



STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DOE OVERSIGHT DIVISION
761 EMORY VALLEY ROAD
OAK RIDGE, TENNESSEE 37830-7072

September 16, 2014

Mr. John Michael Japp
DOE FFA Project Manager
P.O. Box 2001
Oak Ridge TN 37831-8540

Dear Mr. Japp

TDEC Comment Letter

Sampling and Analysis Plan/Quality Assurance Project Plan for Environmental Monitoring at the Environmental Management Waste Management Facility, Oak Ridge, Tennessee (UCOR-4156/R2) and Environmental Management Waste Management Facility (EMWMF) Operations Plan, Oak Ridge, Tennessee (UCOR-4135/ R2)

The Tennessee Department of Environment and Conservation, DOE Oversight Division has reviewed the above referenced documents pursuant to the Federal Facility Agreement for the Oak Ridge Reservation.

The following comments are relevant to the review of *Sampling and Analysis Plan/Quality Assurance Project Plan for Environmental Monitoring at the Environmental Management Waste Management Facility, Oak Ridge, Tennessee (UCOR-4156/R2)*.

General Comments:

1. The SAP/QAPP proposes substantial reductions in the monitoring previously performed at the EMWMF. The State suggests monitoring as previously required be continued. However, the State is not opposed to reducing the number of radionuclides monitored to those radionuclides the more mobile (e.g., uranium isotopes, strontium-90, Technitium-99, tritium, carbon-14, iodine-129). The specific suite of radionuclides and associated data quality objectives requires further discussion. The State does not agree to the use of gross alpha and beta analysis as a screening mechanism to prompt the above analysis, for reasons previously discussed with DOE and UCOR personnel on 08/07/2014. Among these:

- Gross analysis does not have the sensitivity to capture the concentration of *low-energy* alpha and beta emitters at the levels of interest in detection/performance monitoring. The more mobile radionuclides tend to be low energy beta emitters (e.g., tritium, technitium-99, carbon-14, and iodine-129).

- The evaporation technique for the method of gross alpha and beta analysis (EPA 900) does not accommodate those radionuclides that potentially are volatile as nitrates at 105 °C or those radionuclides that may be volatile, which again applies to tritium, iodine, carbon and technetium.
- Gross analysis cannot distinguish the radionuclides of interest from naturally occurring radionuclides (NORM). Consequently, this analysis would not effectively support the objectives of performance monitoring as described in DOE Order M 435.1-1 IV R nor necessarily provide an early warning of releases of radionuclides from the disposal unit before they leave the site boundary, as required by TDEC 1200-2-11-.17(4)(c)).
- While EPA 900 is approved for alpha emitters and mid to high range beta emitters, dissolved and suspended solids in unfiltered samples can be a significant limiting factor.
- As stated in DOE's Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance (DOE, 1991): "*Gross alpha and beta measurements should not be used to characterize a sample. Sample characterization should be done using radionuclide-specific analysis.*"

2. The SAP/QAPP appears to have based all detection monitoring on RCRA general groundwater monitoring requirements and transitioning from quarterly monitoring to semiannual monitoring at closed RCRA facilities at Y-12. The EMWMF is primarily a Low Level Waste Facility operating under the authority of CERCLA and is therefore subject to associated ARARS governing such facilities, as well as DOE Orders regulating low level waste disposal where more prescriptive or restrictive.

- In general, the SAP/QAPP fails to give consideration to the requirements of State Radiological Regulations that are ARARS and provisions of DOE Orders that address monitoring of all media. For example, TDEC 1200-2-11-.17(4)(c) provides: "*During site construction and operation, the licensee shall maintain a monitoring program, including a monitoring system. The monitoring system must be capable of providing early warning of releases of radionuclides from the disposal unit before they leave the site boundary.*" In addition, DOE Order M 435.1-1 Section IV R expands on this requirement and introduces the concepts of performance monitoring and maintenance of the performance assessment and composite analysis, on which the waste acceptance are based. While the State regulations and DOE Orders may not be as prescriptive as the RCRA requirements; the objectives are clear and need to be taken into consideration and integrated into the EMWMF monitoring programs.
- The State does not agree that the transition to semi-annual monitoring as proposed in the SAP/QAPP is equally protective of human health and the environment as quarterly monitoring nor does it seem likely to provide a monitoring system capable of providing an early warning of releases of radionuclides or satisfy the monitoring requirements of DOE Order M 435.1-1. Given the challenges presented by the hydrological conditions at the EMWMF, quarterly monitoring of the wells and surface water should continue and more frequent monitoring of the underdrain be considered, as it provides a direct pathway for the rapid transport of contaminants from the facility to Bear Creek.

3. There are at two contingency action plans that should be carried over from the Environmental Monitoring Plan that was initially provided as an attachment to the *Remedial Design Report for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee* (DOE/OR/01-1873&D2/A1/R2. Both were agreed upon by FFA parties.

The Geologic Buffer/Groundwater Level Contingent Action Plan: The Groundwater Monitoring Contingent Action Plan was developed to address State and EPA concerns with the shallow groundwater table at the location and protect the integrity of the liner should the water table rise. It outlines the requirements for monitoring the groundwater levels and details the actions to be taken should the groundwater levels be measured within the required ten-foot buffer beneath the facility, also agreed upon by FFA parties.

The plan has two tiers. The first aimed at defining and resolving problems early to avoid compromising the liner requires increased monitoring (if groundwater is measured within ten feet of the liner) and installation of additional piezometer to acquire more accurate data (if the incursion lasts for two consecutive months). The second tier requires immediate action, if groundwater is measured within five feet of the liner for two consecutive months. In such a case, the plan requires: all available data to be used to determine options to protect the liner; DOE present an Engineering Feasibility Plan to FFA parties within 180 days; and implementation of the action(s) agreed upon by the FFA parties. The plan has been evoked on two occasions. The first resulting in the EMWMF underdrain: a mitigative action whose long-term effectiveness remains uncertain. The second as a consequence of groundwater elevations reported for the PP-01 piezometer, which continues to be assessed.

The Groundwater Contingency Action Plan: The Groundwater Contingency Action Plan was structured similarly to recommendations in NUREG 1388, although elements of the plan need to be revised to incorporate goals of performance monitoring and the protection of water resources as described in DOE Order M 435.1-1 and associated guidance. The plan has two tiers: The first is based on a concentration of radionuclides or chemicals above which an investigation is required (i.e., the threshold values). The investigation is aimed at verifying the data and taking necessary actions early to prevent the spread of contamination and/or mitigative actions as determined by FFA parties. The second level is the concentration of radionuclides or chemicals that would exceed regulatory requirements/ARARs. In this case, the action level was based on the performance objective in TDEC 1200-2-11-.16(2), which limits releases from LLW disposal to 25 mrem/year from all pathways.

The threshold values were to be based on the background concentrations established during the baseline monitoring. However, the quality of data produced during the effort was not of adequate quality to approximate background levels for many radionuclides. In particular, the background for fission and activation products were orders magnitude higher than what would be expected for a clean site (i.e., very near zero). The problem was exacerbated by the statistical treatment of the radiological results to calculate the UTL-95 that were to be used as the threshold values. For example, the background for strontium-90 was reported at 4.13 pCi/L and the UCL-95 at 27,840 pCi/L or 3,480 times the drinking water standard and thousands of orders of magnitude above what would reasonably be expected to be background at a clean site. To allow the project to

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proceed, it was subsequently agreed to use proxy values for some of the radionuclides temporarily and a true baseline be established over the following year. As the proxy values continue to be used that apparently has never been accomplished.

- It is the commenter's understanding, UCOR is in the process of assessing historical results for this purpose and to investigate anomalies in the results. The threshold values need to be discussed in light of UCOR's findings and the actions levels revised to reflect the objectives of detection and performance monitoring in DOE Order M 435.1-1 IV R and the requirements of CERCLA and DOE Orders to protect water resources.

Specific Comments

1. Page 1 Paragraph 1: *"This document is the Sampling and Analysis Plan (SAP)/Quality Assurance Project Plan (QAPP) for environmental monitoring at the Environmental Management Waste Management Facility (EMWMF). The QAPP for this document is the Quality Assurance Project Plan for the Water Resources Restoration Program (UCOR-4049/R1) which contains the up-to-date references for the sampling procedures. This SAP/QAPP is included as Appendix C of the Remedial Action Work Plan for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee (DOE/OR/01-1874&D2). Requirements presented in this SAP/QAPP supersede the requirements presented in the Environmental Management Waste Management Facility (EMWMF) Environmental Monitoring Plan (UCOR-4001) that was initially provided as an attachment to the Remedial Design Report for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee (DOE/OR/01-1873&D2/A1/R2)."*

- The above is not clear as to the status of this SAP/QAPP. Based on a conversation with DOE and UCOR representatives on 08/07/2014, it was the commenter understanding this SAP/QAPP is a secondary document, which does not require approval of FFA parties and has already been implemented. However, the above suggests it is an appendix to the Remedial Action Work Plan, which would make it a primary document and subject to approval of FFA parties. Please clarify.
- Is the EMP that was included as an attachment to the Remedial Design Report for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee (DOE/OR/01-1873&D2/A1/R2) the only EMP or SAP/QAPP that is currently approved as a primary document? If so, does it not then have primacy over secondary or lesser documents?

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2. Page 1, Paragraph 4: *“Concurrent implementation of these programs provides data used to demonstrate and document compliance with applicable or relevant and appropriate requirements (ARARs) specified in the above-referenced ROD. Other monitoring requirements and objectives are specified in related CERCLA decision documents, such as the Remedial Action Work Plan for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee (DOE/OR/01-1874&D2).”*

DOE Orders should be included in the above.

3. Page 3 Table 1. Summary of sampling and analysis requirements for environmental monitoring at EMWME. For detection monitoring, the State would prefer to see additional analysis of the more highly mobile radionuclides. This additional information would aid in trend analysis much better than just gross alpha and beta. The exceedance trigger of 15 and 50 pCi/L could miss identifying early problems.

4. Page 11 Paragraph 1: *“Sampling and analysis requirements for Detection Monitoring at the EMWME (Table 1) comply with RCRA ARARs (per Table B.1) for **operating** hazardous waste landfills and, as outlined in the following subsections, address groundwater and surface water.”* Does RCRA not require quarterly groundwater monitoring for *operating* Hazardous Waste Landfills?

5. Page 11 Paragraph 4 Sampling Frequency. Table B.5 states in the column under “Performance Measures:” *“Sampling frequencies are based on site characteristics and data obtained. Sampling frequencies are based on site characteristics and evaluation of monitoring data obtained.”* If sampling frequencies are based on performance goals, then leakage rates in the leak detection system should be a trigger for additional sampling.

6. Page 12 Paragraph 7. *“Screening samples for isotopic analyses based on gross alpha and gross beta activity is consistent with requirements for ongoing RCRA detection monitoring performed elsewhere at Y-12, and is a proven and effective best management practice.”* For trend analysis all highly mobile constituents should be monitored to determine if problems are developing. Mobile metals and organics are being monitored, but low levels of radionuclides will be missed with the proposed screening criteria.

7. Page 18, Section 6.4.1 Contact Water: Contact water pond sampling methodology is described briefly here, and the generic QAPP for sampling of surface water is referenced. However, sampling of contact water has a quite different purpose from the other environmental monitoring described in this document. Rather than detection monitoring or ambient monitoring, these results are used to decide whether the water should be discharged or treated. Given the unique purpose of the sampling, and given that water in the contact water ponds may have a relatively long residence time and undergo enough stratification to make representative sampling problematic, a more detailed description of the sampling methodology and all requirements used to assure that the sample is representative.

8. Page B-6 Appendix B Table B.2: Monitoring of contact water prior to release or treatment for radiological constituents is listed as a BMP in Appendix B, Table B.2, but release criteria in Appendix C, Table 2b RAD Extended List are based on DOE Order 5400.5.

The following comments are relevant to the review of the *Environmental Management Waste Management Facility (EMWMF) Operations Plan, Oak Ridge, Tennessee (UCOR-4135/R2)*.

Specific Comments

1. Page 7 Section 2.2 Waste Acceptance Criteria. A more general reference to DOE/OR/01-1909&D3 as the document which specifies the responsibility of the various parties involved in waste acceptance is in order here. The WAC Attainment Team is responsible for reviewing and approving profiles, but does not have sole responsibility for certifying that the waste will meet WAC.

A potentially significant shortcoming in waste acceptance requirements at the EMWMF is the lack of any minimum qualifications for those personnel responsible for WAC Attainment. For example, it would seem reasonable to require that waste profiles for radioactive waste be reviewed by either a Certified Health Physicist or a licensed professional engineer with a degree in nuclear or radiological engineering prior to approval. Furthermore, the current practice of delegating WAC Attainment decisions to the DOE prime contractor, also responsible for EMWMF operations and typically, characterization of wastes generated through response actions, is not optimal for promotion of independent reviews of characterization data. Strengthening of the waste acceptance operations at EMWMF could possibly be accomplished by stipulating some minimum qualifications for and clarifying the roles of the WAC Attainment Team members, as well as requiring that the Team be made more directly accountable to the FFA parties. TDEC understands that implementation of these suggestions, or similar changes, would require further negotiation between the FFA parties and changes to DOE/OR/01-1909&D3 as well as the current RAWP.

2. Page 8 Section 2.4 PWAC Variance Requests. Certain blanket variances to the physical WAC such as EMWMF-BV-07-02 and EMWMF-BV-11-01 have resulted in use of rock placed over the protective layer at the base of the cell to reduce chances of damage to geo-membranes below the leachate collection system via puncture by small diameter pipe, rebar, and other sharp objects. More aggressive size reduction of such objects could also prevent geo-membrane punctures without the loss of disposal capacity that results from the use of rip-rap. Can DOE estimate the total disposal cell volume lost due to rip-rap use?

3. Page 21 Section 4.5.1.1 Notification Leakage Rate and Action Leakage Rate: *“Inspection and monitoring of the LDS will occur each work day to collect leakage rate data for all active disposal cells.”* The information should be reported for all disposal cells that hold water. The information can tell if there are problems with the cells even before waste is emplaced and would help with any trend analysis on leakage rates.

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4. Page 22 Section 4.5.1.4 Response for Leakage Rates Less Than the ALR, pg. 22. To be proactive, there should be a threshold value between the NRL and ALR that prompt additional leak detection monitoring.

5. Page 22 Section 4.6.1 Equipment Decontamination Waste. A portion of decontamination water generated or placed back in the cell during rainy periods is likely to mix with and be managed as contact water.

6. Page 23 Section 4.7 Contingency Planning for Potentially Contaminated Water Management. EMWMF operations staff and subcontractors have developed some computational tools that should be of significant benefit in forecasting volumes of water to be managed. A brief description of these tools might be appropriate in this section.

Questions or comments concerning the contents of this letter should be directed to Howard Crabtree at the above address or by phone at (865) 481-0995.

Sincerely



Roger B. Petrie, FFA Manager
Environmental Restoration Program

xc Patricia Halsey, DOE
Jeff Crane, EPA
John Glenn, DOE