STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
Division of Remediation - Oak Ridge
761 Emory Valley Road
Oak Ridge, Tennessee 37830

January 25, 2018

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

Dear Mr. Japp

TDEC Comments
Sampling and Analysis Plan/Quality Assurance Project Plan for Environmental Monitoring at the Environmental Management Waste Management Facility, Oak Ridge Tennessee (DOE/OR/01-2734&D1/R1, UCOR-4156/R4).

The Tennessee Department of Environment and Conservation has reviewed the above-referenced document pursuant to the Federal Facility Agreement for the Oak Ridge Reservation (ORR). The Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP) outlines proposed requirements for environmental monitoring at the Environmental Management Waste Management Facility (EMWMF).

The EMWMF is an on-site disposal facility that provides for disposal of radioactive, hazardous, and mixed wastes from Comprehensive Environmental Response, Compensation, and Liability Act remedial activities conducted on the ORR and associated sites. Environmental monitoring activities at the facility are extremely important to ensuring the facility functions in compliance with applicable or relevant and appropriate requirements (ARARs) and in a manner protective of the environment and residents of the state of Tennessee.

TDEC comments on this version of the SAP/QAPP are attached. The comments must be satisfactorily addressed in a revised document.

Questions or comments concerning the enclosed comments should be directed to Beth Rowan at the address above or by phone at (615) 532-0928.

Sincerely

Michael Hyman for

Randy Young
FFA Manager

Enclosure

xc Patricia Halsey, DOE
Aaron White, DOE
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Tennessee Department of Environment and Conservation (TDEC) Division of Remediation Comments on Sampling and Analysis Plan/Quality Assurance Project Plan for Environmental Monitoring at the Environmental Management Waste Management Facility, Oak Ridge Tennessee (DOE/OR/01-2734&D1/R1, UCOR-4156/R4).

General Comments

1. EMWMF has discharged water to Bear Creek with mercury at concentrations above the limit defined by the 0.051 micrograms per liter (µg/L) [51-nanograms-per-liter (ng/L)] recreational ambient water quality criterion (AWQC) for organisms in TDEC Rule 0400-40-03-.03(4). Mercury concentrations have been increasing in fish (Rockbass) downstream. However, many mercury results from 2015 and 2016 are unusable for demonstrating compliance with this limit because detection limits for the sediment pond and underdrain samples were elevated above 0.051 µg/L. This problem is documented in TDEC's October 25, 2017 letter to DOE (*Explanation of Significant Differences for the Record of Decision for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee; DOE/OR/01-2322&D1*).

TDEC again asserts the importance of having processes in place to prevent future releases of mercury to Bear Creek. As stated in the October 25, 2017 letter, it is TDEC's expectation that implementation of the revised SAP will produce data of sufficient quality, including adequate detection limits, to support meaningful evaluation of landfill wastewater discharges. As part of the landfill wastewater discharge evaluation, future annual Phased Construction Completion Reports (PCCRs) for EMWMF will be expected to evaluate wastewater discharge for compliance with all Bear Creek designated uses specified in TDEC rule 0400-40-04-.09. This evaluation requires mercury detection limits at or below the 0.051-µg/L limit for Bear Creek.

DOE must clarify how mercury project quantitation limits (PQLs) listed in the SAP support measuring mercury concentrations at or below the 0.051-µg/L limit Bear Creek limit, and correct the document, given the following discrepancies:

- Key locations for assessing impacts to Bear Creek are those where water is discharged: EMW-VWEIR (surface water) and EMW-VWUNDERDRAIN (groundwater).

- Table 5 indicates the baseline/evaluation value for mercury is 0.12 µg/L (0.00012 mg/L), which is 2.4 times the Bear Creek limit, and the PQL is 0.1 µg/L (0.0001 mg/L) or 2.0 times the Bear Creek limit.

- Tables 1b, 2d, 3e, and 4f in Appendix C indicate the mercury PQL (using SW846 Method 7470A or EPA Method 1631) for surface water and groundwater is 0.2 µg/L, which is 3.9 times the Bear Creek limit. A lower PQL of 0.020 µg/L (also using EPA Method 1631) is listed for contact water and leachate. This value would be adequate if it was applied to water discharged at EMW-VWEIR and EMW-VWUNDERDRAIN.

- Table 7d in Appendix C indicates the mercury PQL (using SW846 Method 7470A) for storm water and weekly composite samples is 0.09 µg/L, which is 1.8 times the Bear Creek limit.

Per EPA Region 4, laboratory analyses must employ the most sensitive method shown in 40 CFR 136 "*capable of detecting and measuring the pollutants at, or below, the applicable water quality criteria or permit limits*", in accordance 40 CFR Part 136, or 40 CFR Chapter I, subchapters N and O, as amended in 2014. For mercury, the approved methods are EPA Method 245.7 (detection level 0.0018 µg/L [1.8 ng/L]) or EPA Method 1631 (detection level 0.0005 µg/L [0.5 ng/L]).

If the EMWMF ROD does not include applicable or relevant and appropriate requirements (ARARs) for protection of downstream surface water use, then a ROD amendment may be necessary.

Specific Comments

1. **Page xi, Acronyms:** the acronym 'GW' might be better indicated as 'Groundwater Well' rather than 'Ground Well.'

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 ROD* ***and in this SAP/QAPP***."

   Please, *delete "and in this SAP/QAPP"* in the cited sentence. While it may not be the intent, the statement as written indicates that an ARAR would need to be included in both the EMWMF ROD ***and*** the SAP/QAPP to be a consideration in the monitoring program. However, not all ARARs relative to monitoring at the EMWMF are cited in the

plan. Notably, TDEC 1200-2-11-.17(4)(c) which requires a monitoring program, including a monitoring system, that is capable of providing early warning of releases of radionuclides from the disposal unit before they leave the site boundary. Such a system includes monitoring of groundwater, surface waters, and other media as necessary to identify releases expeditiously, so appropriate mitigative measures can be taken before contaminants spread to off-site locations. DOE Order M 435.1-1 Section IV.R expands on this requirement and ties the monitoring to maintenance of the performance assessment and composite analysis, on which the waste acceptance criteria (WAC) and disposal authorization are based. All ARARs and the substantive requirements of the DOE Orders require consideration in the developing the EMWMF monitoring programs.

3. **Page 3, Table 1, last row**: The table indicates that the sampling at the EMW-VWEIR will occur monthly, but the purpose is unclear as contact water is not released on monthly schedule. If this is the case, some of the monthly sampling at the EMW-VWEIR will consist of monitoring predominately storm water releases. What is the purpose of the frequent sampling and analysis at the WEIR? Sampling for compliance with 25 mrem/yr limit for releases of contact water needs to be further discussed.

4. **Section 2, page 7**: The text refers to Figure A.2 showing locations for Detection Monitoring and Operations Monitoring at the EMWMF. However, Figure A.2 is illegible. The figure should be regenerated to be readable and usable by the reader.

5. **Section 2, page 8, paragraphs 2 and 5**: The text includes reference to the use of "...EPA-approved technically equivalent procedures" for analytical methods/procedures or for operating procedures specified in the QAPP. If deviations from the analytical methods listed in the SAP/QAPP are used, or alternate procedures from those in the QAPP are utilized, such variations should be noted in the PCCR documenting the annual monitoring activities.

6. **Section 4, Data Management and Assessment**: This section describes quality control steps for laboratory analytical data. What steps are implemented to provide some level of quality control on field data that are collected (i.e., check for validity, transcription errors, or omissions)?

7. **Section 5.1, page 13**: No monitoring wells exist in close proximity to the west side of the facility, along-strike from the disposal cells. While surface water sampling location EMWNT-05 supports monitoring for constituents migrating through shallow groundwater that reaches surface water, it does not provide information on releases moving through groundwater along-strike from the interior areas of the disposal cells. Existing well GW-372 (included in the list of sampling locations on page 13) is nosituated close enough to the EMWMF to be used for detection monitoring of groundwater.

8. **Section 5.1, page 14**, last paragraph: While the list of key COCs is provided in Table 3, Table B.5 refers to the key COCs but does not list them. Is reference to Table B.5 listing key COCs intended, or is Table B.5 referenced for some other reason?

9. **Section 6, page 23, first bullet**: DOE needs to add in the text that potentiometric surface monitoring is being conducted not only to monitor the position of the water table relative to the geobuffer, but also to determine groundwater flow directions at the facility.

10. **Section 6.1, page 24 and Figure 2, page 25:** The exact process for determining the need for an engineering feasibility plan in response to potentiometric surface levels observed to be in the geobuffer is ambiguous. According to text on page 24 (3rd paragraph), output from the numerical modeling will be used to identify areas within the EMWMF footprint with groundwater incursions into the geobuffer. However, text in the next-to-last paragraph on the page indicates that measurements from the pneumatic piezometers will trigger completion of the Engineering Feasibility Plan. Additionally, text in the last paragraph indicates an Engineering Feasibility Plan has been written; is this a new plan yet to be submitted to the regulators, or does this refer to the plan prepared in 2013 (UCOR-4517)?

11. **Section 6, Figure 2, page 25:** Does the 'quarterly groundwater level monitoring under EMWMF cells' in the first box refer to readings made from the pneumatic piezometers? If so, it would be helpful to refer to the pneumatic piezometers in the box text.

12. **Section 6.4.2 Leachate, page 27, Characterization Sampling:** "*Laboratory analyses will be performed for the specified key COCs (see Table B.5 and Appendix C). As with contact water, an extended list of COCs will be analyzed annually, and the complete COC list will be analyzed every two years. Until leachate discharge is approved, samples will be analyzed for additional analytes to verify compliance with the receiving facility waste acceptance criteria.*

    While TDEC has agreed that the list of radionuclides to be analyzed in the detection monitoring program can be reduced to a set of the more mobile key radionuclides, that does not necessarily hold true for the release of contact water or leachate to the environment should DOE's proposal be approved. In both cases, a more diverse concentration of radionuclides would be expected at much higher concentrations. TDEC is willing to discuss the issue, but it seems very unlikely that TDEC would accept less characterization of wastewaters to be released to the environment, than the Process Waste Treatment Plant would accept for the treatment of wastewater.

13. **Section 6, Figure 2, page 25:** The flow chart shown in this figure does not include using output from the numerical model for determining the need for an Engineering Feasibility Study, though reliance on the numerical model output is mentioned in the text (see previous comment above). Also, the figure is incomplete without some actions/decisions to determine if there is a need to implement corrective actions.

14. **Section 7.0, page 33, last sentence**: The importance of this sampling plan being able to effectively evaluate the protectiveness of waste disposal on the ORR cannot be understated. The last sentence should be modified to clearly convey that the SAP/QAPP is being treated as a primary document as defined in the Oak Ridge Federal Facility Agreement and any updates or revisions to the SAP/QAPP will require approval of all FFA parties.

15. **Appendix A, Figure A.4**: The symbol for the 'V Weir Contact Water Discharge Sample Location' listed in the legend is not evident on the map.

16. **Appendix B, page B-14**, notes on Table B.5: Add description for B-GW. Also, is EMW-VWUNDERDRAIN equivalent to EMW_VWEIR and Underdrain (listed on Table 2, page 7)?

17. **Appendix C**: Please confirm that the PQLs listed are appropriate to meet the applicable regulatory standard for each constituent/medium. As described in our general comment, mercury is one such constituent with PQL issues; we need to ensure that similar issues do not exist with other constituents.

18. **Appendix E**: Information in this appendix should be replaced with the final piezometer installation details since the installation of the piezometers is now complete. Similarly, Table E.1 can be updated to reflect as-constructed details.

Enclosure

TDEC Comment Letter October 25, 2017

Differences for the Record of Decision for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee (DOE/OR/01-2322&D1)Explanation of Significant

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
Division of Remediation - Oak Ridge
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October 25, 2017

Mr. John Michael Japp
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Dear Mr. Japp

Explanation of Significant Differences for the Record of Decision for the Disposal of Oak Ridge Reservation Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Waste, Oak Ridge, Tennessee (DOE/OR/01-2322&D1)

The Tennessee Department of Environment and Conservation (TDEC), Division of Remediation Oak Ridge Office (DoR-ORO), has reviewed the above referenced submittal pursuant to the Federal Facility Agreement (FFA) for the Oak Ridge Reservation (ORR). The subject document is not approved pending resolution of the issues associated with the *Focused Feasibility Study (FFS) for Water Management for the Disposal of CERCLA Waste on the Oak Ridge Reservation*.

Background

Over the history of the Environmental Management Waste Management Facility (EMWMF) operations, effective water management has been a challenge at the site. In 2014, the FFA parties agreed to evaluate options for the management of leachate and contact water for CERCLA waste disposed on the ORR at both the EMWMF and the proposed Environmental Management Disposal Facility (EMDF). In July 2015, Department of Energy (DOE) submitted the initial version of the *Focused Feasibility Study (FFS) for Water Management for the Disposal of CERCLA Waste on the Oak Ridge Reservation (DOE/OR/01-2664&D1)*. The tri-parties followed the FFA comment and comment response process with a D2 FFS being submitted to EPA and TDEC in February 2016. TDEC was not satisfied DOE had addressed comments regarding water management,

ARAR's, and discharge limits. Therefore, TDEC's comment letter on the D2 FFS (the latest letter by TDEC on the FFS dated March 31, 2016) placed the document in informal dispute. Issues concerning ARAR's and discharge limits are still unresolved. The FFS has not been finalized nor has an alternate path forward been established.

Current Status

In a letter dated July 14, 2017, DOE submitted an extension request on the subject ESD for water management to both EPA and TDEC. The request acknowledged the need *"to resolve issues associated with radiological discharge limits and ARAR's"* and further went on to describe the strategy of continuing communication of project status with the project team and schedule meetings to discuss the radiological discharge limits. Because of TDEC's position that adequate progress has not been made to resolve the issues associated with the FFS that were identified on both the D1 and D2 drafts of the FFS in FY16, TDEC denied DOE's extension request (letter dated July 31, 2017) by citing the failure of DOE's proposed strategy in reaching comment resolution. Instead, the TDEC letter stated that the extension request would be re-evaluated when *"a more detailed project implementation strategy is developed"* and a definitive schedule is incorporated into the extension request for resolution of unresolved issues. In lieu of modifying the request for extension as suggested by TDEC, DOE submitted the D1 ESD to EPA and TDEC on August 31, 2017. Again, because the supporting FFS is a prerequisite for the subject ESD, progress must be made to finalize the study.

Related Issues

On August 8, 2017, TDEC submitted to DOE an audit report to document findings and recommendations regarding DOE Waste Lot 301.4. TDEC's concerns again centered around potential discharges of landfill wastewater to Bear Creek. WL 301.4 contained material from the West End Mercury Area (WEMA) at Y-12 and was disposed at the EMWMF on September 29, 2016.

The audit was initiated to determine whether DOE addressed mercury-bearing waste in accordance with restrictions stated in TDEC's letter dated June 13, 2016. Specifically, that letter restricted mercury-bearing waste disposal in the EMWMF until DOE provides assurance it will not discharge landfill wastewater to Bear Creek with a mercury concentration that exceeds the 51-nanograms-per-liter (ng/L) recreational ambient water quality criterion (AWQC) for organisms in TDEC Rule 0400-40-03-.03(4).

After receiving TDEC's audit report, DOE's Oak Ridge Office of Environmental Management (OREM) questioned whether DOE had discharged wastewater from EMWMF with mercury concentrations above the 51-ng/L limit. TDEC evaluated data available in OREIS as a follow-up to DOE's inquiry but notes that 2017 data for EMWMF

contact water, leachate, underdrain, and the sediment pond are not available yet. Furthermore, much of the data in OREIS for 2014 and before is unusable to determine whether the discharge affected mercury concentrations in fish downstream due to detection limits. Detection limits for mercury for the sediment pond and underdrain were above 51 ng/L during 2015 and 2016. Even with the detection limit issues, discharges greater than 51 ng/L have been detected in contact water. Specifically, mercury concentrations exceeded the limit for 9.0% (7) of the 78 usable contact water results (including 2 filtered samples), as follows.

DATE	SAMPLE	FILTERED	RESULT (ng/L)
12-16-2008	EMWCW1237	No	150J
12-29-2008	EMWCW1257	No	69J
01-08-2009	EMWCW1277	No	61J
07-14-2014	EMWCW4886	YES	59.3
08-13-2014	EMWCW4922	YES	72
04-08-2015	EMWCW5162	No	134
04-16-2015	EMWCW5173	No	60.9

Partially due to the identification of issues in the FFS, the FFA parties are engaged in an ongoing effort to improve the Sampling and Analysis Plan (SAP) for the EMWMF detection monitoring program. It is TDEC's expectation that implementation of the revised SAP will produce data of sufficient quality, including adequate detection limits, to support meaningful evaluation of landfill wastewater discharges. As part of the landfill wastewater discharge evaluation, future annual Phased Construction Completion Reports (PCCRs) for EMWMF would evaluate wastewater discharge for compliance with all Bear Creek designated uses specified in TDEC rule 0400-40-04-.09. Irrespective of whether the waste lot in question released mercury to Bear Creek, TDEC asserts the importance of having processes in place to prevent future releases of mercury to Bear Creek.

Bear Creek and downstream surface water are classified for recreation (e.g. fishing and fish consumption) and other uses and impaired water quality in Bear Creek is not a new issue. Bear Creek continues to be included on TDEC's Division of Water Resources 2017 proposed final year 2016 303(d) list due to mercury and other pollutants. Figure 4.14 of the 2015 Oak Ridge Department of Energy Remediation Effectiveness Report, shown below, graphically represents mercury concentrations in fish (Rockbass at BCK 3.3 and Redbreast at BCK 9.9) downstream of EMWMF in Bear Creek over time. HCK 20.6 is a background reach used for comparing mercury concentrations in Rockbass.

This graph indicates something changed after 2009 causing an increase in concentrations of mercury in downstream Rockbass. The data show that four of eleven samples (36%) collected since 2009 are greater than or equal to the highest levels observed since 1990. This trend is disturbing in light of the fact that DOE proposes to construct another disposal facility in Bear Creek Valley that would potentially receive additional mercury bearing waste from demolition of facilities in the West End Mercury Area (WEMA) at Y-12.

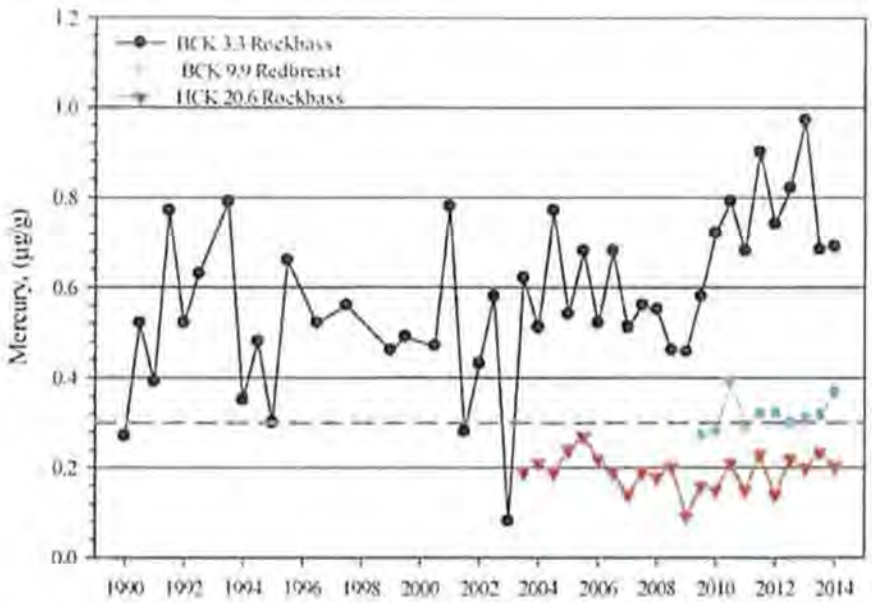

Figure 4.14. Mean concentrations of mercury in rockbass from BCK 3.3, redbreast sunfish from BCK 9.9, and rockbass from the Hinds Creek reference site (HCK 20.6) 1990 – 2014.

Dashed line indicates EPA recommended AWQC for mercury (0.3 µg/g in fish)

The FFS supporting the subject ESD, associated meetings, and several TDEC comment letters dealt with the topic of mercury pollution in Bear Creek. Resolution of the informal dispute regarding the FFS for water management at EMWMF and the proposed EMDF will result in modifications of the EMWMF Record of Decision (ROD) which should document the necessary processes for ensured protection of Bear Creek and more effective management of landfill water.

Further, on March 22, 2016, DOE Oak Ridge Environmental Management provided answers to the Oak Ridge City Council and Mayor on waste disposal in Bear Creek Valley and options for additional waste disposal. During that question and answer period, Mayor Gooch asked if DOE intended to dispose of mercury in Bear Creek Valley. DOE responded that disposal of mercury would be done in accordance with land disposal restrictions (LDRs), and DOE will not dispose of mercury in a manner which allows the mercury to leach. The City wanted public input regarding how mercury waste is addressed, and DOE discussed the application of a CERCLA decision process with public comment.

To demonstrate the seriousness of the commitment made on March 22, 2016 to the City of Oak Ridge, DOE must provide assurance the landfill will not discharge landfill wastewater to Bear Creek with a mercury concentration that exceeds the 51-nanograms-per-liter (ng/L). The commitment must show that DOE does not intend to build a treatment plant at OF 200 to reduce mercury pollution in East Fork Poplar Creek at Y-12 only to move material further down the valley and possibly release mercury to the surface waters of Bear Creek.

Path Forward

TDEC will not be issuing specific comments on the subject ESD at this time because of the unresolved issues of the disputed FFS that will likely result in changes to the ESD. Given that mercury has been and may be continuing to be discharged above allowable limits and mercury accumulation in fish from Bear Creek shows an increasing trend as opposed to decreasing, it is TDEC's position that DOE develop the following:

1) A detailed schedule for resolution of issues associated with water management at the EMWMF and proposed EMDF; and

2) Discharge limits for chemical and radiological contaminants that are consistent with CERCLA, DOE Orders and ARARs; and

3) A plan to identify and correct discharges of mercury above allowable limits.

The mercury discharge issue discussed above, along with other EMWMF water management issues previously identified by TDEC (e.g. valve closures, water levels, detection monitoring, etc.) are symptomatic as to the need of DOE to develop a comprehensive water management strategy for EMWMF and other proposed disposal and cleanup actions on the DOE ORR. TDEC encourages DOE to schedule meetings with the FFA parties to begin resolution of the issues associated with the incomplete FFS.

Questions or comments concerning the contents of this letter should be directed to Howard Crabtree at (865) 220-6571.

Sincerely

Randy C. Young,
FFA Manager

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