

APPENDIX B

The Existing HEU Agreement

The existing HEU agreement, often referred to as “the HEU deal,”⁶⁵ is a complex arrangement that has proceeded in fits and starts. Despite numerous problems, the HEU deal has resulted in the elimination of a substantial amount of Russian HEU. As of December 31, 2001 more than 140 tons of Russian weapons-origin HEU had been blended into LEU and delivered to USEC Inc. (the US executive agent for this agreement) for sale as fuel in nuclear power plants.⁶⁶ That is nearly 27 percent more than the original 1994 implementing contract called for by that date.⁶⁷ It is enough HEU for more than 5,500 nuclear weapons.

One must understand the fragile nature of the existing HEU agreement to appreciate both the constraints upon and the opportunities for expanding efforts to reduce Russian HEU stockpiles. The first priority is to do no harm to the existing deal. Given the substantial benefits and tenuous nature of the existing agreement, the US government is unlikely to consider opportunities for further reductions in the Russian HEU stockpile, unless it is confident that they will not damage the existing deal. Within that constraint, however, there is substantial opportunity to do more.

From the beginning, the major hurdle that framers of the agreement strove to overcome was how to accommodate large quantities of Russian LEU into the market, without causing enormous disruptions to market prices or substantial layoffs in the domestic uranium and enrichment industries. Such concerns were the reason the rate of the blending and sale operation was set at 30 metric tons of HEU per year. Policymakers believed that amount of Russian LEU, equal to about 50–60 percent of the annual requirements of US nuclear power plants, was the maximum that could be absorbed. Since there were substantial excess supplies of natural uranium and a global

overcapacity for uranium enrichment, sizable US production cutbacks were necessary, and continue to be necessary, to absorb that material into the market.

When the HEU deal was first established, the US enrichment industry was entirely owned by the government. Until 1993, it was part of the Department of Energy. In that year, a semi-independent, government-owned corporation, “the US Enrichment Corporation (USEC)” was established. USEC had to reduce production levels in its enrichment facilities to absorb the enrichment component (see Box 3) of the Russian LEU. This resulted in a hidden cost to the government, since its plants were less efficient when operated at the lower production level. The initial price paid to Russia under the deal was considerably less than the price at which the government was selling enrichment, so no actual federal appropriations were needed. Accommodating the enrichment

BOX 3. Two Components of Enriched Uranium

Naturally occurring uranium must be enriched to produce LEU. Therefore, LEU can be thought of as consisting of a natural uranium component and an enrichment component. Historically, nuclear power plant operators have met their uranium and enrichment needs through separate purchases. LEU produced by downblending HEU intrinsically contains both components, but the amounts of each can be established. While the two components are physically intertwined, trade in LEU is still usually based on separate sale of its contained uranium and enrichment.

portion of the HEU deal merely resulted in lower earnings for the government-owned USEC.

The situation was quite different for the uranium component of the LEU. There was no US government uranium producer, and most of the uranium used by nuclear power plants in the United States came from foreign producers. Furthermore, as a result of an earlier finding by the US International Trade Commission that the Soviet Union was guilty of dumping uranium in the United States at below the cost of production, US import and consumption of Russian uranium was severely restricted. The initial implementing contract for the HEU deal called for USEC to pay for the uranium content of the LEU it received from Russia only after USEC was able to resell it for use in nuclear fuel. It quickly became apparent, however, that it would be many years before the uranium was sold and Russia was paid. Since payment for the uranium content represented about one-third of the funds that the Russian government expected from the deal, it repeatedly threatened to stop all LEU deliveries until Russia was compensated for the uranium. Russia did suspend deliveries for a brief time in 1997.

In response, the US government agreed to pay \$157 million for the uranium that Russia had delivered in 1995 and 1996 and to amend the agreement to give Russia an amount of natural uranium equal to the uranium content in the LEU it delivered under the HEU deal beginning in 1997. This turned the US-Russian HEU agreement for the purchase of LEU into an agreement for the purchase of enrichment only. LEU deliveries resumed for a while, but in late 1998, Russia suspended deliveries again, because it was still unable to sell the uranium that it got back and was not allowed to import it for its own use. At the time, the export of the natural uranium to Russia was prohibited, so the material was sitting, unused at USEC's facilities. This second crisis for the HEU deal was resolved in March 1999, when the US government paid Russia another \$325 million for the uranium content of the 1997 and 1998 LEU deliveries under the agreement. In addition, three Western mining and fuel services companies (owned primarily by non-US interests) signed a long term contract with the Russian government giving them the option to purchase a substantial portion of future uranium deliveries under the HEU deal. Arrangements

were also worked out for unsold uranium to be returned to Russia for its own use.

The agreements of March 1999 appeared to resolve the longstanding problem of Russia not receiving payment for the uranium portion of LEU deliveries under the HEU agreement. However, Russia is still not earning what it originally expected from the uranium. Early on, the Russian government set a floor price of \$29 per kg below which it would not sell this uranium. However, during the 1990s, world uranium prices fell considerably, in part because of the extra uranium supply created by the HEU deal. Therefore, Russia sold very little of the uranium from the agreement. The price of uranium has recently recovered to slightly above Russia's \$29 per kg floor price, and in November 2001 the Western parties to the 1999 agreement converted their options contracts to commitments to purchase a substantial portion of the Russian uranium from the HEU deal. However, Russia's revenue from the uranium component of the LEU is still lower than it originally anticipated. Russia's inability to receive an attractive return on the uranium content of the LEU continues to hamper the smooth operation of the HEU agreement.

Meanwhile, difficulties also arose with the enrichment portion of the deal. As this report went to press, no deliveries of LEU under the agreement had occurred in 2002 or been scheduled, because of a dispute over pricing. The original HEU agreement called for annual negotiations between the US and Russian executive agents regarding the price for both the uranium and the enrichment content of the LEU. As discussed above, payment for the uranium content is no longer part of the deal. In 1997, USEC and Tenex (the Russian executive agent for the agreement) signed a contract that set the enrichment price through the end of 2001. Under that contract, the price that USEC paid for the enrichment increased with inflation. Since 1997, however, the world enrichment price has fallen. Thus, in 2001 USEC paid Russia a wholesale price for enrichment that was nearly the same as the retail price USEC received by reselling it. This put severe financial pressure on USEC, since Russian enrichment represented about half of USEC's sales. There was now little or no profit margin on the Russian enrichment that it could apply to offset its fixed overhead costs. What really made that situation

BOX 4. Does the United States Need A Domestic Source of Uranium Enrichment?

The United States imports about two-thirds of its petroleum, 90 percent of its uranium, most of its steel, and nearly all of some types of computer memory chips. Why then is it so important to maintain a domestic source of uranium enrichment? The argument for maintaining such a source is that the enrichment industry is more highly concentrated than any of the other industries mentioned. There are only three enrichment producers (two in Europe and one in Russia) of any size outside the United States. Without any enrichment from the United States, the other three might barely meet world demand.

Short of maintaining a large and expensive strategic reserve of enriched uranium (which could be acquired by downblending HEU from dismantled US nuclear weapons), the United States would be vulnerable to a halt in deliveries from any one of the foreign enrichment producers. A substantial portion of the nation's electricity production from nuclear energy would be at risk.

a problem, however, is that in July 1998, the US government sold USEC to the private sector. Now, instead of being a hidden cost to the government, the economic penalty of constraining domestic enrichment production to accommodate Russian LEU under the HEU agreement is being borne by a private company with a fiduciary responsibility to earn a profit for its shareholders. With USEC operating as a private company, it is more difficult for the government to channel taxpayer funds to subsidize the HEU deal as it has done in the past.

In an effort to improve its profitability, in June 2001 USEC closed one of its two enrichment plants, leaving its remaining plant in Paducah, Kentucky, as the sole domestic source of enrichment services. The Paducah plant is still operating at well below its full capacity. This reduced production level (constrained to accommodate Russian LEU into the US market) does not allow USEC to fully offset its fixed costs with sales of

enrichment from Paducah. To fully offset these costs and earn a profit, USEC needs a markup between the price it pays Tenex for the enrichment from the HEU deal and the price at which it resells that enrichment. Tenex, on the other hand, views that markup as a markdown from the price it would receive if it could sell the enrichment component directly to US utilities. The larger the markup/markdown, the more Tenex believes it is being unfairly treated. The US government does not allow Tenex to sell its enrichment directly to utilities in part because of a history of Soviet dumping of uranium and enrichment on the US market at below cost. In addition, direct sales from Tenex to US utilities would leave USEC unable to cover its fixed costs, which in turn might lead USEC to stop production at Paducah and exit the uranium enrichment business altogether.

Ordinarily, the profitability of a private company would not be of concern to the US government. However, in this case, a failing USEC might be forced to shut down the last operating enrichment plant in the United States. Russian and European enrichment operators would probably be able to make up for the loss of production from Paducah. However, that would leave the US nuclear power industry, which accounts for more than 20 percent of electricity production in this nation, vulnerable to a cutoff in deliveries from Russia or either of the other two producers.

The squeeze on domestic enrichment production has been caused by the large amounts of enrichment introduced into the US market by the HEU deal. That squeeze is a necessary consequence of continuing the HEU deal, which is of vital national security interest to the United States. However, the government must seek a balance between the national security benefits of the HEU deal and the viability of the domestic enrichment industry. If USEC were to shut down the Paducah plant, it would take at least five years for USEC or another entity to build a new enrichment production plant in the United States, presumably using centrifuge technology. If necessary, the government could take over operation of Paducah from USEC, or it could restart production in the Portsmouth enrichment plant, which is being maintained on standby. In such a situation, however, the government would have to directly provide the funding needed to continue