of the HEU into the U.S. market under existing contracts to avoid adverse material market impacts.
- The U.S. and Russian Governments have actively monitored the progress of the HEU Agreement and the Commercial Feed Agreements as well as proposed amendments to help ensure avoidance of market impacts.
- In November 2007, an amendment to the Suspension Agreement was initialed by the United States and Russia, limiting Russian uranium product imports to 20 percent of the U.S. market during 2014-2020, after the scheduled 2013 termination of the HEU Agreement. Much smaller quantities of Russian uranium product would be permitted into the United States under the initialed agreement during 2011-2013.

While the initial uranium deliveries under the HEU Agreement had a limited effect on the commercial nuclear fuel markets, mitigating actions subsequently taken by DOE and Congress to avoid an adverse market impact from future HEU Agreement deliveries have been effective. The successful implementation of the HEU Agreement to date is also attributable to the efforts of the U.S. and Russian Executive Agents for the Government-to Government Agreement, the designated Executive Agents for the commercial arrangement, and the U.S. industry. Recognizing the vital importance of the nuclear fuel cycle to U.S. energy markets and national security, DOE will continue to work with Congress and industry to ensure the HEU Agreement's continued success.

Glossary

Blending or down-blend – The term used to describe the process whereby HEU is mixed with depleted, natural, or low enriched uranium to create LEU.

Cameco – A Canadian company that is the world’s largest supplier of uranium and one of the largest suppliers of uranium conversion services. Cameco is one of the three members of the Western Consortium under the 1999 Commercial Feed Agreement.

AREVA NC – A division of the company, AREVA, includes the company formerly known as Cogema. The parent company AREVA is active in all phases of the nuclear fuel cycle including uranium, conversion, and enrichment services. AREVA NC (through its Cogema origins) is one of the members of the Western Consortium under the 1999 Commercial Feed Agreement.

Commercial Feed Agreement – An agreement between members of the Western Consortium and Russia whereby the natural uranium feed component associated with the Russian LEU delivered under the HEU Agreement after 1998 is purchased for resale in the commercial uranium market. Sales of this natural uranium in the United States are subject to quotas set forth in the USEC Privatization Act.

Conversion – The process whereby natural uranium in the form of an oxide is converted to UF₆.

Depleted uranium – Uranium containing less than the 0.71 percent ²³⁵U. Found in natural uranium.

Enrichment Technology Corporation (ETC) – A 50-50 joint venture of Urenco and AREVA NC that develops and builds gas centrifuges used to enrich uranium.

Enriched uranium – Uranium that is greater than the 0.71 percent ²³⁵U. (See uranium, natural uranium, and highly enriched uranium.)

Executive Agent – These are the commercial companies responsible for implementing the HEU Agreement on behalf of the Governments of the United States (USEC) and Russia (Tenex).

Fissile material – Any material fissionable by thermal (slow) neutrons. The three primary fissile materials are ²³³U, ²³⁵U, and plutonium-239.

Gas centrifuge - A uranium enrichment process that uses centrifuges to spin UF₆ as a gas at high speeds to separate ²³⁵U isotopes from the ²³⁸U isotopes based on their difference in atomic weight.

Gaseous diffusion – A uranium enrichment process where UF₆ as a gas is compressed through a series of membranes to increase the concentration of ²³⁵U isotopes.

General Electric Hitachi (GEH) – An affiliate of General Electric (60 percent in the United States) and Hitachi (40 percent in the United States) that manages the nuclear power activities formerly held by the companies General Electric (United States) and Japan. This includes plans to develop laser-based enrichment facilities in the United States.

Highly enriched uranium (HEU) – HEU is uranium having greater than 20 percent ²³⁵U. (See natural uranium component, enriched uranium, and depleted uranium.)

Kilogram of uranium (kgU) as UF₆– Equal to 2.6 pounds of U₃O₈.

Long-term price – In the context of this report, refers to the price paid for nuclear fuel materials and services that will be delivered more than one year after the contract is signed.

Low enriched uranium (LEU) – Uranium that is greater than 0.71 percent ²³⁵U but less than 20 percent. Most nuclear power reactor fuel contains LEU having three to five percent ²³⁵U.

Louisiana Energy Services (LES) – An affiliate of the European enrichment joint venture Urenco. LES is building a three million SWU gas centrifuge uranium enrichment plant in Eunice, New Mexico.

Metric ton of uranium (MTU) – One thousand kilograms of uranium.

Natural uranium component – The feed material provided to a uranium enricher for producing enriched uranium and uranium tails. The natural uranium feed component consists of U_3O_8 from the mining industry and U_3O_8 to UF_6 conversion.

Nuclear Regulatory Commission (NRC) – The Federal agency that is responsible for the licensing and regulation of nuclear safety, safeguards, and security of commercial nuclear facilities.

Nukem – A company that provides uranium and services in the international nuclear fuel market. Nukem is one of the members of the Western Consortium under the 1999 Commercial Feed Agreement.

Paducah Gaseous Diffusion Plant – The only operating uranium enrichment plant in the United States, located in Paducah, Kentucky.

Portsmouth Gaseous Diffusion Plant – Portsmouth is shutdown uranium enrichment plant located in Piketon, Ohio. The USEC American Centrifuge Plant is located at this site.

Privatization Act - On April 26, 1996, the USEC Privatization Act, Public Law 104-134 (42 U.S.C. 2297h) was enacted.

Separative work units (SWU) – A unit of measurement used in the enrichment of ^{235}U .

Spot market price or spot price – In the context of this report, refers to the price paid for nuclear fuel materials and services delivered within one year of the purchase date.

Tails – UF_6 depleted in ^{235}U produced during the uranium enrichment process.

Techsnabexport (Tenex) – A company wholly owned by the Russian Government and controlled by the Federal Atomic Energy Agency, Russian Federation. Tenex acts as Russia's Executive Agent on the HEU Agreement.

Uranium – A radioactive, metallic element with the atomic number 92; one of the heaviest naturally occurring elements. Uranium has 14 known isotopes, of which ^{238}U is the most abundant in nature. ^{235}U is commonly used as a fuel for nuclear fission. (See natural uranium, enriched uranium, highly enriched uranium, and depleted uranium.)

Uranium hexafluoride (UF_6) – Uranium oxide (U_3O_8) is converted to UF_6 which can then be fed through a uranium enrichment process, traditionally gaseous diffusion or gas centrifuge.

United States Enrichment Corporation (USEC) – Currently the only domestic supplier of uranium enrichment in the United States and operator of the Paducah Gaseous Diffusion Plant. USEC is also the U.S. Executive Agent on the HEU Agreement. USEC, a formerly wholly owned government corporation, was privatized as a result of the USEC Privatization Act of 1996.

Western Consortium – A group of three Western uranium suppliers (Cameco, COGEMA, Nukem) that signed the 1999 Commercial Feed Agreement with Russia to buy and then market the natural uranium that remains in the United States under the HEU Agreement. Cogema is now a portion of the company AREVA NC.