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**SUBMITTAL OF REMOVAL ACTION WORK PLAN FOR THE URANYL NITRATE
REMOVAL ACTION AND STATUS OF LEAK REPAIRS**

06/03/94

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WORK PLAN



Department of Energy
Fernald Environmental Management Project
 P.O. Box 398705
 Cincinnati, Ohio 45239-8705

JUN 0 3 1994

DOE-1840-94

Mr. Thomas A. Winston, P.E.
 District Chief, SWDO
 Ohio Environmental Protection Agency
 401 E. Fifth Street
 Dayton, Ohio 45402-2911

Dear Mr. Winston:

SUBMITTAL OF REMOVAL ACTION WORK PLAN FOR THE URANYL NITRATE REMOVAL ACTION AND STATUS OF LEAK REPAIRS

- Reference:
- 1) OP:94-0402, J. P. Hamric to T. A. Winston, "Response to Ohio Environmental Protection Agency Regarding the Uranyl Nitrate Removal Action," dated April 14, 1994.
 - 2) DOE-0859-94, J. P. Hamric and John A. Rasile to R. Fisher, "Response to Deficiencies Identified in December 9, 1993 Inspection of Uranyl Nitrate Tank System and Request for Additional Information," dated January 28, 1994.

In Reference 1 it was indicated that a Removal Action Workplan for the Uranyl Nitrate Hexahydrate (UNH) Neutralization Project would be submitted to your office for review by May 16, 1994. As was discussed during a telephone conversation with members of your staff on May 13, 1994, it will be necessary to delay submittal of the workplan for the reasons discussed below.

During a presentation to the Ohio Environmental Protection Agency (OEPA) pertaining to the UNH project on April 21, 1994, one of the primary concerns expressed regarded sampling and characterization of the waste streams generated by the neutralization of the UNH solutions. A detailed Sampling Plan to address these concerns is being prepared for inclusion in the workplan, but will not be completed until later this month. The Fernald Environmental Management Project (FEMP) anticipates submittal of a Removal Action Workplan for OEPA review no later than June 20, 1994. Review and approval of the workplan by OEPA and the United States Environmental Protection Agency (U.S. EPA) will take place during the construction phase of the project. Delaying submittal of the workplan is not projected to impact the schedule for initiation and completion of neutralization.

Enclosed is the current Master Plan for the UNH Neutralization project, providing a detailed description and schedule for each step of construction, readiness review, startup and actual neutralization phases of the project. The Master Plan provides a framework for this project and the details of the

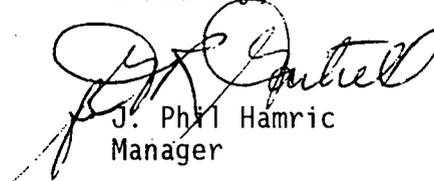
plan are still being developed. In response to recent safety incidents, a stand-down was recently imposed on many activities at the FEMP pending completion of safety reviews. These activities, including many construction and maintenance work and most nonessential field activities, are being restarted only after reviews by independent teams of Fernald Environmental Restoration Management Corporation (FERMCO) and Department of Energy, Fernald Field Office (DOE-FN) personnel certify that they can be conducted safely. This stand-down, along with the funding difficulties discussed at the April 21, 1994 meeting, have necessitated extending the schedule for completion of construction and initiation of the readiness reviews by approximately one month. As was the case in Reference 1, July 1995 is our best estimate for completion of neutralization, contingent upon winter weather, approval of the DOE Master Plan by the Assistant Secretary, and timely resolution of the safety stand-down.

Repair of the UNH tank system leaks, as discussed in Reference 2 and at the April 21, 1994, meeting is underway. The method being used to stop the piping leaks presented at the meeting has not performed as expected at some leak locations due to the condition of the flanges. The vendor has been contacted and corrective measures, such as redesign and modification of some seals, are being implemented. In addition, leak repairs were delayed during the stand-down to allow safety review of the repair procedures.

Currently, of ten (10) UNH leak repair Work Orders, five (5) have been completed, two (2) are in progress, and the remaining are scheduled for repair. Each Work Order may consist of one or more leak repairs. A detailed status and schedule for completion of the leak repairs is being prepared and will be provided by June 9, 1994.

If you have any questions regarding this information or require additional information, please contact Wally J. Quaider, (513) 648-3137 or Ed Skintik, (513) 648-3151.

Sincerely,



J. Phil Hamric
Manager

FN:Skintik

Enclosure: As Stated

cc w/enc:

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FERNALD, OHIO ENVIRONMENTAL MANAGEMENT PROJECT
URANYL NITRATE HEXAHYDRATE (UNH) NEUTRALIZATION RESTART PROJECT

- MASTER PLAN -

SUMMARY:

The purpose of this project is to safely neutralize and dispose of approximately 200,000 gallons of uranium dissolved in nitric acid (UNH). The UNH was "Material in Process" until June 1991 when it was declared a mixed hazardous waste under the Resource Conservation and Recovery Act (RCRA) due to its corrosive properties, and hazardous constituents. These UNH solutions, presently stored in 19 tanks, will be diluted, neutralized, and filtered. The solid filter cake is expected to meet RCRA non-hazardous requirements and will be shipped to the Nevada Test Site for burial as low level radioactive waste. The liquid filtrate will be tested to confirm its acceptability for discharge under the present NPDES permit.

This project implements significant improvements from previous operations that resulted in the April 28, 1993 spill of approximately 30 gallons of UNH. Lessons learned from the resulting Type B Investigation and a February 1, 1993 UNH proof of process test report were utilized in developing the current project design, methods of construction, processing methodology, operating procedures discipline, personnel training and qualification requirements, and waste disposal plans.

UNH project improvements include the following:

- The design and construction of a new transfer header which will enhance system safety, considering the deteriorated state of existing piping. The new header 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.
- Process control will be achieved with improved transfer pumps, valves, engineering and chemistry controls, alarm systems, safety interlocks, new instrumentation and detailed procedures.
- A knowledgeable and capable Operations team will be assured through the implementation of Conduct of Operations principles and rigorous training and qualification programs.

- The chemistry is based on a simple and controllable batch process wherein dilution, neutralization, and precipitation occur in the same tank. To ensure safety and process knowledge and control, all chemical reactions will be duplicated in the laboratory before field operations begin.
- UNH solutions will not be heated to minimize the potential for generation of NOx fumes.
- All of the organizations that have a stake in the outcome of the project will be updated on the project at the same interval currently in place for the rest of the site.

SCHEDULE

The current project was initiated in January 1994. The basic design is complete and construction has started. To meet the ambitious schedule, laboratory chemical bench testing; corrective and preventive maintenance; implementation of Conduct of Operations principles; preparation of the Safety Analysis Report, the Operations Health and Safety Plan, and operational procedures; and training of operations personnel are being conducted concurrent with the transfer pipe construction and processing system upgrade.

After completion of the transfer pipe construction, ten weeks will be required to install the new pumps, check engineering controls and certify the system and operators. Final certification consists of an Operational Readiness Review (ORR) administered by FERMCO, followed by a Department of Energy ORR.

The current project schedule is outlined below.

EVENT	EARLY START	EARLY COMPLETION
Basic Design	Jan 1994 (A)	Mar 28 (A)
Construction	Apr 18, 1994 (A)	Oct 31, 1994
Pump Installation, System & Operator Certification	Aug 15, 1994 (S)	Oct 1, 1994 (S)
FERMCO ORR	Nov 1, 1994 (S)	Dec 2, 1994 (S)
DOE ORR	Nov 15, 1994 (S)	Jan 6, 1995 (S)
DOE Startup Approval		Jan 16, 1995 (S)
Neutralization	Jan 16, 1995 (S)	Jul 95

UNH Neutralization operations will commence two weeks after the DOE ORR Assessment is complete and "DOE approval to start up" has been received. Weather permitting, the neutralization processing has an estimated six months duration. Should winter conditions be extreme, the processing could extend for an additional three months, until October 1995.

PROJECT PHASES

Design and Construction (Jan, 1994 - Oct 31, 1994)

The Project basic design phase is complete. Construction of the piping has begun. The piping is being field routed and will utilize existing pipe racks. The pipe will be sloped to prevent any pockets where the UNH could settle in the lines. The design is simple and consists of the following:

- A single (3", 304LSS) welded Transfer Header from each UNH storage tank area to the Neutralization tanks located inside the Refinery Digestion Building (Plant 2/3) and a Transfer Header from the Neutralization Tanks to the Waste Water Treatment Plant (Plant 8).
- Full-port valves will be installed at key locations along the header. Piping will be arranged so that all valves and flange connections are located within permanent or temporary secondary containment areas. Drain valves will be installed on either side of isolation valves for sampling or flushing.
- Two new, portable, skid-mounted progressive cavity pumps will be used to pump the UNH from the individual storage tanks to one of two Neutralization Tanks. The pump suction will be connected through the top of each tank with temporary hard piping (3", 304L SS), using braided stainless steel flex hoses for final fit-ups. The pump discharges will be connected to the main transfer header at each of the valved points in turn through temporarily installed hard piping, again using braided stainless steel flex hoses for final fit-ups. A recirculation line from the pump to the source is available to improve tank agitation.
- Instrumentation for pump controls will be installed on a local skid-mounted panel. It includes pump speed control and speed indication, flow and total flow, start and stop switches, and run lights. Additionally, each tank will have level and temperature instrumentation.

- Neutralization tanks F1-25 and F1-26 will each have a new progressive cavity discharge pump installed to transfer neutralized UNH slurry to Plant 8 for filtration. A recirculation line will be installed from each pump discharge back to its corresponding tank to augment tank mixing. These recirculation lines will be installed so that the solution is returned to the tank below liquid level. New instrumentation for Tanks F1-25 and F1-26 includes level indication/alarm and temperature indication at three different levels within the tank. Flow meters will be installed to measure the flow of recycled or process water for dilution. Temperature indication for the process water will also be provided. Flow out of each tank will be controlled by adjusting pump speed, and both instantaneous and total flow readouts will be provided. Position indicator switches will be installed on acid and water input valves and output valves of each tank. These switches provide interlock controls to the pump controller so that UNH is not transferred to the Waste Water System.
- Wastewater Plant (Plant 8) feed tanks, F43-203 and F43-203A, will be provided with new level indication instrumentation and alarms. A new progressive cavity slurry discharge pump will be installed to transfer neutralized UNH to the existing East and West EIMCO filters. A new overflow line in the filter basin will be installed, with a level sensor that will stop the transfer pump if the line becomes clogged. Flow will be automatically calculated from the pump speed to provide both instantaneous and total flow readouts. All instrumentation will be mounted on a new local panel within Plant 8.
- In addition to the existing storage and processing tanks, other available equipment and systems that will be used in the neutralization process include the process water system for tank rinsing and dilution, tank agitators, secondary containment systems, and the existing Plant 8 East-West Eimco filter system. Also, the FEMP wastewater treatment and discharge systems will be used to dispose of the filtrate.

Laboratory Bench Scale Testing (Jan, 1994 - Jun 30, 1994)

The contents of each tank will be analyzed to produce an individualized processing plan. Those plans will be verified by bench scale testing. The processing plans are being designed to:

- UNH solutions will not be heated to reduce the potential for generation of NOx emissions

- Minimize addition of precipitating chemicals
- Ensure optimum solids filterability
- Produce a filtered product that is not a hazardous waste
- Produce a filtrate that is not a hazardous waste and that can be discharged from the site in compliance with the existing FEMP NPDES permit

Neutralization Process Tank Preparation (Apr, 1994 - Jun 30, 1994)

Both of the designated Neutralization tanks (F1-26 & F1-25) presently contain UNH solutions (\approx 1,450 and 13,000 gallons, respectively). The 1,450 gallons of solution in Tank F1-26 will be transferred to nearby (\approx 25 feet away) Tank F1-2. Tank F1-2 will be inspected, repaired and hydrotested in preparation for this use. Following UNH transfer from F1-26 to F1-2, Tank F1-26 will be flushed, cleaned, inspected, repaired, instrumented and hydrotested. A separate work plan has been developed for this scope of work.

This transfer of UNH requires specific procedures, training, qualification, and DOE-FN approval to proceed. Each of these activities has been addressed in the project plan and schedule.

Shipment of Legacy Waste to Nevada Test Site (NTS) (Apr, 1994 - Jul 30, 1994)

There are 501 drums of legacy waste from the earlier UNH Neutralization proof of process testing stored at the FEMP. This waste is considered comparable to the type of waste that will be produced by the present UNH Neutralization Project. To verify that the waste meets DOT shipping regulations and NTS acceptance conditions, the previous analysis of the drum contents is being verified using an approved random survey sample technique. FERMCO plans to ship this legacy waste to NTS in July, 1994 to lead the way for shipment of the additional waste material to be generated by the UNH Neutralization Project.

Final Safety Analysis Report Preparation and Approval (Jan, 1994 - Oct 20, 1994)

A preliminary Hazard Analysis has determined that the UNH Neutralization Project is a Hazard Category 3 Restart. The Safety Analysis Report addresses the work environment, dilution, neutralization, and precipitation of the UNH solutions currently stored in 19 stainless steel tanks. This includes:

- Connection of new piping systems to UNH storage tanks
- Transfer of the UNH solution and rinses from the UNH storage tanks to Building 2A for dilution, neutralization, and precipitation
- Dilution, neutralization, and precipitation operations
- Transfer of the precipitated uranium slurry to Plant 8
- Filtration, packaging, and staging operations in Plant 8
- System maintenance activities after start-up
- The 50% design successfully passed a fatal flaw analysis performed by an independent Engineering Analysis and Consulting Service.
- HAZOP analysis of the final design through extensive scrutiny to ensure design soundness and identify procedure requirements for worker safety and system operability

Training and Qualification (Jul, 1994 - Oct 31, 1994)

Project managers, supervisors, maintenance, support personnel and operators will receive extensive classroom and field training and formal qualification. Specific project training and qualification will include the Final Safety Analysis Report, Health & Safety Plan, operating procedures, emergency procedures, system design, and practical system operation.

Equipment Checkouts, Testing, Procedure Verification, and Hands on Training/Qualification (Sept 1, 1994 - Oct 31, 1994)

To ensure that the system meets design and safe operating criteria the system and operators require extensive certification. The certification will include:

- Instrumentation, alarms, interlocks and engineering

controls component checkouts

- Maintenance procedures verification
- Chemistry process and chemical handling verification
- Procedure verification
- Integrated system testing
- Operator certification
- Emergency procedure training

Operational Readiness Review (Nov 1, 1994 - Dec 2, 1994)

The first review of the UNH Neutralization Project will be an Operational Readiness Review (ORR) conducted by an independent team (not directly involved in the design or operation of the project) comprised of FERMCO and/or subcontractor personnel. This FERMCO ORR will review the entire project to verify that the activity will be operated in conformance with applicable DOE Orders and regulatory requirements. The review will verify that adequate training and qualification programs, procedures, and other controls are in place to assure that the project can proceed safely. The ORR meets the requirements of DOE Order 5480.31. The ORR will be conducted in accordance with a detailed ORR Implementation Plan based on a DOE approved Plan of Action to ensure that specifications, design parameters, regulatory requirements, and other prerequisites have been met. The ORR will be documented in a final report which will include findings with corrective action plans and recommendations for improvement.

The FERMCO ORR will be followed by a second ORR conducted by an independent team of Department of Energy (DOE) personnel. The purpose of the DOE ORR is to verify their readiness to manage the project and to assure the FERMCO ORR was complete, comprehensive, and conducted in accordance with DOE Order 5480.31, "Startup and Restart of DOE Nuclear Facilities".

Processing UNH (Jan 16, 1995 - Jul, 1995)

Processing

- After a tank has been emptied of Uranyl Nitrate, the tank will be rinsed with filtrate water. Upon emptying and rinsing of a UNH storage tank, the pump skid piping will be disconnected from that tank, moved, and reconnected to another tank in the same area. After all tanks in an

area are emptied and rinsed, the pump skid will be relocated to the next area of tanks to be processed. At this point, any portions of the main transfer header piping which are no longer required in the process, will be decontaminated, decommissioned, and abandoned in place or dismantled and removed. In all cases, the pump skid will be located within a secondary containment area (permanent or temporary).

- Neutralization tanks F1-25 and F1-26 located in the digestion building (Plant 2/3) will be used to dilute the UNH with process water or recycled filtrate from Plant 8 to control the temperature rise during neutralization and uranium precipitation. The temperature rise during neutralization will be controlled to minimize formation of NOx during UNH processing. A scrubber will be installed on the tank vents that will draw a slight vacuum on the tanks and scrub the off-gas to preclude the release of NOx to the environment.
- Magnesium hydroxide slurry will be introduced into tanks F1-25 and F1-26 to neutralize the UNH solution. A new metering pump will be installed in the line to transfer the slurry to Tanks F1-25 and F1-26. A pH monitoring and recording system will control the caustic unloading pump, which will shut off when the desired pH is reached. This approach optimizes the amount of material required for neutralization and precipitation. Level sensors to be installed in the two tanks will shut off all input pumps on high level.
- The slurry containing the precipitated product will be transferred to Plant 8 for filtration on the EIMCO rotary vacuum filters and drumming in 55 gal. drums.
- The drums of filtered product will be sampled and the drums prepared for shipment to the Nevada Test Site.