Comments on Long-Term Management and Use of Depleted Uranium Hexafluoride

Comments of the Institute for Energy and Environmental Research on the draft of the Department of Energy Programmatic Environmental Impact Assessment for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride (December 1997)

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The Department of Energy's Draft Programmatic Environmental Impact Statement (PEIS) for Alternative Strategies for the Long-Term Management of Depleted Uranium Hexafluoride purports to analyze the impacts of the storage, use and/or disposal of the 560,000 metric tons of depleted uranium hexafluoride currently stored in 46,422 cylinders at three sites located near Portsmouth, Ohio; Oak Ridge, Tennessee; and Paducah, Kentucky. This long term management is for the depleted uranium generated prior to 1993.

In this report the DOE examines six alternatives:

- The "no action" alternative which would be a continuation of the current management program, that is storage on site in cylinders of the depleted uranium hexafluoride.
- Two storage alternatives based on retrievability
    - in UF6 form in yards, buildings or an underground mine
    - in oxide form in buildings, below-ground vaults or an underground mine
- Two use alternatives
    - radiation shielding for casks for storage of spent fuel or high level wastes after conversion to metal
    - radiation shielding for casks for storage of spent fuel or high level wastes after conversion to oxide
- Disposal as low-level waste in the oxide form in drums placed in
    - shallow earthen structures
    - vaults
    - mines

The Draft also makes mention of other possible uses of depleted uranium as part of the use alternatives (see below).

One of these alternatives will be selected in the Record of Decision, which is scheduled for this year. DOE's preferred alternative is to use the entire inventory of depleted uranium after its conversion to a metal and/or oxide form.

The DOE's effort to address the long-term management of the country's depleted uranium hexafluoride, specifically the realization of the importance to convert this material into a stable form is long overdue. The draft PEIS is seriously deficient because it does not address the most environmentally appropriate option – specifically, the DOE did not include the alternative of disposing of depleted uranium according

to the rules of 40 CFR 191 which govern the disposal of transuranic (TRU) wastes. IEER, in its comments (Mar 22, 1996) on DOE's Notice of Intent (Jan 25, 1996), had already noted that the proposed list of alternatives was incomplete since it did not include the option of disposal under 40 CFR 191. The DOE has rejected our comments without providing any technical or environmental explanation. Our comments of March 22, 1996 are attached . DOE should include this option in the Final PEIS.

IEER agrees with DOE that the no action alternative is inappropriate and should be rejected because of the dangers of UF_6 storage. For the same reason, long-term UF_6 storage in new containers should also be rejected. Overall, conversion to oxide would reduce risks. While conversion poses risks to workers and the off-site population, continued storage also poses serious risks.

However, the various alternatives the DOE has considered have not been properly assessed in this PEIS.

A. Conversion of uranium hexafluoride

Most of the alternatives considered involve the conversion of uranium hexafluoride. Three alternatives would convert uranium hexafluoride to an oxide and one alternative would convert uranium hexafluoride to a metal. This conversion would have the positive result of putting the depleted uranium in a more stable chemical form, therefore eliminating the chances of an hazardous releases of UF_6 and hydrofluoric acid from aging corroding cylinders. DOE's analysis is incomplete or deficient in regard to the

- fate of the empty cylinders,
- commercial use of contaminated anhydrous hydrogen fluoride (produced during the conversion process),
- the radiological effects on workers.

1. Fate of the empty cylinders

DOE admits that ".. the ultimate disposition of the empty cylinders was not analyzed in detail as part as the alternative management strategies." The empty cylinders would become part of the DOE scrap metal inventory. The options for disposition are: recycling "… into LLW disposal containers, reuse as LLW containers, free release for re-melting, and disposal as LLW." However DOE has not analyzed the environmental and health impacts of these proposals. This lack of analysis is a serious problem since the volume of contaminated metal involved is large and doses to the public and to workers may be significant.

2. Commercial use of contaminated HF and CaF_2

The DOE has not properly assessed the management of both HF, a by-product of the conversion process, and calcium fluoride (CaF_2), a product of the neutralization of HF. Both these products will be slightly contaminated and in the Cost Analysis Report for the Long-Term Management of Depleted Uranium Hexafluoride concerns are expressed as to the public acceptance of the uranium contaminants. Regardless of this concern, the DOE, in its Draft PEIS, assumed that these products could be commercially sold for unrestricted use. It is unacceptable to release a non-labeled contaminated product which has not received public acceptance. The Cost Analysis Report also states that the demand for HF is "still very uncertain". An other option is to use the HF for the production of UF_6. For this option as well as the commercial use

option, DOE has not addressed the fact that part of the UF_6 inventory is recycled UF_6 which is contaminated by radionuclides other than uranium-238, such as Tc-99 and U-236 which both have a long half life.

3. Radiological effects on workers

In their calculation of radioactive dose assessment, DOE does not take into account internal radiation doses that would be received by involved workers during the conversion process. This is a serious deficiency since involved workers are the most at risk. DOE claims that measures taken to prevent inhalation and ingestion of radioactive material would effectively protect the involved workers. The emphasis on prevention measures is not enough without a monitoring program installed for health purposes. DOE also claims use of respirators will reduce workers doses. But routine reliance on respirators is unacceptable as a radiological control practice. Moreover, some of the depleted uranium comes from the enrichment of UF6 from recycled uranium from spent fuel. This UF_6 contains some radionuclides of concern such as technitium-99, a long lived beta emitter and uranium-236, a long lived alpha emitter. DOE does not seem to have analyzed the radiological impacts.

B. Uses of depleted uranium

1. Uses analyzed

DOE's preferred alternative is to use the entire inventory of depleted uranium after its conversion to a metal or an oxide form for radiation shielding in storage casks for spent fuel. However since these casks would have to be licensed by the NRC (6.11-9-1 Engineering analysis report) this choice is premature. Even if the licensing is approved cask fabrication creates more problems than solutions. The problems are that

- it is not a final solution since the casks envisioned do not meet the criteria for deep repository disposal. Hence this is not a solution but a stop-gap storage method that would create more contamination and radioactive waste in the form of used casks. The DOE has not done the preliminary work ascertaining the license ability of the casks. DOE's choice of preferred option is premature and inappropriate.
- DOE doesn't say what will happen to the DU in the casks. It only states that: "No assumptions were made regarding the fate of the oxide- and metal-shielded casks after use. The empty casks could be recycled, stored, or disposed of as LLW." (p. H-32).

For the manufacturing casks as with the conversion process, the contribution to the dose from internal radiation to involved workers has not been assessed.

2. Other uses not analyzed in depth

With the long-term storage options DOE preserves the possibility to pursue the use of depleted uranium in light water reactor fuel cycle, advanced reactor fuel cycles and, dense material applications. The light water reactor option has two sub-options: the re-enrichment of DU and the use of DU for MOX. Among these options, the fact that the use of depleted uranium in advanced reactors (that is fast neutron reactors, also known as breeder reactors) is at all considered is particularly disturbing. Depleted uranium being the

raw material for plutonium production, by converting it into a material not only much more radioactive but also weapons usable would not only defeat the stated purpose of the PEIS which is to “achieve the safe and effective long-term management of depleted UF_6.” It would also have serious proliferation consequences.

3. Uses not analyzed

The feasibility of using depleted uranium hexafluoride for the blending down of surplus highly enriched uranium was not considered in this PEIS. Although it would utilize only a small portion of the stock, this use would have several advantages, among them: the contribution to non-proliferation, a minimum of handling, and incorporation of depleted uranium into spent fuel. This use option could be made part of any of the alternatives except UF_6 storage.

C. IEER’s recommendations

IEER recommends that:

- depleted uranium be classified as a waste equivalent to TRU waste for management purposes
- UF_6 be converted to an oxide form and declared a waste to be handled on a par with repository-designated TRU waste, with the possible exception of a relatively small quantity to be used for the blending down of highly enriched uranium. This should be the preferred option in the Final PEIS
- The issue of internal radiation for involved workers during conversion and cask fabrication be addressed carefully along with an assessment of the effects of uranium-236 and technitium-99
- the fate of the empty UF_6 cylinders and their proper disposition should be studied
- the fate of the anhydrous hydrogen fluoride and calcium fluoride should be properly studied
- radioactive materials such as HF from UF_6 processing and steel from empty UF6 cylinders not be circulated in the civilian economy.