

Small UF₆ Cylinder Disposition Project

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January 5, 2009

Project Summary



- Cylinders being processed and disposed of in this project contain various amounts of Uranium Hexafluoride (UF_6)
- This UF_6 was used as feed stock in the enrichment process and has been stored for years in various buildings onsite

Background: Cylinder Disposition – Phase I

- Phase I of the Small Cylinder Project consisted of disposal of cylinders that were clean and empty or contained Resource Conservation and Recovery Act (RCRA) empty heel quantities of UF_6 (<3% by weight)
- Approximately 1,250 cylinders were identified to be processed as part of Phase I.
 - Approximately 800 were clean empties
 - Remaining ~450 contained heel quantities of UF_6

Background: Cylinder Disposition – Phase I

- Treatment

- IES technicians introduced a Magnesium Hydroxide (Milk of Magnesia) solution into the cylinders which neutralized the UF_6 .
- The resulting solution was mixed with mortar mix and solidified inside the cylinders, thereby disabling the cylinders for future use.
- The cylinders were loaded into B-25 boxes and shipped to (NTS) for disposal.



Cylinder Disposition – Phase II

- Phase 2 of the Small Cylinder Project will dispose of the cylinders with greater than heel quantities of UF₆
- Three different populations of cylinders have been identified as part of Phase 2:
 - Approximately 34 cylinders will be transferred to Uranium Disposition Services, LLC (UDS) at a later date for processing
 - Approximately 127 cylinders have been transferred to the United States Enrichment Corporation (USEC) for recovery of the cylinder contents
 - Approximately 300 cylinders will be processed by LPP and disposed of as waste. These cylinders were determined not to contain recoverable amounts of uranium

Cylinder Disposition – Phase II

- Currently all but a small number of cylinders to be processed by USEC have been transferred to them for processing. Discussions are ongoing in relation to the process of treating the few remaining cylinders.
- The majority of the cylinders transferred to USEC have been emptied and returned to LPP. These are being stored and awaiting stabilization at a later date.

Cylinder Disposition – Phase II

- Phase 2 cylinder stabilization is currently scheduled to begin in May 2008 and will be performed by IES.
- The same in situ (in place) stabilization process discussed for Phase I will be utilized for all cylinders emptied by USEC and for any other cylinders containing heel quantities of UF_6 that fall under the scope of the contract with the Department of Energy.

Cylinder Disposition – Phase II

- For cylinders with greater than heel quantities of UF_6 , an external stabilization process will be followed:
 - Cylinders will be heated under controlled conditions to the point where the UF_6 is sublimated, or turned into a gaseous state
 - The sublimated UF_6 will be drawn off and reacted with Potassium Hydroxide to neutralize it
 - The resultant solution will be mixed with mortar and solidified
 - The cylinder then will be stabilized as described previously and disposed of with the containers of concreted uranium salts produced by the external stabilization
- Once stabilized, the waste will be shipped to NTS in B-25 boxes for disposal

Safety: Cylinder Disposition – Phase II

- Multiple safeguards will be in place to prevent inadvertent release of HF gas or criticality during processing:
 - Stabilization work will be performed inside a stainless steel Perma-Con enclosure inside the X-345 facility
 - IES will utilize High Efficiency Particulate Air (HEPA) filtered ventilation systems both on the enclosure where work is being performed as well as locally when performing breaching evolutions
 - A high volume ventilation scrubber system is used during handling of all cylinders inside the processing enclosure. This system utilizes drums of activate alumina to neutralize any gaseous HF that may be produced when cylinders are being processed.

Safety: Cylinder Disposition – Phase II

- Safeguards (continued):
 - Only one cylinder at a time will be heated, the tank where the neutralization reaction takes place will be emptied, and the contents will be solidified following the processing of each cylinder. This will reduce the possibility of inadvertent criticality.
 - Many of the valve operations and monitoring activities associated with the heated processing system will be performed remotely. This action would serve to minimize personnel exposure in the event of an accidental release.

Cylinder Disposition – Phase II

- Project is scheduled to be completed by the end of September 2009
- Waste shipping activities will be ongoing as cylinders are processed and should conclude shortly after processing is finished