

## PROPOSAL 2

# Remove HEU Stockpiles from Smaller, Less Secure Facilities

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### Small Facilities are More Vulnerable to Theft

**U**nder the existing HEU deal, Russia must derive the LEU it sells to the United States from nuclear weapons. However, the large stocks of HEU coming from nuclear weapons do not represent the greatest risk of diversion; nuclear weapons in Russia are kept in heavily guarded facilities, and the HEU that is removed from these weapons is kept in large processing and storage facilities to which access is also tightly restricted. There is no question that blending and selling this material improves its security and provides a long-term benefit for arms control. Nevertheless, stockpiles of HEU in small research facilities, with fewer resources for security, pose a greater immediate risk of diversion and should have even higher priority for elimination. According to the US Department of Energy's 2003 budget request to Congress, "civilian sites contain approximately 35 tons of the most vulnerable, proliferation concern material. These facilities are located in densely populated areas throughout the Russian Federation and the Newly Independent States and are considered to be the most likely target for proliferants seeking weapon useable material through either abrupt theft or protracted diversion."<sup>31</sup>

Most of that 35 tons of HEU is located at a handful of large research institutes or processing facilities, but numerous sites have small quantities of HEU, which are still significant from a security standpoint. A recent status report on nuclear facilities in the Former Soviet Union lists twenty civilian facilities as having more than a few kilograms, but less than one metric ton of HEU.<sup>32</sup> Ten of those facilities are in Russia and the other ten are in Belarus, Kazakhstan, Latvia, Ukraine, and Uzbekistan. While those twenty facilities with the smallest stockpiles have less than

three tons of HEU in total, that amount is still sufficient for many dozens of nuclear weapons. Removing all HEU from those facilities can provide a significant improvement in security at a modest cost.

While the US Department of Energy has upgraded the materials protection control and accounting systems at all of those twenty facilities, many of the sites do not have sufficient funds to properly operate the security systems. In order to compensate for these security inadequacies, DOE provides ongoing financial assistance for operations. According to a report by the General Accounting Office, "operational assistance is necessary because the Russian sites where DOE helped install nuclear security systems lack the financial resources, adequately trained staff, and the knowledge of procedures to operate and maintain the systems effectively."<sup>33</sup> Overall, DOE expects to provide about \$50 million per year in operational and infrastructure assistance to Russian institutes and the Department projects that facilities will continue to need some assistance until at least 2020.<sup>34</sup> By eliminating stockpiles of HEU from as many facilities as possible, DOE can not only improve security, but it can reduce operations and infrastructure spending as well.

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### The DOE Materials Consolidation and Conversion Project

In 1999, the US Department of Energy and the Russian Ministry for Atomic Energy (Minatom)

established the Materials Consolidation and Conversion (MCC) Project to reduce the complexity and the costs of securing Russian HEU.<sup>35</sup> The MCC Project works toward this goal by moving HEU from smaller facilities to two large Minatom facilities with downblending capabilities, blending the HEU to 19.9-percent LEU, and storing it at those facilities.<sup>36</sup> The Department of Energy pays the blending facilities a fee for each kilogram of 19.9-percent LEU they produce in order to cover their costs, give them an incentive to acquire and blend the HEU, and pass on an incentive payment to the sites that give up their HEU. Even though the material is moved from one facility to another its ownership does not change, since the enriched uranium is the property of the Russian Federation. Therefore, no payment needs to be made for the market value of the material as fuel.

Russia greatly benefits from this transaction because, under the MCC Project, it retains ownership of the LEU. If market conditions become favorable, Russia may still reap the full market value of the material blended under the MCC Project in the future. This differs from the weapons-origin HEU deal, under which the US executive agent (currently USEC Inc.) ends up owning the LEU.<sup>37</sup>

Through 2001, about 2.4 tons of HEU was blended to LEU under the MCC Project. DOE estimates that another 1.2 tons will be blended in 2002. According to the DOE's 2003 Budget request, the MCC Project plans to fund the conversion of 29 tons of HEU to LEU and the removal of all HEU from 55 buildings by 2010. These figures came from a draft conversion plan produced by Minatom, but Minatom has not provided any site-by-site information to corroborate its estimates.<sup>38</sup>

### Limitations of the MCC Project

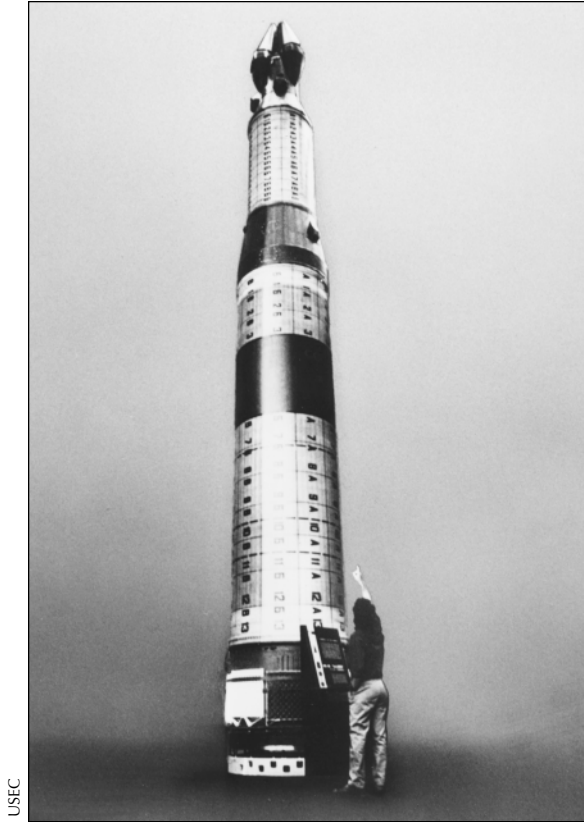
If Minatom follows through on its stated goals and successfully removes 29 tons of HEU from the most vulnerable facilities, thereby removing all HEU from 55 buildings, it will dramatically reduce the potential for diversion of HEU and simultaneously reduce the cost of security. It is not clear, however, whether that full goal can be achieved, and it is very unlikely that it will be reached by 2010. Moreover, the current program

is not targeting the most vulnerable facilities first. As noted above, twenty small facilities have less than three tons of HEU in total. Removal of HEU from those facilities should have a higher priority than reducing stockpiles of HEU at larger facilities.

Removal of HEU from the smallest facilities would produce the largest improvement in security per ton of HEU downblended. However, under the current arrangement, DOE has little say in determining where the HEU to be downblended comes from. That decision is left to the discretion of the Russian blending facilities. The blending facilities have consulted with DOE in selecting the sites from which they get HEU, but the Minatom-operated blending facilities have had final control over where the HEU comes from. In some cases, DOE has not even known its place of origin. The MCC Project may be paying to draw down stockpiles of HEU from large storage facilities, where the reductions produce only a marginal improvement in security.

Minatom has told DOE that it will provide comprehensive site-by-site information after the US and Russia complete an umbrella agreement to govern the MCC Project, but progress toward such an agreement has been slow. The US government held up negotiations on the umbrella agreement for more than two years, first because of concern over Russia's nuclear cooperation with Iran, and then while the new Bush Administration reviewed all of DOE's Russian nonproliferation programs. In October 2001, the Administration gave DOE approval to submit its draft to Minatom, and negotiations on the umbrella agreement have finally begun. DOE hopes these discussions will lead to a site-specific planning document for the blending program.

Even if the current discussions produce a site-specific plan, it is likely to be limited. Minatom controls only those institutes and facilities that are or were directly involved in nuclear weapons development or nuclear power research. There are at least seven non-Minatom, civilian facilities in Russia with significant quantities of HEU. It is not clear whether Minatom has the authority to coordinate the removal of HEU from those facilities. Even if Minatom has such authority, it will still be difficult for DOE to establish priorities and tailor incentives to individual facilities by working through Minatom as an intermediary.



USSEC

*The HEU contained in Soviet SS-20 IRBMs is being blended down under the HEU deal. The missile above is on display at the Smithsonian Air and Space Museum, minus the HEU.*

Many of the facilities of greatest concern are reluctant to give up their HEU. These facilities will require specifically tailored incentives, including non-monetary incentives, in order to cooperate with HEU consolidation efforts.<sup>39</sup> Non-monetary incentives may include assistance in replacing HEU fuel in research reactors with LEU fuel (the third proposal of this paper discusses the steps needed to do that) and assistance in converting research programs to new activities that are not based on HEU (for which there are several programs in DOE and other government agencies). It would also help if DOE had more flexibility in the types of monetary incentives it could offer, including the ability to provide low or no interest loans and the ability to increase the size of the incentive payment to facilities that completely eliminate their HEU stockpiles. On the other hand, some facilities have no current use for their HEU and should accept a lower payment

to have it removed from their site than facilities for which the HEU has a continuing valid use. The lack of flexibility in the current program makes it difficult to match the incentives to the requirements of specific sites.

Another problem is that the current MCC Project is limited to Russian facilities. As noted above, there are significant quantities of HEU at ten non-Russian facilities in countries of the Former Soviet Union. These are mostly small facilities whose ability to maintain effective security is questionable. Concerted efforts should be made to remove material from these facilities. In at least one case, Ukrainian officials have indicated to US officials their willingness to sell about 75 kg of HEU from the Kharkiv Institute of Physics, which no longer needs the material. However, the US government has not yet made an offer to purchase this material.<sup>40</sup> Ideally, this HEU should go to one of the Russian blending facilities for downblending to 19.9-percent LEU, but there are alternative solutions. If the U.S. government cannot broker such an arrangement, it should bring the material to the United States for storage, blending, and perhaps sale.

The key point is that DOE must be more active in setting priorities and in site-by-site planning to remove HEU stockpiles than it is under the current MCC Project. DOE should tailor specific packages of assistance to individual institutes in Russia and other nations of the FSU to provide the appropriate incentive to remove their HEU stockpiles. DOE should offer larger payments and additional incentives to sites that completely eliminate their HEU stockpiles. Officials from the Luch blending facility told the General Accounting Office that some facilities would not transfer their HEU to Luch for blending, because they thought they could get a better deal from DOE.<sup>41</sup> DOE must play an active role in negotiations with these facilities to make it clear that they cannot profiteer from removing HEU, while at the same time offering to structure a multifaceted incentive package to match each institute's needs.

### Funding Issues

At the start of the FY 2002 Budget season, and even well after the September 11 terrorist attacks, it appeared there would be a large overall cut in funding for DOE's Russian nonproliferation

programs. However, last minute actions in both House and Senate Energy and Water Appropriations and an emergency supplemental appropriation for anti-terrorism activities increased the funding for DOE's Materials Protection Control and Accounting (MPC&A) Program, of which the MCC Project is a part, to \$293 million. That is an increase of 68 percent above 2001 and more than double the Bush Administration's original request of only \$139 million.

The Administration's original request included \$26 million for the MCC Project, from which it anticipated spending \$19 million as incentive payments for Russian facilities to downblend two tons of HEU to LEU. The final legislation, however, gave DOE little guidance on how to spend the increased funds for MPC&A. Nonetheless, the report accompanying the House version of the Energy and Water Bill (H. Rept. 107-112) stated:

The Committee has provided a significant increase in funding for fiscal year 2002. This increase should be targeted toward projects to consolidate materials and reduce the number of buildings and facilities holding nuclear materials.

This language appears to tell DOE to provide a major portion of the increase over the budget request for MPC&A to the MCC Project. However, according to DOE's 2003 Budget request, it plans to devote to MCC only \$5.3 million of the extra \$154 million in 2002 congressional funding for MPC&A. That would bring 2002 funding for MCC to \$31.3 million. Furthermore, DOE has reduced its 2002 target for blending under this program. The 2002 Budget request had a goal of blending 2.0 tons of HEU to LEU in 2002, but the 2003 Budget request has reduced the 2002 goal to only 1.2 tons. The lower goal is primarily due to the slow progress in negotiating an umbrella agreement with Minatom. If additional funds were available for incentive payments to Russian institutes, the downblending could proceed at a faster pace.

The Budget requests only \$27 million for the MCC Project for 2003, which is a decrease of 13 percent from the amount that DOE plans to spend on MCC in 2002. DOE's blending target for 2003 is 2.9 tons, which is more than twice the 2002 target, suggesting that a portion of the 2002 funding will go to payments for future blending.

Much HEU remains at civilian facilities in the FSU. It would appear that the pace of blending

this HEU to LEU could be increased if more funds were allocated to the MCC Project. However, despite the large increase in funding for MPC&A provided by Congress in 2002, the Administration has chosen to devote very little of it to the MCC Project.

### Recommendations to Enhance the MCC Project

The MCC Project has made a promising start in reducing HEU stockpiles at civilian facilities in Russia. DOE and the project team should be commended for their efforts, but the scope of the project must still be expanded. The DOE approach of working with Minatom and with Minatom-controlled blending facilities to identify sources of excess HEU and candidate facilities for removal of all HEU has some advantages. It makes maximum use of Minatom's inside knowledge of, and in some instances control over, the operation of facilities with large HEU stockpiles. However, the MCC Project is not currently devoting sufficient resources to non-Minatom, civilian facilities in Russia or to facilities in other nations of the FSU that have smaller, but still dangerous, stockpiles of HEU and inadequate security programs. In addition, by working solely through Minatom, DOE does not have sufficient flexibility to tailor packages of incentives to the needs of individual facilities to persuade them to significantly reduce or eliminate their stockpiles of HEU. We make the following recommendations to augment the MCC Project.

The Department of Energy should:

- **Prepare a comprehensive list of facilities in Russia and other States of the FSU that should be candidates for HEU reductions or removal.**

For each facility, DOE should seek to determine how much HEU is at the site and what it is used for. DOE should also assess how well the HEU is protected and the potential for eliminating HEU from individual buildings and from the entire site. DOE should seek cooperation from Minatom in preparing this list, but should not rely solely on its help. The list must also include non-Minatom, civilian facilities in Russia, and facilities outside of Russia. DOE's MPC&A Program is collecting some of this information, but a comprehensive in-

ventory of candidate sites for HEU removal is long overdue and urgently needed to set consolidation priorities.

- **Assign a project manager for each facility on the list.** Each project manager should work with their facility to develop proposals for reducing its stockpiles and eliminating HEU from specific buildings or from the entire site. DOE should reassign current employees and possibly hire new staff on an emergency basis to provide sufficient project managers for all facilities of concern.
- **Target facilities that are the highest priority to the US for HEU reduction and elimination.** DOE should not allow Minatom alone to set the priorities for reducing and eliminating HEU stockpiles. The forthcoming Minatom master plan for its nuclear complex can be a useful starting point, but since it will not include non-Minatom facilities in Russia or non-Russian facilities, it should not be the sole basis of the US consolidation effort. Furthermore, Minatom's priorities for consolidation may not always conform to US priorities. Significantly more benefit can be derived from the elimination of all HEU from a building or site than from simple reductions in the amount of HEU present. Therefore, the US should offer greater incentives (including a higher direct payment) to facilities that completely eliminate HEU from buildings and sites than to those that simply blend down a portion of their inventory. The highest priority should be given to those facilities with the greatest risk of diversion. Efforts should be focused on facilities that have fresh HEU fuel for reactors that are no longer operational or other high-grade HEU that is left over from their programs. Those facilities have the least incentive to spend their resources protecting obsolete HEU stockpiles. Facilities with small, but still significant, stockpiles of HEU should be another high priority. Working first with those facilities will maximize the number of buildings and facilities from which HEU is eliminated for a given investment.
- **Designate a senior official to negotiate tailored incentive packages on a site-by-site basis** to encourage facilities in Russia and other States

of the FSU to eliminate HEU from their sites. This official should have the authority to offer flexible packages that may include assistance (including direct payments and subsidized loans) from multiple DOE programs and programs in other agencies. The means of eliminating HEU from a site should also remain flexible and might include the blend-down operation of the existing MCC Project. They might also include other mechanisms, such as blending and sale by a Western agent or transfer to an appropriate large, secure storage facility in Russia or a Western country, possibly the United States.

- **Provide an appropriate incentive for Russia to take back spent HEU fuel from research reactors outside of Russia.** Spent HEU fuel from research reactors still contains appreciable amounts of weapons-usable HEU. Because fuel elements from research reactors are much smaller than those from nuclear power plants, the spent fuel is less radioactive and may provide a very attractive target for diversion. Removal of spent HEU fuel from facilities that no longer have operating reactors should be a high priority because security at such facilities is generally lax. Spent HEU fuel should also be removed from all facilities outside of Russia. For many years, it has been official Russian policy to take back spent fuel that it has supplied to other nations, but Russia has not followed that policy consistently. There is little financial incentive for Russia to recover spent HEU fuel from other nations because the transport and processing costs exceed the value of the reprocessed product. Unlike agreements that Russia has recently made with other countries, the FSU states do not pay Russia a fee for taking the spent fuel off their hands. The US government should give a high priority to recent efforts (discussed in the following section) to accelerate Russian take-back of such spent fuel. US support might at least cover Russia's cost of repatriating and managing the returned fuel.

The Administration and Congress should:

- **Increase funding for an expanded MCC Project to at least \$54 million per year (twice the 2003 request).** The additional funds should be

sufficient to remove all HEU from high priority facilities within three years and to cut two or more years from DOE's goal of converting 29 tons of HEU to LEU and removing all HEU from 55 buildings by 2010.

- **Provide legislation for DOE to work with Western-based agents to purchase, blend, prepare, and sell LEU derived from non-weapons HEU.** This would allow for the yearly removal of up to 2 tons of HEU from civilian facilities in Russia or other States of the FSU. This legislation is needed to exempt the material from current trade restrictions so it can be sold in the United

States. Facilitating the sale of LEU derived from civil HEU can provide additional incentives for Russian blending facilities and institutions with HEU to cooperate in converting the HEU to LEU. It can also provide new opportunities for Western-based organizations to remove HEU from vulnerable facilities for down-blending and sale. Care must be taken to insure that this new supply of LEU does not damage the market arrangements of the existing HEU deal. However, the market impact of LEU from an additional two tons of HEU would be small.