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Mr. James A. Saric, Remedial Project Manager
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Region V, SR-6J
77 West Jackson Boulevard
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DOE-0257-03

Mr. Tom Schneider, Project Manager
Ohio Environmental Protection Agency
401 East 5th Street
Dayton, Ohio 45402-2911

Dear Mr. Saric and Mr. Schneider:

PROBLEM IDENTIFICATION AND PATH FORWARD FOR TREATMENT ISSUES AT THE ADVANCED WASTE WATER TREATMENT SYSTEM PHASE II

The purpose of this letter is to inform the United States Environmental Protection Agency (USEPA) and Ohio Environmental Protection Agency (OEPA) of several modifications to the existing waste water treatment programs. The Fernald Closure Project (FCP) plans on implementing these modifications to address operational issues related to Phase II of the Advanced Waste Water Treatment (AWWT) System. The AWWT Phase II has experienced a degradation in effluent quality relative to uranium concentration over the past year making these changes necessary to help ensure continued compliance with the DOE-FCP's obligations under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Operable Unit 5 Record of Decision, while implementing groundwater remediation efforts to the maximum extent possible. These issues and the specific modifications described herein were discussed in the March 5, 2003 meeting between DOE-FCP, OEPA, USEPA and Fluor Fernald, Inc.

The Phase II system uranium removal efficiency has been deteriorating to unacceptable levels over the course of the past year. Investigations to date point to two factors. First, due to higher concentrations of uranium in waste waters, two to three times more uranium were loaded onto the Phase II resins in 2002 compared to immediately preceding years. With the higher influent uranium concentrations to Phase II, the uranium loaded at a faster rate than in previous years causing effluent uranium concentrations from the lag vessels to

exceed their target concentration faster than in previous years. The second potential factor identified is the increase in Total Dissolved Solids (TDS) in the Biosurge Lagoon (BSL) water in the form of the following ions:

- Nitrates - the nitrate content of Waste Pits Remedial Action Project (WPRAP) discharge waters has doubled so that it now exceeds 1300 ppm nitrate (NO_3) ions.
- Sulfates - the current concentration range from about 150 to 175 ppm. These concentrations may be due to a significant increase in sulfates from the On-Site Disposal Facility (OSDF), particularly since Cells 4 and 5 have come on line. This increased sulfate concentration, combined with sulfates from the use of aluminum sulfate (alum) in the AWWT treatment process, has contributed to the problems associated with the Phase II system (alum is added to the influent as the precipitant in the Phase I and Phase II clarifiers).
- Chlorides - Chlorides are currently running over 300 ppm in BSL water. Additionally, the regeneration of ion exchange resin using the saturated sodium chloride regenerant solution has added chlorides to the Phase II series vessels as a result of the introduction (bleeding) of the regeneration filtrate into the Phase II system for processing.

Based on research and discussions with the resin manufacturer, Dow Inc., there has not been a specified upper limit on the concentrations of these ions above which treatment degradation occurs. However, a rule-of-thumb is that a level of TDS (sum of all above anions plus their associated cations) above 1000 ppm begins to affect ion exchange resin performance relative to uranium removal due to these ions competing with uranium for sites on the resin. In support of this assertion, data from our past studies of the regeneration eluate have indicated that a level of chlorides in the influent of 500 to 1000 ppm will begin to cause the ion exchange system to desorb rather than adsorb uranium. The more the chloride concentration is above 500 to 1000 ppm, the greater the concentration of desorbed uranium. Specific effects from other ions are still not fully known, but are currently being investigated.

Recent operational experience has indicated an improvement in Phase II performance when a constant blend of Biosurge lagoon water and groundwater is fed to the Phase II system. This combination reduces the overall concentration of the ions mentioned above leading to improved uranium removal performance. This theory is also supported by the relative good performance of the Phase II system when processing only groundwater.

In order to fully implement this blending approach, it is necessary to divert two waste streams away from the Biosurge lagoon. This diversion allows a reduced hydraulic load on the Biosurge lagoon so that a continual blending of the Biosurge lagoon water with groundwater can be performed without seeing an ever increasing inventory in the Biosurge lagoon.

The diversions necessary are:

- Diversion of the Waste Pit Area Runoff Control Sump to the Storm Water Retention Basin (SWRB) utilizing the Alternative Remedial Action Subcontracting Approach (ARASA) Basin re-route pipeline.
- Diversion of the Waste Pit Project Storm Water Management Pond to the SWRB (If treatment of this water is required based on uranium concentration. Currently, when the uranium concentration of this water is less than 30 ppb it is discharged directly to Paddys Run.)

These diversions are appropriate, as the pedigree of these waters are storm water runoff. Neither of these basins is used to collect process waste waters from pit excavation or drying operations. Additionally, there is no known organic contamination in these waters such that treatment through Phase II, containing activated carbon absorption, would be necessary.

The FCP believes the additional hydraulic loading on the SWRB can be effectively managed by maintaining, to the extent possible, the SWRB at low levels consistent with the current philosophy in the Operations and Maintenance Master Plan (OMMP) for operating the SWRB. These changes, once approved, will need to be reflected in the next revision of the OMMP.

Additional enhancements involve:

- Reroute the eluate from the Phase II system to the Phase I system. The infrastructure needed to accomplish this diversion is in place and operational. This diversion has already been implemented.
- Shut down process area sewage lift station during storms when the equalization tank at the Sewage Treatment Plant (STP) is full. The sewage lift station will be placed back into operation when the STP has had time to recover from the contributing storm event.

As discussed in the March 5, 2003 meeting, after the implementation and evaluation of these enhancements to determine their effectiveness, a significant revision to the OMMP will be required to refine the operational strategy again for all treatment systems and groundwater pumping facilities.

If you have any questions regarding the issues described or the path forward on the modification of the OMMP, please contact Robert Janke at (513) 648-3204.

Sincerely,

Johnny Reising

FCP:R.J. Janke

Johnny W. Reising
Fernald Remedial Action
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