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# TREATMENT OF URANIUM AND THORIUM CHIPS AT THE DOE SITES

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**Treatment of Uranium and Thorium Chips at the DOE Sites**

Two of the unique wastes in the U.S. Department of Energy (DOE) complex are uranium and thorium chips. Significant quantities of these materials exist throughout the DOE complex, produced mostly as machining and tooling residues. DOE's Waste Elimination Team (WET) surveyed the DOE complex to determine the location and quantity of uranium and thorium chips that require treatment.

The inventory revealed depleted uranium and thorium in a variety of forms and matrices, including chips, foil, sludge, shavings, turnings, and larger shapes, mixed with a whole spectrum of contaminants. Because the chips are pyrophoric, they are commonly stored under mineral or diesel oil or other liquid, though some chips recovered in remedial actions were mixed with soil. Common contaminants are heavy metals, polychlorinated biphenyls, and spent solvents. The total inventory identified in the survey includes 1865 drums, 151 bottles, one plastic bag, 25 pipe sections, four B-12 boxes, seven glass containers, 19 metal containers, nine 4-L cans, and 120 food pack cans. Since the initial inventory effort, additional waste streams have been discovered, adding hundreds of drums.

To address the problem, the WET, through UT-Battelle, issued a statement of work and a request for proposal (RFP). Five companies responded to the RFP. The evaluation panel selected a vendor, based on criteria that balanced expected performance and overall evaluated price. Following the panel's recommendation, UT-Battelle initiated a basic order agreement (BOA) with Perma-Fix. An audit was conducted at the Perma-Fix site to ensure that the uranium and thorium chips would be treated (1) within appropriate industrial safety and hygiene practices, (2) via appropriate process technologies, and (3) in compliance with the pertinent regulatory framework.

One of the requirements of the BOA specified that Perma-Fix perform a First Article Test, demonstrating the efficacy of the process. The WET coordinated with the Rocky Flats site to supply four drums of chips for that test. The First Article Test must have demonstrated Perma-Fix's capability to treat, transport, and dispose of the treated chips, satisfying Envirocare of Utah's waste acceptance criteria before any subcontracts could be issued for the full-scale processing of the DOE inventory.

This paper describes the WET's progress on the uranium/thorium chip disposition project and reports the results of the First Article Test conducted at the Perma-Fix facilities in Oak Ridge, Tennessee. In addition, the paper outlines a strategy to assist the DOE sites in their use of the BOA for treating their wastes that contain uranium and thorium chips.