



## Department of Energy

Washington, DC 20585

January 20, 2000

Ms. Tara Thornton  
International Coordinator for Depleted Uranium  
Military Toxics Project  
P. O. Box 558  
Lewiston, ME 04243-0558

Dear Ms. Thornton:

Thank you for your recent letter regarding your organization's concerns about plutonium in the uranium stocks at the gaseous diffusion plants in Oak Ridge, Tennessee, Paducah, Kentucky and Piketon, Ohio. The Secretary asked that I respond to your questions. As you are probably aware, the Department has taken this issue very seriously. Senior Departmental managers met with workers at Portsmouth and Paducah.

As background, I would note that our historical information shows that recycled uranium, which came straight from one of our production sites, e.g., Hanford, would routinely contain transuranics at a very low level. The process for recycling the uranium does not convert all of the transuranic contaminants into uranium hexafluoride (UF<sub>6</sub>). Further, much of the transuranic contaminants that do enter the cascade are deposited in the cascade. Therefore, the depleted or enriched uranium exiting the cascades is normally much lower in transuranics than that which was shipped to the site. We expect an order of magnitude reduction in plutonium throughout these processes. Consequently, we are primarily concerned with the processing of recycled uranium that could concentrate transuranics, thereby creating a hazard which is primarily from the transuranics, and for which protective measures may not have been sufficient. We have begun a program to recreate our understanding of the flow of recycled uranium and to look for such processes.

Further, I would offer you this benchmark – if the plutonium in a recycled uranium oxide sample contained about 11 parts per billion of plutonium 239, and the oxides were inhaled by a receptor, the plutonium would cause a dose increase of about 14 percent over that of the uranium. At these levels, the radiological controls that are used for uranium would be expected to provide sufficient protection from the plutonium.

With regard to the four questions asked in your letter, the following responses are provided:

*Question 1: Do any of the depleted uranium stocks at any of these three sites contain plutonium? If so, what portion and how was this fraction determined? If not, what has been done to ensure the reliability of that conclusion?*

**Response:** We believe that minute quantities of plutonium may be contained in some of the depleted uranium stocks presently at the gaseous diffusion plant sites. Although the depleted



uranium extracted from the cascade at the diffusion plants should be very low in transuranic contaminants (e.g., parts per trillion of plutonium), some cylinders presently containing depleted uranium may have been previously used to hold uranium with higher (parts per billion plutonium) transuranic levels; e.g., incoming UF<sub>6</sub>. Past evaluations reveal the presence of transuranics in the uranium materials at the gaseous diffusion plants., e.g., "Historical Impact of Reactor Tails on the Paducah Cascade" KY/L-1239, March , 1984. The Depleted Uranium project does contain a sampling program that may be helpful in understanding the levels of transuranics and fission products in some of the existing depleted uranium stock, and provide an additional verification means.

Question 2: *Did any of the depleted uranium used in the past to manufacture depleted uranium munitions contain plutonium? Did the Department of Energy measure plutonium in its final metal products in its DU metal processing operation, such as at its Fernald, Ohio, plant to ensure there was no plutonium in them?*

Response: The initial test rounds made at the Fernald Environmental Management Project (FEMP) almost certainly contained recycled uranium. The Air Force worked with Fernald in late 1976 or early 1977 to participate in the development of an armor piercing round. Later , the Army joined the effort. There were three potential alloys originally considered for the project; only two contained uranium. One of the uranium alloys was chosen as the final metal for the project. The Fernald site made the uranium part of the round for testing. The production of the rounds was turned over to commercial businesses. Carolina Metals, Aerojet and NMI collaborated on the commercial production of the depleted uranium rounds. The FEMP is presently compiling data on the depleted uranium and the shipment of this material. We are attempting to determine the characteristics of the material used for the development and testing program that was conducted by the Department, and of that which may have been supplied to the commercial sector or the Army for that use.

Question 3: *What official investigations have there been in regard to plutonium contamination of depleted uranium?*

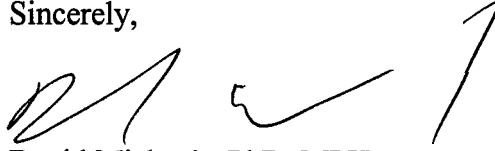
Response: Questions about the use of recycled uranium, that contained trace amounts of plutonium, have been raised as decisions were made about the recycle process, and date back to the early days of production (i.e. 1950's and 1960's). In the 1980's , there was concern with the level of plutonium in recycled uranium, and a special Task Force was formed by DOE's Oak Ridge Operations Office. A report was published in September 1985, *The Report of the Joint Task Force on Uranium Recycle Materials Processing*. This report is enclosed.

More recently, the Office of Environment, Safety and Health conducted a comprehensive two phase investigation (the second phase still ongoing) of concerns at Paducah. An initial report was completed in September 1999, *Phase I Independent Investigation of the Paducah Gaseous Diffusion Plant, Environment Safety and Health Issues*. Phase II will continue this assessment, with subsequent investigations to be conducted of facilities at the Portsmouth, Ohio, and former K-25 site in Oak Ridge, Tennessee. The Nuclear Regulatory Commission is also performing an independent review of the United States Enrichment Corporation, which operates Paducah and Portsmouth. The DOE report is enclosed for your information.

Question 4: What *measures are in place now to assure that depleted uranium metal does not contain plutonium?*

Response: One may normally expect that depleted uranium contains a trace amount of plutonium. However, the quantity of plutonium in depleted uranium is generally very low, and the major health concern is from the uranium, not the traces of plutonium. We have initiated a project to characterize the level of transuranics in the various depleted uranium inventories. Results from this project should be available in June 2000.

Sincerely,

A handwritten signature in black ink, appearing to read 'D. Michaels', with a long horizontal stroke extending to the right and a vertical stroke at the end.

David Michaels, PhD, MPH  
Assistant Secretary  
Environment, Safety and Health

Enclosures: (2)

Phase I Independent Investigation of the Paducah Gaseous Diffusion Plant, S&H Issues  
The Report of the Joint Task Force on Uranium Recycle Materials Processing