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**FACTSHEET NEUTRALIZATION OF UNH INVENTORIES AT FERNALD  
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FACTSHEET

# FACT SHEET: NEUTRALIZATION OF UNH INVENTORIES AT FERNALD

## Background

During uranium production, uranyl nitrate hexahydrate (UNH) was an intermediate product in the recovery of uranium from process residues. Uranium-containing residues were dissolved in nitric acid to form a UNH solution which was then purified and converted to uranium trioxide (UO<sub>3</sub>). UO<sub>3</sub> was subsequently converted to uranium metal.

There are approximately 200,000 gallons of acidic uranyl nitrate stored in 19 tanks in and around the Plant 2/3 refinery. A 1991 inspection revealed that small leaks had developed in the piping system associated with the tanks.

CERCLA Removal Action No. 20 (Stabilization of UNH Inventories) is designed to neutralize the UNH and convert it to a non-hazardous solid form which can be disposed of as low-level waste. Liquid waste generated as a result of UNH neutralization will be sampled, treated, and discharged to the Great Miami River in accordance with Fernald's National Pollutant Discharge Elimination System (NPDES) permit with the State of Ohio.

## Project improvements assure worker safety and health

A new transfer pipe is under construction that will allow pumping the contents of one UNH tank at a time to the dilution/neutralization tank. The new system addresses hazardous waste handling requirements for containment, and will be connected to only one storage tank at a time to enhance configuration control, reduce the potential for spills, and prevent inadvertent transfers.

New pumps will be installed to transfer the UNH, and new instrumentation will be installed on all of the tanks and pumps to be used in the neutralization process. Process control will be achieved with improved transfer pumps, valves, engineering and chemistry controls, alarm systems, safety interlocks, new instrumentation, and detailed procedures.

The chemistry is based on a simple and controllable process in which dilution, neutralization, and precipitation occur in the same tank. To ensure worker safety and process control, all chemical reactions will be duplicated in the site laboratory before field operations begin.

The process has been designed to avoid heating the UNH solutions and thereby prevent emissions of nitric oxide (NO<sub>x</sub>) to the air. In addition, scrubbers will be installed on the neutralization tanks to assure that any NO<sub>x</sub> which is inadvertently formed will be removed from the air emitted from the tank.

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Project improvements assure worker safety and health (cont.) -2-

A knowledgeable and capable operations team will be assured through rigorous training and qualifications programs.

Equipment installation is scheduled to be completed in October 1994, followed by extensive worker training and systems safety checks. Actual processing is scheduled to begin by February 1995. The project is scheduled for completion in July 1995.

Regulatory issues

When Fernald's UNH inventory was declared a waste by the DOE in 1991, the material became regulated by the Resource Conservation and Recovery Act (RCRA) due to its low pH (high acid content) and levels of chromium and barium. RCRA is a federal law designed to ensure safe handling, storage, treatment, and disposal of chemically hazardous waste materials.

The solid filter cake is expected to be non-RCRA hazardous acceptable for shipment to the Nevada Test Site for disposal as low-level radioactive waste.

The liquid filtrate will be tested to confirm its acceptability for discharge under Fernald's NPDES permit.

Fernald's NPDES permit from the State of Ohio allows for discharge of wastewater to the Great Miami River. This encompasses process area wastewater (including liquid filtrate from UNH neutralization), sanitary wastewater, and stormwater. The NPDES permit imposes treatment regulations and discharge limits for pollutants regulated by the Clean Water Act.

The NPDES permit does not regulate uranium as a toxic pollutant under the Clean Water Act. Fernald's uranium discharge limit (1,700 pounds per year) is part of the 1991 Amended Consent Agreement between DOE and the U.S. EPA.

Fernald's wastewater treatment system provides treatment for uranium removal to assure that uranium discharges are minimized. Uranium-contaminated wastewater is first treated at Plant 8 by precipitation and filtration in the same manner proposed for the UNH solutions. The filtrate from this wastewater processing then receives additional treatment at the Biode-nitrification and Interim Advanced Wastewater Treatment facilities before discharge to the Great Miami River.

Since the liquid filtrate from UNH processing will contain minimal amounts of uranium, it will be treated and discharged in the same manner as other uranium-contaminated wastewater which has been treated at Plant 8. Based upon the levels of uranium typically present at the discharge from the Biode-nitrification facility, the UNH Neutralization Project is estimated to increase the uranium discharged to the Great Miami River during 1995 by less than 10 pounds.

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The neutralization process

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Following is a description of the UNH neutralization process to be used at Fernald: From the storage tanks and associated piping the UNH is pumped to the refinery where the material is neutralized with magnesium hydroxide and lime. The uranium, chromium and barium will be precipitated out and the liquid becomes a slurry of milk-shake consistency. The slurry is then filtered in Plant 8. Resulting solid filter cake is collected in drums and sampled for uranium content and RCRA characterization. Liquid filtrate goes through normal site wastewater treatment systems including biodenitrification prior to discharge.

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