



STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Division of Remediation, Oak Ridge Office
761 Emory Valley Road
Oak Ridge, Tennessee 37830

August 29, 2017

Mr. Brian Henry
Portfolio Federal Project Director
Y-12 NSC Projects
Post Office Box 2001
Oak Ridge Tennessee 37831

Re: Audit Report, Tennessee Department of Environment and Conservation (TDEC) Division of Remediation (DoR) Audit of Department of Energy (DOE) Waste Lot 301.4 Disposed at the Environmental Management Waste Management Facility (EMWMF) on September 29, 2016

Dear Mr. Henry,

The Tennessee Department of Environment and Conservation (TDEC) Division of Remediation (DoR) prepared the enclosed report to document findings and recommendations resulting from an audit of Department of Energy (DOE) Waste Lot 301.4. That waste lot contained material from the West End Mercury Area (WEMA) at Y-12 and was disposed at the Environmental Management Waste Management Facility (EMWMF) on September 29, 2016. The audit was initiated to determine how DOE addressed mercury-bearing waste in accordance with restrictions stated in TDEC's letter dated June 13, 2016.

TDEC appreciates DOE's responsiveness during the audit, as well as DOE's commitment to review waste management processes and identify and implement improvements. TDEC also appreciates DOE's offer to present a briefing on the EMWMF waste review process during a forthcoming project team meeting. DOE should hold the briefing by October 30, 2017 and should also present DOE's plans to address the recommendations in the enclosed TDEC report.

Questions or comments concerning the contents of this letter should be directed to Kristof Czartoryski at the above address or by phone at (865) 220-6580.

Sincerely,

A handwritten signature in black ink, appearing to read "Kristof Czartoryski".

Kristof Czartoryski
Federal Facility Agreement Program Manager

cc: John M. Japp, Dave Adler, and Patricia Halsey, DOE
Carl Froede, Connie Jones, and Rich Campbell, EPA
Pete Osborne, SSAB
Amy Fitzgerald, Ron Woody, and Traci Cofer, ORRCA



Department of
**Environment &
Conservation**



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Department of Energy Waste Lot 301.4

Materials Disposed at the Environmental Management
Waste Management Facility (EMWMF)

Tennessee Department of Environment & Conservation

Division of Remediation | Audit Report | August 2017



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DOE Waste Lot 301.4 Disposed at the EMWMF

Introduction

The Tennessee Department of Environment and Conservation (TDEC) Division of Remediation (DoR) audited the U.S. Department of Energy (DOE) waste management operations associated with Waste Lot (WL) 301.4, which was disposed at the Environmental Management Waste Management Facility (EMWMF) on September 29, 2016. DOE's Oak Ridge Office of Environmental Management (OREM) coordinates such operations for all entities on the Oak Ridge Reservation (ORR). This report documents TDEC's findings and recommendations.

Objective

The objective of this audit was to determine whether DOE waste management operations associated with WL 301.4 met the expectation expressed in TDEC's June 13, 2016 letter (Attachment A) restricting 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-ng/L recreational water quality criterion for organisms in TDEC Rule 0400-40-03-.03(4).

Background

On October 11, 2016, TDEC-DoR initiated an audit of WL 301.4, following review of the September 2016 Tennessee Oversight Agreement (TOA) Monthly Scale Report for EMWMF. That report indicated that waste associated with WL 301.4 from the Y-12 National Security Complex (Y-12) West End Mercury Area (WEMA) had been disposed at EMWMF on September 29, 2016. Specifically, the scale report documents disposal of two truckloads of waste associated with WL 301.4, as indicated in the table below.

Date & Time	Waste Lot	Truck Number	Gross Weight (pounds)	Net Weight (pounds)
09/29/2016 13:14	301.4	1147-9505	31,400	3,980
09/29/2016 09:19	301.4	1147-9505	56,600	29,180

The scale report documents the following description for WL 301.4:

"Y-12 Building 9201-5 and 9204-4 legacy material consisting of mechanical equipment and materials removed from inside the structure primarily in the beryllium controlled areas. Material will be encapsulated and/or containerized prior to shipment and disposal."

The audit was initiated to determine if and how DOE addressed the mercury-bearing waste in accordance with TDEC's letter (Attachment A). The June 13, 2016 letter from Steve Goins, Director of TDEC-DoR, to Ed Worth, Director of the DOE Environmental Management Project Management Division, states the following:

"...TDEC is restricting the acceptance in the EMWMF of all mercury-bearing waste until the DOE provides assurance that no discharge would be made of either contact water or leachate to Bear Creek without treatment to meet the effluent concentration of 51 ng/l."

TDEC sent the letter to OREM because the OREM Manager at that time, Sue Cange, stated that OREM is the central coordination point for all DOE entities on the ORR.

Methods and Observations

TDEC-DoR completed the audit through a series of interviews and meetings with EMWMF operations personnel, Waste Acceptance Criteria (WAC) attainment team members, and Upper East Fork Poplar Creek (UEFPC) project team staff. A detailed chronology of events is included in Attachment B, and key events are summarized below.

- In 2010, the U.S. Environmental Protection Agency (EPA) and TDEC approved the Waste Handling Plan (WHP), the sampling and analysis plan (SAP), and the quality assurance project plan (QAPP) for Legacy Material Removal (LMR).
- On January 9, 2013, Federal Facility Agreement (FFA) managers signed a Concurrence Form allowing DOE to dispose at the EMWMF, under WL 301.4 profile Revision 3, pre-demolition equipment/materials from Building 9201-5 characterized in the original project.
- On February 5, 2013, process knowledge (PK) presented in WL 301.4 profile Revision 3 indicated that mercury is a contaminant of concern (COC) for Buildings 9201-5 and 9204-4. DOE characterized the waste using results from 272 samples, which were analyzed for total metals and Toxicity Characteristic Leaching Procedure (TCLP) metals. Mercury was detected in 154 samples, equaling 57% of the samples analyzed, with a maximum concentration of 8.36 mg/kg and UCL-95 of 3.8 mg/kg. Mercury was also

detected in 14 or 5.1% of the TCLP samples, with a maximum concentration of 0.009 mg/L and UCL-95 of 0.004 mg/L.

- On June 13, 2016, TDEC-DoR sent a letter to DOE restricting the disposal of mercury-bearing waste in the EMWMF (Attachment A).
- On September 29, 2016, DOE disposed two truckloads of waste from Buildings 9201-5 and 9204-4 in EMWMF under the WL 301.4 profile.
- On October 11, 2016, TDEC noted the disposal of waste associated with WEMA and initiated this audit.
- Between October 11 and October 17, 2016, TDEC worked with the WAC attainment team to obtain the 2013 Waste Profile Report (Rev. 3) for WL 301.4.
- On October 26, 2016, TDEC raised the WL 301.4 issue with DOE during two EMWMF project team meetings. During both meetings, DOE and contractor personnel responses indicated that TDEC's expectations had not been communicated adequately within DOE's OREM.
- On November 4:
 - OREM provided a copy of TDEC's June 13, 2016 letter to the UEFPC project team.
 - TDEC staff learned that "DOE project managers do not know about the shipments...it appears NNSA [National Nuclear Security Administration] is the party in charge."
- On November 8, 2016, TDEC raised the WL 301.4 issue with DOE-NNSA during an UEFPC project team meeting. Also, TDEC requested a meeting through the portfolio federal project director (FPD) for cleanup at Y-12 to ensure that TDEC has a clear understanding of how the waste was managed and how the TDEC letter factored into OREM waste management decisions.
- On December 5, 2016, DOE and TDEC met to address the following objectives:
 - Ensure a clear understanding of CERCLA waste management;
 - Acquire information regarding DOE's process for assuring that waste disposal at EMWMF does not result in the discharge of landfill wastewater with mercury concentrations greater than 51 ng/l;
 - Learn how OREM waste management decisions address the expectations communicated in the TDEC letter; and
 - Clarify the meaning and intent of TDEC's June 13, 2016 letter.

During that meeting, the portfolio FPD for cleanup at Y-12 stated that upon receipt of TDEC's June 13, 2016 letter, OREM management discussed the letter but did not communicate it down the line, because they concluded the existing waste management process was adequate.

Findings

- By not initiating any technical review or analysis of the existing waste characterization and disposal processes, DOE OREM management did not comply with an official letter from the TDEC-DoR director *"restricting the acceptance in the EMWMF of all mercury-bearing waste until the DOE provides assurance that no discharge would be made of either contact water or leachate to Bear Creek without treatment to meet the effluent concentration of 51 ng/l"*.
- Waste disposal operations continued at the EMWMF without providing requested assurances to TDEC.
- OREM disposed two truckloads (33,160 pounds) of waste from the WEMA at the Y-12 National Security Complex (Y-12) in the EMWMF as part of WL 301.4.
- The UEFPD project team, WAC attainment team, and EMWMF operations staff were unaware of TDEC's letter to OREM (dated June 13, 2016).
- EMWMF operations personnel were not able to provide information regarding WL 301.4. EMWMF staff stated their personnel only review waste lots for physical WAC (pWAC)—i.e., whether landfill equipment can pick it up and handle it. EMWMF operations personnel referred TDEC staff to the members of the WAC attainment team.
- DOE and contractor personnel indicated that OREM did not communicate TDEC's expectations expressed in the June 13, 2016 letter to project teams, the WAC attainment team, or EMWMF operations staff. Personnel on the EMWMF and WAC attainment teams were unaware of the letter.
- It is unclear how DOE assigns and shares accountability for waste disposal among OREM, project teams, the WAC attainment team, and EMWMF operations staff.
- A WHP and associated waste profile may remain active for years without review to determine whether it continues to address current conditions or whether updates are needed to address changing conditions and requirements.

Recommendations and Expectations

- In accordance with TDEC's letter dated June 13, 2016, OREM must provide assurance that EMWMF will not discharge any landfill wastewater (contact water or leachate) to Bear Creek with a mercury concentration that exceeds the 51-ng/L recreational water quality criterion for organisms [TDEC Rule 0400-40-03-.03 (4)].
 - OREM should not rely on a listed waste (D009) determination for mercury, because the limit associated with the land disposal restriction (LDR) is less restrictive than the 51-ng/L mercury limit for Bear Creek.

- OREM must clarify assignments of roles and responsibilities for the disposal of CERCLA generated waste in the EMWMF. OREM should empower EMWMF operational personnel to accept or decline waste lots based on whether those lots are consistent with waste profiles developed by project teams and approved by the WAC attainment team. EMWMF staff should have the responsibility and authority to refuse waste that fails to meet WAC and regulatory requirements. Moreover, they should be able to access and provide the documentation that supports waste disposal in the EMWMF.
- As the central coordinator for all entities on the ORR, OREM must communicate this and all other regulatory expectations regarding CERCLA waste disposal to relevant entities, including project teams, the WAC attainment team, and EMWMF operations staff.
- OREM must work collaboratively with these entities to review waste management processes and implement any necessary improvements that may be identified. During previous audits (e.g., WLS 84.04, 149.04, and 149.10), TDEC recommended the following improvements:
 - OREM should establish an independent verification system to ensure that waste disposed on site meet WAC and other requirements. Most waste accepted at EMWMF is generated by URS/CH2M Oak Ridge, LLC (UCOR) and its subcontractors. It is highly unusual from a QA/QC perspective for the primary waste generator to serve as the auditor for waste acceptance, WAC attainment, and determinations of waste characteristics and volumes. For example the Nevada National Security Site (NNSS) at the Nevada Test Site (NTS) utilizes a program of waste characterization and approval that is audited and enforced by independent on-site contractors to ensure that waste meets the WAC.
 - OREM should consider requiring project teams to document the manner in which they independently verify on-site waste generator shipments to EMWMF before the waste leaves the point of origin.
 - OREM should consider designating a federal staff member to oversee WAC compliance as part of their performance plan tasking to avoid delegating this responsibility to the contractor generating the waste and operating the landfill.
- OREM must review WHPs and waste profiles frequently enough to address changing conditions, including regulatory requirements, and revise those WHPs as appropriate, to maintain protectiveness of landfill operations. In this case, TDEC expected that:
 - TDEC's mercury restrictions would precipitate review of existing WHPs, with generators made aware that any new shipments of mercury-bearing waste need to be reviewed and approved by the WAC attainment team.

- The WAC attainment team would review the WL 301.4 WHP in the context of the TDEC restrictions on mercury disposal and coordinate with the waste generator and EMWMF operations personnel to comply with the restriction.
- EMWMF operations staff would review the WL 301.4 documentation to ascertain the additional waste shipments match the WHP description, review documented WAC attainment approval per the modified WHP, and ascertain that the WHP meets any new requirements of compliance with TDEC's mercury restriction.
- EMWMF operations staff would have the right to reject any waste for which documentation questions arise.
- OREM must develop a process to communicate and coordinate among the ORR entities and with regulatory officials before planned disposals; project team meetings may be useful forums for addressing issues such as TDEC's restrictions/expectations.
- TDEC expects OREM to schedule a presentation of the waste management process, including clear lines of responsibility in WAC attainment process, at a future EMWMF project team meeting. Specifically, DOE should present waste management process improvements that result from the findings and recommendations of this audit.

Path Forward

TDEC looks forward to working with DOE-OREM to implement the recommendations presented in this report and to improve the waste management processes that play such an integral role in the cleanup of legacy contamination on the ORR.

J. Brad Stephenson, Audit Team Leader

Kristof Czartoryski

Curt Myers

Robert Storms

Dr. Sid Jones (retired)

List of Attachments

Attachment A: TDEC Letter Dated June 13, 2016

Attachment B: Waste Lot 301.4 Chronology

Attachment C: Acronyms and Abbreviations

Attachment A
TDEC Letter Dated June 13, 2016

Tennessee Department of Environment and Conservation (TDEC)
Position Regarding the Potential for Further Mercury Impacts
in Bear Creek on the Oak Ridge Reservation



DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF REMEDIATION
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 14th Floor
Nashville, Tennessee 37243

June 13, 2016

Ed Worth, Director
Environmental Management Project Management Division
US Department of Energy
PO Box 2001
Oak Ridge TN 37831

Dear Mr. Worth

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION (TDEC) POSITION REGARDING THE POTENTIAL FOR FURTHER MERCURY IMPACTS IN BEAR CREEK ON THE OAK RIDGE RESERVATION

TDEC has learned of a project for removal of mercury-contaminated equipment from the COLEX process at Building Alpha 5 in the West End Mercury Area. While we understand the current scope of the project is not to dispose of Colex material in the Environmental Management Waste Management Facility (EMWMF); for future reference we feel it is appropriate to identify our position on mercury disposal in EMWMF. TDEC recognizes a significant, near-term issue the Department of Energy (DOE) can encounter, associated with management of any mercury-contaminated waste on the Oak Ridge Reservation.

Since Bear Creek currently receives contaminated inputs from various legacy sites (e.g. Bear Creek Valley Burial Grounds and S-3 Ponds) and from CERCLA waste disposal operations at EMWMF in Bear Creek Valley, the stream is impaired and does not meet the parameters for its water quality classifications. Placement of mercury-bearing waste in the existing EMWMF would inevitably generate landfill wastewater containing mercury and said wastewater would eventually need to be discharged. No discharges should occur without sampling and treatment, as necessary, to meet all the limits. In addition, the WEMA area itself is located on Upper East Fork Poplar Creek, which is also impacted and does not meet water quality classifications.

The wastewater discharge, including both contact water and leachate, to Bear Creek has at times exceeded the recreational use water quality standard, according to DOE's own sampling and records. The TDEC mercury position is further elaborated in our comments to the Water Management FFS dated March 31, 2016. Therefore, TDEC is restricting the acceptance in the EMWMF of all mercury-bearing waste until the DOE provides assurance

that no discharge would be made of either contact water or leachate to Bear Creek without treatment to meet the effluent concentration of 51 ng/l.

DOE's WEMA approach to remove any type of equipment, structural debris, or D&D waste, should be subject to thorough methods of characterization and processing/handling to remove any residual free liquid mercury, as much as technically practicable.

Questions or comments concerning the contents of this letter should be directed to Andy Binford at (615) 532-0911.

Sincerely



Steve Goins
Director, Division of Remediation

Xc: Rich Campbell, EPA
Jeff Crane, EPA
Dave Adler, DOE
Chris Thompson, TDEC
Shari Meghreblian, TDEC
Andy Binford, TDEC
Steven Stout, TDEC
Tisha Calabrese-Benton, TDEC
Pat Flood, TDEC

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Attachment B

Waste Lot 301.4 Chronology

Waste Lot 301.4 Chronology

Environmental Management Waste Management Facility (EMWMF)

2010 Y-12 Waste Handling Plan

- According to the waste profile report (Y-12, 2013), the U.S. Environmental Protection Agency (EPA) and the Tennessee Department of Environment and Conservation (TDEC) approved the Waste Handling Plan (WHP), the sampling and analysis plan (SAP), and the quality assurance project plan (QAPP) for the Legacy Material Removal (LMR).

Reference

Waste Handling Plan for Removal of Legacy Material from Building 9201-5 at the Y-12 National Security Complex, Oak Ridge, Tennessee, DOE/OR/01-2431&D2 (DOE 2010)

December 2012 DOE Request to Expand WL301.4

- In December 2012, the U.S. Department of Energy (DOE) approached the project team and FFA managers with a request to remove and dispose some pre-demolition equipment and materials from Building 9201-5 that were characterized in the original LMR project.

January 9, 2013 Approval (Concurrence Form)

- On January 9, 2013, Federal Facility Agreement (FFA) managers signed a Concurrence Form to allow DOE to dispose at the EMWMF, under WL 301.4 profile Revision 3, some pre-demolition equipment/materials from Building 9201-5 characterized in the original project.

February 5, 2013 Y-12 Waste Profile Report (Rev. 3)

- Waste Lot (WL) 301.4 was an American Recovery and Reinvestment Act of 2009 (ARRA) project approved in 2011 to remove non-processing equipment such as lathes, grinders, and desks from Buildings 9201-5 and 9204-4. The original project was completed in ~2012.
- Process knowledge (PK) indicates that mercury (Hg) is a contaminant of concern (COC) for Buildings 9201-5 and 9204-4.
- DOE characterized the waste using results from 272 samples.
- DOE analyzed all samples for total metals and Toxicity Characteristic Leaching Procedure (TCLP) metals.
- Hg was detected in 154 samples (57%) (max = 8.36 mg/kg and UCL-95 = 3.8 mg/kg) and 14 (5.1%) TCLP samples (max = 0.009 mg/L and UCL-95 = 0.004 mg/L).

Reference

Environmental Management Waste Management Facility Waste Lot Profile 301.4, Revision 3 for Legacy Material Removal from First and Third Floor Beryllium Areas and Remaining Equipment from Building 9201-5, Building 9204-4 Basement and First Floor at the Y-12 National Security Complex, Oak Ridge, Tennessee (RP 920105-F-0005 000 03)

June 13, 2016 TDEC Letter to DOE

- On June 13, 2016, Steve Goins, Director of the TDEC Division of Remediation, sent a letter to Ed Worth, Director of the DOE Environmental Management Project Management Division.

- The subject of the letter is:

Tennessee Department of Environment and Conservation (TDEC) Position Regarding the Potential for Further Mercury Impacts in Bear Creek on the Oak Ridge Reservation

- The letter states, for reasons explained therein, that:

...TDEC is restricting the acceptance in the EMWMF of all mercury-bearing waste until the DOE provides assurance that no discharge would be made of either contact water or leachate to Bear Creek without treatment to meet the effluent concentration of 51 ng/l.

DOE's WEMA approach to remove any type of equipment, structural debris, or D&D waste, should be subject to thorough methods of characterization and processing/handling to remove any residual free liquid mercury, as much as technically practicable.

September 2016 Tennessee Oversight Agreement (TOA) Monthly Scale Report

- The scale report documents disposal of two truckloads of waste under the WL 301.4 profile:

Date Time	Waste Lot	Truck Number	Gross Weight	Net Weight
09/29/2016 13:14	301.4	1147-9505	31,400	3,980
09/29/2016 09:19	301.4	1147-9505	56,600	29,180

- The scale report documents the following description for EMWMF WL 301.4:

Y-12 Building 9201-5 and 9204-4 legacy material consisting of mechanical equipment and materials removed from inside the structure primarily in the beryllium controlled areas. Material will be encapsulated and/or containerized prior to shipment and disposal.

October 2016 TDEC-DoR Reviews TOA Monthly Scale Report and Initiates Evaluation

- On October 3, 2016, TDEC received the monthly scale report for September 2016.
- On October 11, 2016:
 - TDEC (Dr. Sid Jones) reviewed the scale report and noted the disposal of waste associated with WL 301.4 from the West End Mercury Area (WEMA) at Y-12.
 - TDEC (Dr. Sid Jones) immediately questioned whether/how DOE addressed the Hg-bearing waste in accordance with the June 13, 2016 letter—i.e., whether/how DOE provided assurance that any landfill wastewater it discharges to Bear Creek will meet the effluent concentration of 51 ng/l.
 - TDEC (Kristof Czaratoryski and Christine Thompson) initiated a review of DOE waste management operations with respect to handling of the WL 301.4 waste from the point of generation point to disposal at EMWWMF on September 29, 2016. The evaluation included a review of DOE procedures for demonstrating that the waste did not contain mercury.
 - TDEC (Robert Storms and Brad Stephenson) visited with Jeff Grindstaff at the EMWWMF office to determine whether WL 301.4 waste disposed on September 29, 2016 was evaluated for mercury prior to disposal. Mr. Grindstaff was not able to provide any specific information regarding WL 301.4. Initially, he said that we would need to speak with Matt Hagenow, but he indicated that Matt was out all week for a meeting. He also stated that EMWWMF personnel only review waste lots for their physical waste acceptance criteria (pWAC)—i.e., whether their equipment pick it up and handle it. Subsequently, he referred TDEC to two members of the WAC attainment team:

Doug Hanahan
ETTP Building 1580 Room 319
865-241-9573 office
937-313-9476 mobile

Guy Hopper
ETTP Building 1580 Room 318
865-576-4657 office
865-742-7463 mobile

- Mr. Grindstaff stated that Mr. Hanahan was in the meeting with Matt all week, so TDEC (Robert Storms and Brad Stephenson) visited Mr. Hopper's office at ETTP. Mr. Hopper was not in his office, so TDEC (Brad Stephenson) attempted to call Mr. Hopper on the telephone. Mr. Hopper's office phone did not connect to voice mail, and the voice-mail box associated with his mobile phone was full and not accepting additional messages.

- TDEC (Brad Stephenson) called Doug Hanahan and left a voice-mail message (and followed up with an email message) requesting that he provide the waste lot characterization information via email.
- On October 12, 2016, Mr. Hopper provided the 2013 Waste Profile Report (Rev. 3) via email, noting that Hg was detected in [TCLP leachate] concentrations up to 0.009 mg/L.
- On October 13, 2016:
 - TDEC (Brad Stephenson) requested that Mr. Hopper provide the appendices for the 2013 Waste Profile Report (Rev. 3).
 - Mr. Hopper provided appendices small enough to email, noting that the original Rev. 0 report file was too large to send via email.
 - TDEC (Brad Stephenson) requested that Mr. Hopper provide all appendices for the 2013 Waste Profile Report (Rev. 3) on compact disc (CD).
- On October 17, 2016, Mr. Hopper delivered the requested appendices to TDEC on CD.
- On October 26, 2016:
 - TDEC (Dr. Sid Jones) raised the WL 301.4 issue with DOE (Brian Henry) during a meeting to resolve EPA comments and DOE responses on the *Focused Feasibility Study for Water Management for the Disposal of CERCLA Waste on the Oak Ridge Reservation, Oak Ridge, Tennessee* (DOE/OR/01-2664&D2).
 - TDEC (Curt Myers) raised the WL 301.4 issue with DOE personnel during a project team meeting for the EMWMF and proposed Environmental Management Disposal Facility (EMDF). DOE's minutes from that meeting state, erroneously:

"TDEC requested information on equipment disposed at EMWMF in September 2016 from Y-12 Alpha 5. This equipment contained mercury, and the TDEC sent a letter in June 2016 requesting no waste contaminated with mercury be sent to EMWMF for disposal until Outfall 200 Mercury Treatment Facility is operational."

The treatment facility cited in TDEC's letter refers to the one needed to treat landfill wastewater discharged to Bear Creek from the EMWMF—and potentially from DOE's proposed future landfill, the Environmental Management Disposal Facility (EMDF).

- During both meetings, DOE personnel responses indicated that TDEC's expectations, expressed in the June 13, 2016, letter had not been communicated adequately within DOE's Oak Ridge Office of Environmental Management (OREM). DOE and contractor personnel on the EMWMF and WAC attainment teams had been unaware of the letter and its implications.

November 2016 TDEC-DoR Continues Review of DOE WL 301.4 Waste Management

- On November 1, 2016:
 - TDEC (Brad Stephenson) emailed the WAC attainment team (Mr. Hopper and Mr. Hanahan) and EMWMF operations (Mr. Grindstaff and Mr. Hagenow) to request a meeting to ensure that TDEC has a clear understanding of how the waste was managed from generation to disposal and how the TDEC letter factors into OREM waste management decisions. TDEC requested a response by close of business on November 2, 2016.
 - Mr. Hanahan replied and indicated they would “be glad to sit down and discuss our perspective. Guy [Hopper] and I will check schedules and send you a date.”
- On November 2, 2016:
 - Neither DOE’s WAC attainment team nor EMWMF operations personnel responded with a meeting date.
- On November 3, 2016:
 - TDEC (Brad Stephenson) emailed a reminder to Mr. Hanahan.
 - Subsequently, Mr. Hanahan stopped by the TDEC-DoR office in Oak Ridge and requested that TDEC pursue the meeting request through the portfolio FPD for cleanup at Y-12 (Brian Henry).
 - DOE (David Adler) discussed the June 13, 2016 TDEC letter with TDEC (Chris Thompson) and emailed a copy of the TDEC letter to her.
 - TDEC (Chris Thompson) replied via email to DOE (David Adler), suggesting that “if DOE has questions regarding how best to meet the intent of the letter, they request a meeting with the [TDEC] Divisions of Water Resources and Remediation to discuss it.”
 - DOE (John Kubarewicz) emailed a meeting agenda to TDEC (Curt Myers) for the Upper East Fork Poplar Creek (UEFPC) project team meeting on November 8, 2016, noting that the agenda was revised to address recent WL 301.4 waste shipments.
- On November 4, TDEC (Curt Myers) learned at the core team meeting that “DOE project managers do not know about the shipments and...told me that it appears NNSA is the party in charge.”

- On November 8, 2016:
 - TDEC (Curt Myers and Brad Stephenson) raised the WL 301.4 issue with DOE/NNSA (Terry Cothron) during a meeting of the UEFPC project team.
 - TDEC (Curt Myers) inquired about the nature and source of the WL 301.4 waste disposed at EMWMF on September 29, 2016. He stated that he assumed it was related to the ARRA-funded work but had thought that work was completed several years ago.
 - DOE/NNSA (Mr. Cothron) acknowledged that TDEC and DOE were working to schedule a meeting to clarify the June 13, 2016 letter and stated that he would not address that “global” issue in this meeting. However, he said he could address TDEC questions about WL 301.4.
 - DOE/NNSA (Mr. Cothron) indicated that the WL 301.4 waste disposed at EMWMF on September 29, 2016 was mostly “uncontaminated” tooling and containers from the Beta-4 area. He stated that the Beta-4 area was used for the electrical exchange (ELEX) lithium isotope separation process for about 1 year and was not used for the column exchange (COLEX) lithium isotope separation process that used and released large quantities of Hg. He said the big Hg releases were associated with Alpha-4 and Alpha-5 areas. He also said that disposal of Hg at EMWMF was evaluated with ARRA funding. Findings at that time indicated that it is more practical and cost-effective to dispose Hg (e.g., waste from Building 9808) “out west” because of land disposal restrictions (LDRs) and because liquid waste is not allowed in EMWMF.
 - DOE/NNSA (Mr. Cothron) also took an action item to work toward closing out projects initiated with ARRA funding and documenting their conclusion in a Phased Construction Completion Report (PCCR) during FY17.
 - DOE/NNSA (Joe Birchfield) stated that characterization of the pre-demolition LMR waste in WL 301.4 was funded by the ARRA, but only two or three loads were disposed before that funding expired. The loads disposed at EMWMF on September 29, 2016 were part of a WHP that was approved historically by TDEC and EPA and reviewed by the WAC attainment team. He also said that equipment disposed as WL 301.4 was extremely well characterized with 98.9% coverage, meaning there is only a 1.1% chance of missing the maximum contamination. He said this level of characterization was needed because the equipment was so diverse and poorly understood. Finally, he stated that he only received a copy of TDEC’s June 13, 2016 letter on November 4, 2016, following initiation of TDEC’s review.
 - NNSA personnel also noted that Consolidated Nuclear Security (CNS) is considering disposal of more such waste later this calendar year and intends to use the same approved waste profile.

- TDEC (Brad Stephenson) emailed the portfolio federal project director (FPD) for cleanup at Y-12 (Brian Henry) to request a meeting regarding TDEC's letter of June 13, 2016. The purposes of the meeting are to:
 - ensure that we have a clear understanding of how CERCLA waste is managed from generation to disposal;
 - acquire information regarding DOE's process for assuring that waste disposal at EMWMF does not result in the discharge of landfill wastewater with mercury concentrations greater than 51 ng/l; and
 - learn how OREM waste management decisions address the expectations communicated in the letter.

- On November 9, 2016:
 - The TDEC "mercury letter" of June 13, 2016 was discussed during an "action items" telephone conference that included DOE, EPA, and TDEC.
 - Draft meeting minutes distributed by John Michael Japp (DOE-OREM) stated: "Brian Henry (OREM FPD for EMWMF) is coordinating meeting to discuss related issues. Suggestion was made that TDEC water division staff should be involved".

- On November 11, 2016:
 - Kristof Czartoryski (TDEC) suggested clarification of the meeting minutes as follows: "Brian Henry (OREM FPD for EMWMF) is coordinating meeting to discuss related issues. Suggestion was made that TDEC water division staff should be involved in discussions related to the discharges of wastewaters to the surface water."

- On November 14, 2016:
 - Chris Thompson (TDEC) concurred with the revision suggested by Kristof Czartoryski and asked Randy Young to request the change.

- On November 15, 2016:
 - Before an EMDF RI/FS dispute resolution meeting, Brian Henry (DOE) mentioned to Brad Stephenson (TDEC) that he still needs to coordinate with DOE and contractor staff to schedule the meeting requested on November 8, 2016.

- On November 16, 2016:
 - Brad Stephenson (TDEC) emailed Brian Henry (DOE) to inquire about the status of scheduling the meeting requested on November 8, 2016.
 - Ellie Allen (DOE) provided possible meeting dates on behalf of Brian Henry.

- Brad sent meeting invitation for December 5, 2016 (13:00-14:00) in the Large Conference Room of the TDEC-DoR Oak Ridge office.

December 2016 TDEC-DoR Completes Review of DOE WL 301.4 Waste Management

- On December 5, 2016, DOE and TDEC met for 1 hour to address the following objectives. See TDEC (Brad Stephenson) meeting notes in separate file.
 - Ensure a clear understanding of CERCLA waste management from generation to disposal;
 - Acquire information regarding DOE's process for assuring that waste disposal at EMWMF does not result in the discharge of landfill wastewater with mercury concentrations greater than 51 ng/l;
 - Learn how OREM waste management decisions address the expectations communicated in the letter; and
 - Clarify the meaning/intent of TDEC's June 13, 2016 letter.
- On December 8, 2016, DOE/NNSA (Terry Cothron) emailed the following to TDEC (Curt Myers).

Curt, at the November 8, 2016, UEFPC Project Team meeting you asked about removal and disposition of equipment and materials from Building 9204-4 (Beta 4). I committed to provide information on work that has been conducted in that regard. It might help to remember that the May 2009 LMR Action Memorandum only covered the second floor and mezzanine of Beta 4. That Action Memorandum was later amended to cover the remainder of Beta 4. As funding has become available, we have performed additional removal work in Beta 4. Below is a summary of work completed since December 2011 when a Removal Action Report covering the initial ARRA removal work was submitted.

- Between May 14, 2013 and December 16, 2014, 64 cubic yards of waste was sent to EMWMF under WL 301.4.
- On April 2, 2015, 29.78 cubic yards of mixed waste was sent to M&EC for macro-encapsulation and then to NNSA for disposal.
- On September 29, 2016, 40.76 cubic yards of classified tooling was sent to EMWMF under WL 301.4.

There is some hope that funding might become available later in FY 17 to do additional cleanout work in Beta 4. Please give me a call if you have further questions regarding this work.

February-July 2017 EMWMF Project Team Planned Action Items

- On February 22, 2017, DOE presented the EMWMF-EMDF Project Team with a list of "Open Action Items", including Action Item Number 197 (10/26/2016): "*Provide information to the Regulators on the Y-12 Alpha 5 equipment disposed at EMWMF in September.*" The action was

assigned to [Mary] Magleby with a planned completion date of "TBD" and a status of "Open".

- On March 22, and May 3, 2017, DOE presented the EMWMF-EMDF Project Team with a list of "Open Action Items", including Action Item Number 197 (22-Feb-17): *"Draft a proposal for notifying the Regulators when mercury waste is planned for disposal at EMWMF."* The action was assigned to [Annette] Primrose with a planned completion date of "TBD" and a status of "Open". Minutes from the May 3 meeting also state, *"Action item #197 - Open. DOE still is drafting a proposal for notifying the Regulators when mercury waste is planned for disposal at EMWMF."*
- On June 28, 2017, DOE presented the EMWMF-EMDF Project Team with a list of "Open Action Items" on which the Action Item Number changed to 198 (22-Feb-17). The action remained the same; the planned completion date remained "TBD"; and the status was revised to *"Open. DOE still is drafting a proposal for notifying the Regulators when mercury waste is planned for disposal at EMWMF"*. DOE contractor personnel clarified that they have an internal milestone to provide DOE with an updated draft of DOE's 2014 mercury strategy plan (a "living document") in September 2017. They also stated the intent is for the revised document to define "what is mercury-bearing waste".
- On July 26, 2017, DOE presented the EMWMF-EMDF Project Team with a list of "Open Action Items". The status of Action Item Number 198 was revised to *"Closed. Mercury contaminated waste that passes TCLP, meets LDR prior to treatment, and is not listed waste is not considered a hazardous waste and can be disposed of at permitted industrial landfills or EMWMF. Any waste that is characteristically hazardous due to mercury contamination and requires treatment to meet LDRs will require regulatory approval prior to onsite disposal through the Waste Handling Plan The Mercury Strategy being updated will discuss this."* DOE contractor personnel clarified that the update was made per Brian Henry, portfolio FPD for cleanup at Y-12, and that they have a September 30, 2017 due date to provide DOE with an updated draft of that plan.

Attachment C
Acronyms and Abbreviations

Acronyms and Abbreviations

ARRA.....	American Recovery and Reinvestment Act of 2009
CD.....	compact disc
CNS.....	Consolidated Nuclear Security
COC.....	contaminant of concern
COLEX.....	column exchange
DOE.....	Department of Energy
DoR.....	Division of Remediation
ELEX.....	electrical exchange
EMWMF.....	Environmental Management Waste Management Facility
EPA.....	Environmental Protection Agency
FFA.....	Federal Facility Agreement
FPD.....	Federal Project Director
Hg.....	mercury
LDR.....	Land Disposal Restriction
LMR.....	Legacy Material Removal
NNSA.....	National Nuclear Security Administration
OREM.....	Oak Ridge Office of Environmental Management
ORR.....	Oak Ridge Reservation
PCCR.....	Phased Construction Completion Report
PK.....	process knowledge
pWAC.....	physical waste acceptance criteria
QAPP.....	Quality Assurance Project Plan
SAP.....	sampling and analysis plan
TCLP.....	Toxicity Characteristic Leaching Procedure
TDEC.....	Tennessee Department of Environment and Conservation
TOA.....	Tennessee Oversight Agreement
UEFPC.....	Upper East Fork Poplar Creek
WAC.....	Waste Acceptance Criteria
WEMA.....	West End Mercury Area
WHP.....	waste handling plan
WL.....	Waste Lot
Y-12.....	Y-12 National Security Complex