Comments on the proposed uranium enrichment plant in New Mexico

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There are three main issues of serious concern (other than industrial accidents at the plant):

1. **Depleted uranium management and disposal:** DU is about three times more radioactive per unit weight than the threshold for transuranic waste. However, the Nuclear Regulatory Commission is likely to allow its disposal as Class A low level radioactive waste – which would likely pose a significant threat to the environment and especially to groundwater resources.
2. **Non-Proliferation:** The building of a new uranium enrichment plant is likely to slow down the downblending of excess Russian and U.S. highly enriched uranium to reactor fuel, because of fears that a rapid pace will adversely affect market prices. This has already occurred in the past. The pace of downblending needs to be stepped up, not slowed down.
3. **Transport, processing, and storage of uranium hexafluoride:** An enrichment plant will require that natural uranium hexafluoride be transported in and the enriched uranium hexafluoride be transported out.

A. Radiological Characteristics of depleted uranium

The table below compares the specific activity of depleted uranium to TRU waste and to a uranium ore with 0.4 percent uranium content, a typical value for U.S. uranium ores historically (since one proposal is to dispose of DU in uranium mines).

Specific Activities of Various Forms of Depleted Uranium Compared to TRU Waste and Uranium OresChemical f

Depleted u

Depleted u
Depleted u
(UF6)
TRU waste
long-lived

0.4 %

It is clear that, pound for pound, depleted uranium is two-and-half to three-and-half times more radioactive than the threshold that defines transuranic waste. It is far more radioactive than typical uranium ores, because the ore is mixed with large quantities of non-radioactive materials. **Thus, putting depleted uranium in mines is not comparable to replacing the original ore that was mined out of the ground. Rather it is analogous to putting TRU waste in the ground.** In other words, it would be like disposing of TRU waste in shallow dumps, a practice that even the Atomic Energy Commission abandoned as unsound in 1970.

Moreover, DU radioactivity consists principally of alpha particles, as is the case for radioactivity in TRU waste. The main constituents of both DU and TRU waste are long-lived; DU constituents are actually far more long-lived than most TRU waste constituents.

IEER has, for many years, opposed the classification of DU as low-level waste. DU should be disposed of in a deep geologic repository in a manner comparable to TRU waste. That repository cannot be WIPP, because WIPP does not have enough room for the TRU waste in the DOE complex.

Hence, before a private company can be permitted to generate large amounts of DU:

- DU should be classified as waste that is comparable to TRU waste and that must be disposed of in a new deep geologic repository.
- The generator of DU should be required to present a plan for developing such a repository, including a siting process and cost estimates.
- The generator should be required to put forth monies in advance that will ensure that the DU does not pile up onsite and that it will be disposed of in a deep repository as it is generated (a delay of a few years after the start of generation might be reasonable if a specific repository has been identified and is actually being developed).

It is true that the DOE has a very large amount of DU already. However, this cannot be an argument for putting more DU in the hands of a government agency that has mismanaged DU and other forms of radioactive waste. The DOE does not have a plan for a new repository for its DU. Simply passing the DU to the DOE and assuming the problem would be solved would be to continue the waste shell game that has bedeviled radioactive waste management. Needless to say, a deep repository will cost a lot of money, but should be factored into the cost of a new uranium enrichment plant.

B. Markets and non-proliferation

The need for a new enrichment plant must be assessed according to two primary criteria:

1. the market for enrichment services in light of existing supply as well as demand;
2. national security considerations, including the current, projected, and desirable downblending of both Russian and U.S. highly enriched uranium (HEU) for the purposes of fulfilling non-proliferation and disarmament goals as well as for reducing the risks of nuclear diversion, especially in the aftermath of the tragic events of September 11, 2001.

The analysis by LES submitted at the time of the Tennessee proposal did not provide an analysis of either of these considerations. Rather it made reference to “Congressional policy pronouncements” that there is an established need for a domestic source of uranium enrichment capacity. This is a completely insufficient basis for asserting the need for a project that will have a major impact on the supply of enrichment services as well as on national and global security.

LES must provide the documentation and analysis on the basis of which it is asserting the need for the project. If it is going to rely on congressional policy pronouncements, then the economic and technical basis of those pronouncements must be set forth in sufficient detail for an independent assessment of their validity to be made. There is no way in which the NRC or any other body can assess the soundness of LES's assertion unless such documentation and analysis are provided.

The current enrichment capacity as well as the existing commitments and projects to downblend surplus military HEU in Russia and the United States into LEU reactor fuel taken together indicate that there is no need for the LES project in the short- and medium-term.

- There is enough LEU (Low Enriched Uranium) for about 6 years to fuel all the U.S. reactors at the current rates of consumption from the down-blending of the remaining 350 metric tons of Russian surplus HEU at Portsmouth Ohio by USEC (US Enrichment Corporation), assuming 1.5 percent enriched blendstock.
- The down blending of 120 metric tons of surplus HEU will provide fuel for the reactors for about 1.5 years at the current rate of consumption, assuming natural uranium blendstock.

This means that a total of about 7.5 years of U.S. demand for enrichment services is already in the pipeline due to the downloading of military HEU that has been declared surplus. In addition, the United States Enrichment Corporation has an agreement with the U.S. DOE to keep the Paducah plant open until it brings a centrifuge plant on line. The downblending program and the Paducah plant together already create surplus enrichment capacity of about 40 percent over the actual present U.S. requirements for reactor fuel. Thus, there is already a significant surplus of reactor fuel in the commercial pipeline for the next decade. Furthermore in 1993, the RAND Corporation estimated that in the year 2003 the U.S. surplus of HEU would be 339 tons. IEER has estimated that 600 metric tons of U.S. HEU could be declared surplus (including that which has already been so declared). There is also the potential for additional surplus Russian HEU, the amount of which would depend on suitable pricing and political agreements with the United States.

Finally, declaring more highly enriched uranium surplus in the U.S. and Russia is very desirable for security reasons, especially as further downblending will remove large amounts of weapons usable HEU from potential diversion.

Approval of a project to build a new enrichment will hinder declarations of more surplus HEU. There are likely to be commercial pressures against such declarations in the face of a continuing glut in LEU market when both commercial SWU capacity and equivalent SWU capacity from downblending are taken into account. Moreover, LES has not specified whether and how its planned project would affect the government's plan to develop advanced centrifuge technology in collaboration with the United States Enrichment Corporation.

A new enrichment plant will compromise national and global security by hindering the best single non-proliferation policy that the U.S. and Russia are currently implementing themselves (rather than just advocating non-proliferation for others). This policy has had, and continues to have, bi-partisan support.

C. Uranium Feed and DU transport, storage and processing

Uranium feed and enriched uranium product will be transported to and from the plant in hexafluoride form. DU will be stored at the site in the same chemical form. Uranium hexafluoride is highly reactive chemically, yielding hydrofluoric acid and uranyl fluoride on contact with the moisture in the air. Both are very dangerous.

Since New Mexico air is relatively dry, complete hydrolysis of any uranium hexafluoride released in an accident or terrorist event would likely take longer; hence the acid and the uranyl fluoride might spread over larger distances than in other areas. This would make the plume more dilute, but it would affect more people. The problem of uranium hexafluoride transport and storage needs special attention in New Mexico. Generic analysis should be unacceptable.

Transport of a vast quantity of DU out of the state for disposal (or to DOE or both) would present special problems. Transport of large quantities of DU in the form of hexafluoride would present risks proportional to the number of shipments. If the hexafluoride were processed into safe uranium dioxide form before shipment, the risks arising from processing onsite should be evaluated.

Processing uranium hexafluoride into uranium dioxide will yield hydrofluoric acid that is slightly contaminated with uranium. In the past (in the Tennessee proposal, for instance), LES has assumed that it will be able to market this contaminated acid as non-contaminated material. This is quite fanciful. If the acid is required to be processed as radioactive waste, it will present a new, large-scale waste problem, with associated processing, packaging, and disposal costs.

D. Conclusions

1. This is an especially inopportune time to build a uranium enrichment plant for nonproliferation reasons. In my view, a new plant should be ruled out just on that score.
2. DU should be classified as waste comparable to TRU waste and not as low-level waste.
3. If the plant is built, it will be crucial to take into account the fact that even gas centrifuge technology, which is better than gaseous diffusion technology in its routine operational characteristics, involves problems of waste and uranium hexafluoride transport, storage, and processing. These will present severe challenges to any state that hosts the plant. They must be squarely addressed before a decision to license and build a plant is made.

Notes:

1. For more detail see the comments of the Institute for Energy and Environmental Research submitted to the Nuclear Regulatory Commission in November 2002, when the LES uranium enrichment plant was proposed to be cited in Tennessee. The full memorandum is available online . ? Return