



*Many Voices Working for the Community*

# Oak Ridge Site Specific Advisory Board

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July 10, 2003

Mr. Steve McCracken  
Assistant Manager for Environmental Management  
DOE-Oak Ridge Operations  
P.O. Box 2001, EM-90  
Oak Ridge, TN 37831

Dear Mr. McCracken:

**Recommendation Concerning the Depleted Uranium Hexafluoride Disposition Program  
at the DOE East Tennessee Technology Park, Oak Ridge, Tennessee**

At our July 9, 2003, meeting, the Oak Ridge Site Specific Advisory Board approved the enclosed recommendation.

We appreciate your consideration of our recommendation and look forward to receiving your written response.

Sincerely,

David N. Mosby, Chair

Enclosure

cc/enc: Dave Adler, DOE-ORO  
Pat Halsey, DOE-ORO  
Dave Hutchins, DOE-ORO  
Connie Jones, EPA Region 4  
John Owsley, TDEC  
Sandra Waisley, DOE-HQ



## **Oak Ridge Site Specific Advisory Board Recommendation Concerning the Depleted Uranium Hexafluoride Disposition Program at the DOE East Tennessee Technology Park, Oak Ridge, Tennessee**

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### **BACKGROUND**

A uranium enrichment process called gaseous diffusion was used at the Oak Ridge Gaseous Diffusion Plant, now called the East Tennessee Technology Park (ETTP), from 1945 until 1985. The process physically separated naturally occurring uranium, fed as a uranium hexafluoride ( $UF_6$ ) gas that solidifies at ambient temperatures, into a product enriched in uranium-235 and a depleted stream that was withdrawn and stored in cylinders allowed to accumulate on site. Most cylinders contain either 10 or 14 tons of  $UF_6$ , but there are a number of cylinders of smaller sizes and ones that are empty or contain heels.

Overall, there are approximately 57,000 storage cylinders containing over 500,000 metric tons of  $UF_6$  at the ETTP, Paducah, Kentucky, and Portsmouth, Ohio, gaseous diffusion plants. Since there are more cylinders at Paducah (about 38,000), transporting the 6,364 ETTP cylinders to Portsmouth would bring the inventories into balance and facilitate the design and operation of two similarly sized conversion plants. The Tennessee Department of Conservation (TDEC) and DOE signed a Commissioner's Order in 1999 requiring DOE to submit a plan to remove the depleted  $UF_6$  ( $DUF_6$ ) cylinders and their contents no later than December 31, 2009. The Oak Ridge Comprehensive Closure and Performance Management Plans accelerate this schedule to the end of fiscal year 2007 to accomplish closure of ETTP. In 2002, DOE awarded a conversion contract to Uranium Disposition Services for two plants and also decided that Bechtel Jacobs Corporation (BJC) and Uranium Disposition Services (UDS) will share responsibility for shipment of the ETTP cylinders to Portsmouth. Requirements for shipping  $UF_6$  cylinders are contained in the U.S. Department of Transportation Hazardous Materials Regulations, 49 CFR Parts 100.185 and ANSI N14.1, *Uranium Hexafluoride – Packaging for Transport*. BJC will be responsible for shipping ANSI N14.1-compliant cylinders in 2003 through 2005, and UDS will be responsible for shipping ANSI N14.1-noncompliant cylinders in 2005 through 2007.

### **DISCUSSION**

On May 14, 2003, Mr. David Hutchins, Manager of the  $DUF_6$  Cylinder Program at ETTP, gave a review to the Oak Ridge Site Specific Advisory Board (ORSSAB) on plans for shipping cylinders at ETTP to Portsmouth. The presentation focused on the ANSI N14.1-compliant cylinders. DOE notes that these shipments do not involve "Highway Route-Controlled Quantities," and are not subject to any laws that require specific routing, notifications, or escorts, but they are taking some additional steps. The questions asked by members of the Board and the public related to emergency response and preparedness training, communications with local communities, shipping logistics, and hazards inherent to the material. The Board was told that some consideration was given to disguising the cylinders for security purposes but that ability to identify the material in any incident was decided to be more important. Shipment by barge and air were discounted. DOE prefers highway shipments by truck, claiming they're more cost

effective than rail. Truck shipments were said to have higher probability of accident occurrence than rail, but rail accidents would have higher consequences due to more cylinders potentially being involved. Truck shipments allow greater potential selection of routes. DOE has worked primarily through state authorities rather than directly with every local community along the way to develop the transportation plan and to train emergency response personnel. The Department of Transportation has set an initial evacuation distance for UF<sub>6</sub> from a large spill at 100 meters (1/16 mile) and then 300 meters (3/16 mile) in event of a major fire. By comparison, evacuation distances, in event of a fire, are 800 meters (1/2 mile) for gasoline and chlorine and 1,600 meters (1 mile) for propane.

Historical research indicates that DOE and its predecessor agencies have been involved in efforts to make the handling of uranium hexafluoride safer for a long time. In 1966, fire tests of bare, UF<sub>6</sub>-filled cylinders were conducted at the Oak Ridge Gaseous Diffusion Plant Rifle Range to determine if cylinders would hydrostatically or explosively rupture and the time available for fire fighting before either incident occurred.<sup>1</sup> The tests confirmed that a UF<sub>6</sub> cylinder rupture of explosive force is possible and that it can occur within a time sufficiently short as to preclude fire fighting unless initiated very promptly. It was also concluded that a type of foam insulation provided a high degree of fire protection for shipments.

Safety issues related to the storage of DUF<sub>6</sub> have continued to be investigated up through preparation and maintenance of current safety basis documents for the cylinder storage yards.

On April 30, 2002, the Department of Transportation issued a notice of proposed rulemaking (NRPM) to bring about compatibility of its regulations with those of the International Atomic Energy Agency (IAEA). One area that has the greatest potential for substantially increased costs to shippers of radioactive materials concerns large stocks of DUF<sub>6</sub> stored in currently authorized packagings at three different locations. If this material should be moved off-site to one or more conversion facilities, then it is likely that the current packagings will not meet the standards proposed in this NPRM. In that case the existing packages likely will be required to be overpacked in order to meet the standard for a hypothetical fire test. The ramification of differences between U.S. and IAEA regulations is something that needs to be better understood.

## **RECOMMENDATION**

ORSSAB fully supports the accelerated shipping schedule for DUF<sub>6</sub> cylinders from ETTP. Additionally, we recommend that DOE keep open and not preclude transportation options other than highway. Finally, we recommend that DOE manage the safety aspects of the program consistent with the entire knowledge base of the hazards associated with handling UF<sub>6</sub> and inform the public about any plans to seek exemptions from more stringent requirements that may be evolving.

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<sup>1</sup> Mallett, A.J., *ORGDG Container Test and Development Program – Fire Tests of UF<sub>6</sub>-Filled Cylinders*, K-D-1894, Union Carbide Nuclear Division, ORGDG, January 12, 1966.