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

August 20, 2015

Mr. John Michael Japp
DOE FFA Project Manager
P.O. Box 2001
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Dear Mr. Japp

TDEC Comment Letter
Focused Feasibility Study for Water Management for the Disposal of CERCLA Waste on the Oak Ridge Reservation, Oak Ridge, Tennessee
DOE/OR/01-2664&D1
April 2015

The Tennessee Department of Environment and Conservation, DOE Oversight Office, has reviewed the above referenced submittal pursuant to the Federal Facility Agreement for the Oak Ridge Reservation. The following comments are relevant to our review.

General Comments

1. DOE has taken the position (page 19 of the FFS) that state regulations governing the disposal of Low Level Radioactive Waste (LLRW) are not relevant and appropriate to the disposal of DOE radioactive wastes on the ORR; therefore the state rules should not be considered Applicable or Relevant and Appropriate Requirements (ARARs). While DOE states it is obligated to abide by DOE Orders, it is also DOE's position that the orders should not be cited as requirements or to be considered guidance (TBC) in Records of Decision and other CERCLA agreements.

It is TDEC's position that the substantive requirements of TDEC 0400-20-11, *Licensing Requirements for Land Disposal of Radioactive Waste*, are relevant and appropriate to the management and disposal of LLRW authorized by the FFA parties under CERCLA and intrinsic to the CERCLA process. While TDEC agrees DOE Orders are not ARARs as defined in CERCLA, the orders nevertheless represent DOE's regulatory responsibilities under the Atomic Energy Act, as well as its obligation to maintain the facilities in perpetuity. Consequently, the orders require consideration in Records of Decision and associated CERCLA documentation to the extent that they form a basis for more stringent requirements than the TDEC rules.

2. The *Focused Feasibility Study (FFS) for Water Management for the Disposal of CERCLA Waste on the Oak Ridge Reservation, Oak Ridge, Tennessee* (DOE/OR/01-2664&D1) was prepared as a companion document to the *Remedial Investigation/Feasibility Study* [RI/FS] *for Comprehensive Environmental Response, Compensation, and Liability Act Oak Ridge Reservation Waste Disposal, Oak Ridge, TN* (DOE/OR/01-2535&03). Alternatives were evaluated assuming treatment of landfill wastewater from both the current disposal facility and a future facility identified as the preferred alternative in the RI/FS. However, the RI/FS failed to provide a sufficient range of alternatives or an adequate technical and regulatory basis for the preferred alternative. On-site waste disposal alternatives could also include landfills with smaller footprints, smaller operating cells, and sites not adjacent to the current facility. Consequently, the alternatives evaluated in this FFS should be modified and expanded to assure the key parameters such as the quantity of water generated and the cost of pumping or trucking water to treatment reflect additional scenarios that might be used for future disposal of CERCLA waste. One approach might be to evaluate alternatives based on the assumption of another EMWMF-like facility adjacent to the current facility as one bounding scenario and evaluate treatment for wastewater generated only at the EMWMF as another bounding scenario. The FFS presents some analysis of the former case, and the latter would be less complicated by uncertainty, particularly with regard to the volume and characteristics of the wastewater to be treated.

3. While both the EMWMF and the proposed EMDF are primarily Low Level Radioactive Waste (LLRW) Disposal Facilities, neither TDEC Rules or DOE Orders regulating releases of radionuclides are addressed in the FFS. The FFS also fails to assess the risk posed by the radionuclides in landfill effluents relative to CERCLA requirements. In order to evaluate alternatives for the management of effluents, the FFS must first establish release criteria for all contaminants of concern, including radionuclides. Considerations should include:

- the limits imposed by the performance objectives of TDEC rules and DOE Orders;
- the protectiveness required under CERCLA's risk range of 10^{-4} to 10^{-6}; and
- the contribution to exceedances of remedial goals at BCK 9.2 in the *Record of Decision for the Phase 1 Activities in Bear Creek Valley* (DOE/OR/01-1750&D4).

The expectation is the most restrictive requirements would apply

4. During the stream assessment process in the watershed cycle, TDEC's Division of Water Resources (DWR) uses DOE data from DOE's Remediation Effectiveness Reports (RER) as the best data source on water quality conditions. The RER data persistently indicate that Bear Creek suffers from significant pollutant loadings upstream and downstream of the proposed CERCLA waste disposal facility. Because of the significant adverse impact on Bear Creek from these upstream discharges, it will be difficult if not impossible to measure any improvements downstream of this facility no matter what remedial option is chosen. TDEC stresses that DOE must pursue corrective actions in the headwaters of the watershed.

5. While the FFS does take a comprehensive look at the analytical data generated by wastewater monitoring at the EMWMF since 2005, the document does not try to anticipate contaminants of concern for future candidate waste streams. Some information on the hazardous and radiological characteristics of future waste would allow for a more rigorous evaluation of alternatives. Some preliminary characterization data for candidate waste should have been gathered prior to drafting both this document and DOE/OR/01-2535&03 the *Remedial Investigation/Feasibility Study*

(RI/FS) for Comprehensive Environmental Response, Compensation, and Liability Act Oak Ridge Reservation Waste Disposal, Oak Ridge, TN.

6. The document remains at high level when discussing alternatives. A more thorough analysis of alternatives would include more information on treatment efficiency and cost for portable treatment units that might be deployed at the disposal facility and units that might be used for pre-treatment prior to treatment at PWTP or outfall 200. Treatment efficiency for various unit operations and process that could remove metals, radionuclides, and organic compounds that screening has shown would likely require treatment would contribute to an informed choice between alternatives.

7. This document is one of the first CERCLA documents to explicitly incorporate the Tennessee Anti-degradation Statement as an Applicable or Relevant and Appropriate Requirement. Specific comments relevant to the Anti-degradation Statement may be useful for future projects, as a number of streams have been impacted by Oak Ridge Operations. Limits placed on concentrations of mercury and cadmium in effluents from the on-site waste disposal facilities that discharge to Bear Creek or its tributaries required to demonstrate compliance with the anti-degradation requirements listed in Appendix D of the document should be discussed and evaluated under alternative 2. Whether or not the quantity of water requiring treatment is over-estimated in this FFS, other information provided in the document indicates that some component of on-site treatment or pre-treatment will be necessary, unless wastewater volume is minimized to allow for treatment at WETF without modification of the facility.

Specific Comments

1. **Page IX, Paragraph 1:** *"The purpose of this focused feasibility study is to evaluate options and recommend a solution for the management of leachate and contact water (landfill water) generated from the on-site disposal of Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) waste from the Oak Ridge Reservation and associated sites."*

   The term *"landfill water"* as used throughout the FFS is inappropriate when addressing leachate and associated effluents. The regulatory term would be landfill wastewater as defined in 40 CFR 445.2 (i.e., all wastewater associated with, or produced by the landfilling activities including, but not limited to leachate, contaminated storm water, and contact washwater from washing trucks, equipment, and surface areas which have come in direct contact with waste at the facility).

2. **Page 3, Section 1.3 Site Description:** The site description correctly states that **Bear Creek has unavailable capacity** for nitrates, cadmium, mercury, PCBs and uranium. This statement is supported by data from the DOE 2014 Remedial Effectiveness Report (RER).

   - Nitrates: refers to the TDEC 2012 303(d) list;

     TDEC's Division of Water Resource's 2014 proposed final version of the 303(d) list retains this impairment. See page 88 at http://www.tn.gov/assets/entities/environment/attachments/2014-proposed-final-303d-list.pdf.

The 2014 RER report agrees; Section 4.2.1.2.1.2 states that the headwaters portion of Bear Creek, known as Zone 3 and the receiving stream for EMWMF/EMDF, had ~40 mg/l since 2009.

- Cadmium: = 2.4 ug/l (WQC is 0.25) – page 4-23 reporting 2013 data
- Mercury: ~ 0.8 ppm, indicates fish tissue values increasing - page 4-40, Figure 4.14.
- PCBs: ~ 0.6 ppm, indicates fish tissue declining - page 4-40, Fig 4.15.
- Uranium: indicates uranium flux increasing at headwaters.

Further, the state reported Biological Integrity data in the 2014 Environmental Monitoring Report showing Bear Creek's aquatic community is impaired in waters of this stream segment (with a score of 18 versus reference stream score of 32). See Table 7, pg. 44 at http://www.tn.gov/assets/entities/environment/attachments/rem_2014-environmental-monitoring-report.pdf.

To be clear, there are no data to explicitly attribute the cause of this impaired biology to either the ongoing discharges from EMWMF or to upstream exceedances.

3. **Page 7 Section 1.6: EMWMF and EMDF Landfill Water Management:** *"The scope of this focused feasibility study is the management of EMWMF and EMDF* ***landfill water****. The definitions of leachate and contact water follow (UCOR-4135/R1, Environmental Management Waste Management Facility (EMWMF) Operation Plan, Oak Ridge, Tennessee), and Fig. 5 illustrates how landfill water is managed:*

- *Contact water—Contact water is precipitation that falls into an active EMWMF cell, comes in direct contact with waste, is pumped to the contact water tanks from the liner, and does not infiltrate into the leachate collection system. Because contact water contacts the waste, it potentially is contaminated.*
- *Leachate—Leachate is precipitation that falls into an active cell, infiltrates through the waste, infiltrates through the liner, is collected by the leachate collection system, and is pumped to the leachate storage tanks."*

As defined in TDEC 0400-11-01: "*Leachate means a liquid that has passed through or emerged from solid waste and contains soluble, suspended, or miscible materials removed from such waste.*" RCRA (40 CFR 260.10) provides a similar definition: "*Leachate means any liquid, including any suspended components in the liquid that has percolated through or drained from hazardous waste.*" Based on the definitions contained in these rules and elsewhere, leachate is not precipitation; although, precipitation can become leachate, if it passes through, drains from, or mixes with waste or waste constituents. The definitions of leachate in the rules do not limit the term to a location or provide that a liquid that drains from the waste must infiltrate through the liner ***and*** be collected by the leachate collection system ***and*** be pumped to leachate storage tanks to become leachate. As a large part of the regulations focus on minimizing the generation of leachate and controlling its release and migration, redefining what leachate is undermines the intent of the law and / or regulations.

The definition of contact water provided in the text cited in the FFS, basically describes leachate and / or contaminated storm water as defined in TDEC 0400-11-01 and RCRA 40CFR445.2(b) respectively. Leachate, contaminated storm water, and non-contaminated

storm water are all defined in the regulations with specific regulatory requirements addressing each. Please use the regulatory definitions and nomenclature provided in the rules, to do otherwise only serves to confuse the issues.

4. **Page 9, Paragraph 1:** *"The EMDF approach to landfill water collection may differ from EMWMF. A low permeability material in the catchment areas (referred to as "windows") is being considered to allow contact water to percolate quickly into the leachate collection system, thus allowing collection and management as one stream."*

   Was the intent to say "high permeability" rather than "*low permeability*"?

5. **Page 12, Table 2:** The table appears to accurately capture numeric AWQC for Fish & Aquatic Life and Recreation use classifications, including hardness-adjusted metals, as well as the narrative criteria, especially the biological integrity provisions and anti-degradation requirements.

   TDEC suggest the contaminant names shown in this table should either indicate "total" or "dissolved", not both. A "total" sample represents an unfiltered sample whereby all the constituents, including settleable/suspended/dissolved, are analyzed. A "dissolved" sample represents a filtered sample, whereby the contaminant attached to particulate matter is physically separated from the portion in solution (i.e., in a dissolved state).

   This total-versus-dissolved issue may affect the treatability for mercury. It matters for the Alternative 4 Treatment at PWTC-ORNL whether the contaminants are present as particulate-based or not, since the facility stopped using the multi-media filters last year. At present the Waste Acceptance Criteria for PWTC for Total Suspended Solids is 1,000 mg/l.

   The proposed EMDF wastewater's composition of total-versus-dissolved mercury has not been defined, only modelled to date. Although this wastewater will experience settling in the EMWMF ponds, additional solids removal at either EMDF or PWTC may be required and should be evaluated in the FFS.

6. **Page 17, Paragraph 4:** *"Since the scope of this focused feasibility study is limited to evaluating alternatives for the management of landfill water, the remedial action objective is to: • Meet AWQC."*

   It is not clear why the FFS would limit its remedial objectives to meeting AWQC, when the EMWMF and the proposed EMDF are primarily Low Level Radioactive Waste Disposal Facilities. In order to evaluate alternatives for the management of effluents, the FFS needs to establish release criteria for all contaminants of concern, including radionuclides.

   Other remedial actions that should be considered include:

   - Prevent further degradation of water resources in Bear Creek Valley.
   - Meet the dose limits imposed by the performance objectives for LLRW Disposal Facilities by TDEC 0400-20-11-.16(2) and DOE Orders M 435.1-1 IV.P.(1)(a).
   - Meet the Superfund risk based levels imposed by CERCLA.

The DOE Order requirements may be met indirectly for some alternatives as they are presumably incorporated into waste acceptance criteria for the existing treatment facilities, but they play a role in the establishing the basis for implementing all alternatives.

7. **Pages 17 through 18, "Applicable or Relevant and Appropriate Requirements" and Table D.1 Page D-33 "ARARs and TBC guidance..."**

   Under Rule 0400-40-03-.06, the Tennessee Antidegradation Statement is an Applicable Requirement. Due to the existing WQ conditions in Bear Creek which cause the designation as "Unavailable Waters", any future discharge of nitrates mercury, PCBs, cadmium, or pesticides must not cause measurable degradation. Measurable means not detectable by chemical-specific laboratory methods having sufficient sensitivity during monitoring activities used to document compliance with ARARs.

8. **Page 19, Paragraphs 2 and 5:** *"DOE Orders are neither ARARs nor TBC guidance. DOE Orders are not ARARs because they are not promulgated". ....."DOE Orders...issued under the Atomic Energy Act [that] have the same force for DOE facilities or 'within DOE' as does a regulation."*

   The FFS seems to argue on one hand that DOE Orders are equivalent to state and federal regulations and on the other they are not. TDEC agrees DOE Orders are not ARARs as defined in CERCLA. Nevertheless, the orders represent DOE's responsibilities under the Atomic Energy Act and therefore need to be considered in CERCLA actions, as has been the case historically on the ORR and at other DOE facilities. While the FFS makes the statement that DOE Orders are not TBC, it never explains why that would be the case in this instance or why on the ORR and not at other facilities in the DOE complex. For example, the Record of Decision for the Portsmouth CERCLA on-site disposal facility signed in June of this year included DOE Orders as TBC and Ohio LLRW regulations as ARARs. Is there any other CERCLA LLRW Disposal Facility authorized by FFA parties under CERCLA authority where this DOE position has been accepted?

9. **Page 19, Paragraph 5:** *"NRC regulations and the TDEC rule equivalents (NRC/TDEC) are also not relevant and appropriate based on the preamble to the final rule establishing the NCP (55 FR 8744, March 8, 1990): "EPA believes it is reasonable to consider the existence of waivers, exemptions, and variances under other laws because generally there are environmental or technical reasons for such provisions...These provisions are generally incorporated into national regulations because there are specific circumstances where compliance with a requirement may be inappropriate for technical reasons or unnecessary to protect human health and the environment." Since DOE is specifically exempted from NRC regulations and the TDEC rule equivalents and has equivalent requirements in its internal Orders, it is per EPA's own language, inappropriate and unnecessary to cite these as relevant and appropriate requirements."*

   TDEC does not understand how the language in the preamble of the NCP cited here is used to conclude that the state equivalents of NRC regulations (Tennessee Rules, Chapters 400-20-04 through 400-20-12) are not relevant and appropriate. In any case, Tennessee Rule 0400-40-05-.04, paragraph (1), subparagraph (b), which is not an NRC equivalent, prohibits

the permitting of *"the discharge of radioactive waste into waters (though this does not prohibit radioactivity from authorized discharges provided such discharge is in accordance with state water quality standards)."*

The definition of "radioactive waste" in Tennessee water rules (see paragraph 3 of Rule 0400-45-06-.02) refers to Chapter 0400-20-05:

"Radioactive waste" means any waste which contains radioactive material in concentrations which exceed those listed in Rule 0400-20-05-.161, Schedule RHS 8-30, Table II, Column 2. This state prohibition is more restrictive then the analogous federal requirement under 40 CFR 122.4, which prohibits the discharge of radioactive warfare agents or high-level radioactive waste.

10. **Page. 19, ARARs, Last Paragraph:** *"TDEC regulations allow for a "locational running average..."*

This is an incorrect application of rules from the Safe Drinking Water Act to a discharge to surface waters. Although TDEC Division of Water Resources uses an annual running average for nutrients in NPDES permits, it's only for continuous discharges of non-toxic substances, and only based on loading, not concentration.

Compliance must be based on testing in a comprehensive monitoring plan to ensure that all discharges meet the WQC identified in Table D.1., and for toxics, based on reasonable potential analysis for toxicity, using the daily maximum and monthly average concentrations of treated effluent to address acute and chronic toxicity, respectively.

For continuously treated discharges to Bear Creek, representative sampling can be provided on a weekly or monthly basis. The reporting frequency can be reviewed following development of a statistically valid analytical data set. For batch treated discharges to Bear Creek, sampling of each release from individual treated wastewater ponds or tanks is required.

11. **Page 27, Alternative 2, Managed Discharge, Last Paragraph:** For the proposed combined discharge, *"The quality of the landfill water will be determined on the basis of a running annual average."*

In order to comply with the Tennessee Antidegradation Statement, the proposed discharge of combined wastewater from EMWMF and EDMF for Alternative 2 must meet no detectable concentrations of these pollutants – mercury, cadmium, PCBs, and nitrates.

See comment 10 regarding the monitoring basis for discharge.

12. **Page 27, Paragraph 5 (last paragraph):** *"This process can be operated on either a batch or continuous basis. Samples will be collected from a continuous, flow proportional sampler during release."*

If managed discharge is to be preserved as an alternative, then additional sampling will need to be performed prior to the release. How and where would continuous sampling be implemented during discharge of batch releases?

13. **Page 32, Paragraph 1:** *"If storm flow above the design storm rates occurs that exceeds the storage capacity, the stormwater will be released through a bypass pipeline without active management. If this occurs, the surrounding streams will also be flowing at high levels, minimizing any potential impacts from this release."*

    This would typically constitute a bypass of treatment as defined under Rule 0400-40-05-.02, paragraph (15) and prohibited, subject to exceptions, under Rule 0400-40-05-.07, subparagraph (2)(l). While these rules apply to permitted facilities, prohibitions on bypass or discharge would appear to be substantive rather than administrative requirements.

14. **Page 32, Alternative 3: Treat at EMWMF/EMDF, 2nd Paragraph:** *"The treatment system will be designed to meet AWQC."*

    As stated above, the treated effluent must be designed to meet no detectable concentrations of mercury or cadmium.

15. **Page 32, Alternative 3, Last Paragraph:** *"...running annual average..."*

    Compliance must be based on testing in a comprehensive monitoring plan to ensure that all discharges meet the WQC identified in Table D.1., and for toxics, based on reasonable potential analysis for toxicity, using the daily maximum and monthly average concentrations of treated effluent to address acute and chronic toxicity, respectively.

16. **Page 33, Alternative 3, Monitoring and Land Use Controls, 2nd Paragraph:** Monitoring of most physical-chemical treatment systems for mercury/cadmium/PCBs/pesticides will require daily analyses during the startup period and shakedown operations, and during development of a routine operating scheme. Influent sampling is always necessary during this time to evaluate treatment system performance. Following that period, weekly sampling may be adequate.

17. **Page 33, Paragraph 4:** *"Operating the treatment system will require trained chemical operators and an operations supervisor to oversee the processing activities."*

    Does this mean a certified operator, as defined and described in TN Rule Chapter 0400-49-01, *Rules Governing Water and Wastewater Operator Certification*?

18. **Page 35, Paragraph 5:** *"The average flow rate is 30 gpm, an 18 gpm increase over the current yearly average for EMWMF leachate volume of approximately 12 gpm."*
    TDEC anticipates the future generation of landfill wastewater will be constrained by changes to the proposed conceptual design of any additional land disposal facility in Bear Creek Valley. Some changes from operational practices that have minimized waste handling costs at the expense of wastewater generation are also anticipated. Thus, an evaluation of alternatives using the average flow generated at the EMWMF may already be a conservative

approach, without the need to increase treatment capacity to 30 gpm /60 gpm. While this change in discharge may not influence the analysis of contaminants of potential concern or the discussion of sampling frequency and protocols, the reduced flow might alter the alternatives analysis.

19. **Page 36, Alternative 4, 2nd Paragraph:** Has DOE estimated the volume of additional water storage at EMWMF, and the resulting residence time in the storage ponds?

20. **Page 36, Alternative 4, 3rd Paragraph *and* Figure 13, PWTC Process Flow Diagram (Page 39):** *"Elevated levels of mercury above the current PWTC [WAC] will require additional pretreatment prior to treatment at the PWTC."*

    This statement acknowledges the issue for solids removal discussed in previous comments.

    Revise Figure 13 to indicate that current PWTC treatment causes flow to bypass the Dual Media Filters.

21. **Page 41, Alternative 4, Documents *and* Page48, Alternative 5, Documents:** Modification of the NPDES permits for ORNL (Alt 4-PWTC) or Y-12 (Alt 5 – WETF) in 2021 may or may not be required, depending on the significance of the change in effluent. Part II of each NPDES permit requires the facility to notify TDEC of Planned Changes.

22. **Page 66, Paragraph 8:** *"The Managed Discharge alternative will be protective of human health and the environment for the batch discharge of landfill water that meets AWQC. Bear Creek already exceeds AWQC for cadmium and mercury (TDEC 2014a). The landfill water from EMWMF may contain cadmium at concentrations above the criterion continuous concentration AWQC, but below the criterion maximum concentration AWQC applicable to batch discharges. To meet AWQC, the release of EMWMF landfill water must be performed on a batch basis only. If the mercury concentration in the proposed EMDF leachate exceeds AWQC, managed discharge will not be protective of human health and the environment and cannot be performed. Therefore, the Managed Discharge alternative will be protective of human health and the environment for the batch discharge of landfill water when AWQC are met prior to batch discharge."*

    TDEC agrees with this conclusion, but emphasizes that environmental protection includes meeting the requirements of the anti-degradation statement as well as AWQC. It would seem that the need to restrict managed discharge to batch operations would complicate the use of this alternative in conjunction with continuous treatment at a treatment facility.

23. **Page 68, Paragraph 8:** *"Construction time is estimated to be approximately one year. Treatment technologies for removal of mercury and cadmium are well demonstrated, reliable, effective, readily available, and easily implemented. If the landfill water composition changes and additional contaminants must be addressed, the treatment system can be modified easily due to its modular design to include the necessary unit operations."*

TDEC does not contest these conclusions, but there is not enough supporting information in the document with regard to availability and cost for small treatment facilities that can effectively remove hazardous and radioactive constituents from wastewater. Since the other alternatives use existing or proposed facilities, where costs and treatment technologies are already established, the need for more detail is primarily in support of alternative 3.

24. **Page 91, Paragraph 3, Last Paragraph):** "*The recommended alternative is a combination of Alternative 2, Managed Discharge, and Alternative 3, Treat at EMWMF/EMDF. Since the landfill water from EMWMF currently meets the AWQC without treatment, Alternative 2, is recommended to be implemented immediately.*"

While managed discharge remains an option at the EMWMF, it is not clear how often landfill wastewater will meet ARARs for anti-degradation requirements. Mercury and cadmium detections occur less than half the time, but with some regularity. Recommending a combination of alternatives as "preferred" may be premature at this point.

25. **Page F-9, Paragraph 1:** "*This same waste determination applies to the landfill water from the Environmental Management Disposal Facility.*"

For any future waste disposal facility for CERCLA generated waste, both waste characteristics and waste acceptance criteria are likely to be different from those at EMWMF. Consequently, this statement is premature.

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

Sincerely

Randy Young
Acting FFA Project Manager

xc Patricia Halsey, DOE
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