Site Treatment Plan for Mixed Wastes on the U.S. Department of Energy Oak Ridge Reservation

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TABLES

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ACRONYMS

AK	Acceptable Knowledge
CCP	Central Characterization Project
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	code of federal regulations
CH	contact-handled
DOE	U.S. Department of Energy
DOE-HQ	U.S. Department of Energy Headquarters
DOE-OR	U.S. Department of Energy-Oak Ridge (Includes the Heritage Center (formerly known as ETTP), ORNL, and Y-12 Facilities)
DOE-ORO	U.S. Department of Energy-Oak Ridge Office
EPA	U.S. Environmental Protection Agency
ETTP	East Tennessee Technology Park (formerly K-25 Site)
FFA	Federal Facility Agreement
FFCA	Federal Facilities Compliance Agreement
FFCAct	Federal Facility Compliance Act
FY	fiscal year
LDR	Land Disposal Restriction
LLW	low-level waste
MACRO	Macroencapsulation
MLLW	mixed low-level waste
MPC	Matrix Parameter Category
MTRU	mixed transuranic
MVST	Melton Valley Storage Tanks
MWIR	Mixed Waste Inventory Report
NEPA	National Environmental Policy Act
NNSA	National Nuclear Security Administration
NNSS	Nevada National Security Site
OMB	Office of Management and Budget
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
PCBs	polychlorinated biphenyls
PPE	personal protective equipment
RCRA	Resource Conservation and Recovery Act
RH	remotely handled
RMERC	Retorting of mercury waste
STP	Site Treatment Plan
SWSA	Solid Waste Storage Area
TDEC	Tennessee Department of Environment and Conservation
TN	Tennessee
TRU	transuranic
TSF	Tower Shielding Facility
TWPC	Transuranic Waste Processing Center
UCOR LLC	***an Amentum-led partnership with Jacobs***
WAC	Waste Acceptance Criteria
WIPP	Waste Isolation Pilot Plant
Y-12	Y-12 National Security Complex

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1. PURPOSE AND SCOPE

1.1 BACKGROUND

The U.S. Department of Energy (DOE) was required to prepare a plan for developing treatment capacities and technologies for each facility at which DOE generates or stores mixed waste, pursuant to Section 3021(b) of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. 6939C, as amended by Section 105(a) of the Federal Facility Compliance Act (FFCAct), P.L. 102-386. Section 3021(b)(2)(A) of RCRA required DOE to submit the plan for the Oak Ridge Reservation to Tennessee for review and either approval, modification or disapproval within six months after receipt of the plan. In reviewing and making a determination on the plan, the state has considered the need for regional treatment facilities, consulted with the Administrator of the U.S. Environmental Protection Agency (EPA) and any other state in which a DOE facility affected by the plan is located, sponsored a public workshop, participated in stakeholder meetings, and considered public comments. After modification, Tennessee approved a modified plan and issued an Order requiring compliance with the approved plan. In the Order, provisions were included to update the plan annually. This document describes the version to be in effect in FY ~~2021~~ ***2022***.

1.2 SCOPE

In accordance with RCRA Section 3021, this Site Treatment Plan (STP) delineates how DOE will treat the site's mixed wastes or develop technologies when technologies do not exist or when existing technologies need to be modified. For some waste streams, a plan and schedules for characterizing wastes for treatment, for undertaking technology assessments, and for providing the required plans and schedules for developing capacities and technologies, as appropriate, are provided. This STP applies specifically to mixed wastes on the Oak Ridge Reservation. Other facilities under the management of DOE have site-specific site treatment plans (STPs) for their mixed wastes.

1.3 PURPOSE

The purposes of this STP include the following:

1. Fulfilling the requirements of the FFCAct.

2. Establishing an enforceable framework, in conjunction with the Order, in which DOE will develop methods to treat [or otherwise meet RCRA Land Disposal Restrictions (LDR) for] all LDR mixed wastes currently in storage and to be generated or received on the Oak Ridge Reservation during the term of the STP.

3. Allowing for storage of current and projected LDR mixed wastes at the Oak Ridge Reservation, which in the absence of an STP would be in violation of RCRA Section 3004(j), pending the development of treatment technologies or capacity and ultimate treatment or other disposal of such wastes according to LDR requirements during the term of this STP.

4. Fulfilling a requirement of the June 1992 Federal Facility Compliance Agreement (FFCA) into which DOE entered with EPA Region IV. One of the key provisions of the FFCA was that DOE would prepare a treatment methods plan for all mixed wastes on the Oak Ridge Reservation for which treatment capability did not exist. In lieu of the treatment methods plan, this STP is being provided to EPA.

1.4 ORGANIZATION OF THE SITE TREATMENT PLAN

This STP provides overall schedules, along with milestones and target dates for achieving compliance with the LDR, and a general framework for the establishment and review of milestones and target dates, the conversion of target dates into milestones, and other provisions for implementing this STP that are enforceable under the Order.

1.5 ORGANIZATION OF THE ANNUAL UPDATE

Because the Annual Update retains the contents of the STP, information no longer pertinent is presented in ~~strikethrough~~ and new information is presented in ***bold italic*** font. Milestones completed in the previous fiscal year are presented under a separate heading within the section and milestones no longer appropriate are presented separately as well.

2. IMPLEMENTATION OF THE SITE TREATMENT PLAN

This section establishes the mechanisms and procedures for administering and implementing the treatment plans and schedules in Chapters 3 through 5 of this STP.

2.1 COVERED MATTERS

This STP addresses LDR requirements pertaining to storage and treatment of LDR mixed wastes, which in the absence of an STP would be in violation of RCRA Section 3004(j), whether such wastes were generated or accumulated in the past, are currently generated or accumulated, or will be generated or accumulated in the future. This STP also requires DOE to submit information concerning generation and storage of LDR mixed wastes which are not in violation of RCRA Section 3004(j).

2.2 COMPLIANCE SCHEDULES

2.2.1 Purpose

This STP provides overall schedules for achieving compliance with LDR requirements for mixed wastes on the Oak Ridge Reservation. The schedules include activities that are required to bring existing waste treatment facilities or technologies into operation, and those required for the development of new facilities and treatment capacities. This STP shows target dates and milestones for treatment technologies and facilities for wastes covered under the STP. The schedules differentiate between (1) milestones and (2) target dates that will be converted to milestones.

2.2.1.1 Activities

For the purposes of this STP, milestones and target dates will identify dates or time frames by which a certain activity (including an event such as submittal of a deliverable) is scheduled to occur, or any other dates or deliverables that are properly incorporated into this STP.

2.2.1.2 Assumptions

The assumptions upon which individual schedules are dependent are contained in Chapters 3 through 5. The schedules may be affected if the underlying assumptions are incorrect or if they change.

2.2.1.3 Milestones

Milestones are fixed, firm, and enforceable dates as set forth in this STP. Milestones correspond to the categories of milestones set forth in Section 2.2.3. Changes or revisions to milestones are subject to approval, approval with modifications, or disapproval by the Tennessee Department of Environment and Conservation (TDEC) according to the process and framework set forth in this STP. Milestones are set based on target dates, defined in Section 2.2.1.4, in accordance with the process described in Section 2.2.2.

2.2.1.4 Targets

Target dates mark the anticipated completion of tasks that have not been designated as milestones. Target dates correspond to the categories of milestones set forth in Section 2.2.3. Target dates are not requirements and are not enforceable. Target dates are converted into enforceable milestones in accordance with the process described in Section 2.2.2.

2.2.2 Setting Future Milestones and Target Dates

Through the Annual Update process, milestones will be established for a three year rolling period consisting of the fiscal year (FY) plus two additional fiscal years (FY+1 and FY+2) as follows:

1. On the effective date of the Order requiring the implementation of this STP, enforceable milestones in applicable planning schedules are established for a three fiscal year period. After the expiration of the current fiscal year, what was previously FY+1 will become the current fiscal year, FY+2 will become FY+1, and FY+3 will become FY+2. On October 1 of each year, the target dates falling within the former FY+3 time period shall be automatically converted to FY+2 milestones. It is anticipated that DOE will submit notification of proposed changes in the Annual Update. The Annual Update notification will include any proposed adjustments to milestones for the three-year period, as well as proposed adjustments to targets dates. Proposed changes to milestones based upon funding received shall be subject to Section 2.9, "Funding." Nothing in this section precludes DOE or TDEC from proposing or requesting changes to milestones at other times.

2. In adjusting milestones pursuant to this section, funding availability including the amount of funds provided to the DOE-OR in its Approved Funding Program for the current fiscal year (FY) for environmental management activities, and the internal Review Budget for FY+1, and associated out-year funding targets for the DOE-OR, site priorities, cost estimates, new or emerging technologies, and other new information shall be considered.

3. The schedules established for years past these three years are non-enforceable target dates. DOE will propose milestones in the Annual Updates for FY+2 based on target dates provided in Chaps. 3-5 as updated by previous Annual Updates. If there is no ensuing target date to convert to a milestone within a given FY for a particular facility or treatment approach, the Semi-Annual Progress Reports will describe progress on interim activities.

2.2.2.1

Approval of the proposed conversion of target dates to milestones shall be in accordance with Section 2.8, "Submittal, Review, and Approval of Deliverables," except if DOE proposes the same or earlier date, the next target date shall be converted to a milestone automatically and such conversion shall not require approval and shall not constitute a revision to the STP. The conversion shall be reflected in the next scheduled Annual Update to STP.

2.2.3 Categories of Milestones and Target Dates

The categories of activities for which milestones and target dates will be provided for different types of treatment approaches in this STP are listed in Tables 2.1 through 2.4 and in other provisions below. To the extent appropriate, the categories of activities are based on Section 3021(b)(1)(B)(i), (ii) and (iii) of RCRA. Depending upon the status of the facility or treatment option (e.g., operating under interim status or at differing stages of development), certain types of target dates or milestones may not be necessary,

the activities may appear in a different order, or an alternative activity that is more appropriate to the facility or treatment approach may be designated as a target date or milestone.

2.2.3.1 Plans for wastes with existing treatment technologies

For some of the mixed wastes, treatment technologies have been identified and developed. For these wastes that will be treated on site, the categories of milestones and target dates identified in Table 2.1 will apply.

Table 2.1 Schedule for mixed wastes with existing treatment technologies

Categories of milestone and target activities

- Submit RCRA permit applications to TDEC
- Procure contracts
- Initiate construction
- Commence systems testing
- Commence operations
- Submit a schedule for processing backlogged and currently generated mixed wastes

2.2.3.2 Plans for waste for which treatment technology must be developed

For some mixed wastes, no appropriate treatment technologies have been identified and developed, or treatment technology must be modified or adapted to be made applicable for mixed waste. For these wastes that will be treated on site, the categories of milestones and target dates identified in Table 2.2 will apply.

Table 2.2 Schedule for mixed wastes without existing treatment technologies

Categories of milestone and target activities

- Identify and develop technology
- Submit treatability study exemption application
- Submit research, design, and development permit applications
- Submit schedule in accordance with Table 2.1 or new schedule for development of alternative treatment technologies in accordance with this section

2.2.3.3 Requirements pertaining to radionuclide separation through surface decontamination

The FFCAct sets additional requirements for those instances when DOE intends to conduct radionuclide separation of mixed waste. Should DOE decide to conduct on-site radionuclide separation of mixed wastes through surface decontamination, DOE will establish milestone and target date categories as delineated in Table 2.3.

Table 2.3 Schedule for radionuclide separation of mixed wastes

Categories of milestone and target activities
• Complete an estimate of the volume of waste generated by each case of radionuclide separation • Complete an estimate of the volume of waste that would exist or be generated without radionuclide separation • Complete an estimate of the costs of waste treatment and disposal if radionuclide separation is used compared to the estimated costs if it is not used • Provide the assumptions underlying such waste volume and cost estimates • Provide a schedule for surface decontamination • Submit a plan for treatment or management of residues, as appropriate, in accordance with this section

2.2.3.4 Plans for other types of activities

This STP may contain additional milestones and target dates for other types of situations related to treatment or storage of Oak Ridge Reservation (ORR) mixed wastes, including the following:

1. In the STP, the final target date or milestone to ship for treatment or disposal will be completed once the material is manifested and shipped to a commercial facility or another non-ORR DOE facility. Information supporting the development or use of commercial or non-ORR DOE site treatment capacity or technology for treatment of such wastes shall be provided in the Semi-Annual Progress Reports. If changes in the commercial or non-ORR DOE site treatment facility's schedule affect the schedule in this STP, DOE will notify TDEC, and DOE and TDEC will attempt to negotiate necessary changes in accordance with Section 2.5, "Revisions," or 2.6, "Duty to Perform; Delay in Performance," as appropriate and subject to Section 2.10, "Disputes." Additional milestones or target dates for completion of on-site activities may be established. Table 2.4 contains some categories of milestones and target dates that may be provided for mixed wastes to be shipped to commercial or non-ORR DOE site for treatment and/or disposal.

Table 2.4 Schedule for mixed wastes to be shipped to commercial or non-ORR DOE site treatment and/or disposal facilities

Categories of milestone and target activities
• Initiate preparation of waste(s) for transport • Transportation of waste(s) • Complete shipment of waste(s) off site

2. The DOE will also ensure that the regulatory agency of the receiving facility has approved the proposed shipment of DOE-OR waste before notifying TDEC of the acceptance (if approval by the regulatory agency is legally required). If DOE wishes to treat waste at a commercial or non-ORR DOE facility that was previously slated to be treated on site, DOE will propose necessary changes in accordance with Section 2.5, "Revisions" and subject to Section 2.10, "Disputes." When the waste is to be shipped to another DOE facility, DOE (or TDEC, if so agreed) will ensure that the regulatory agency of the state in which the receiving facility is located is notified of the proposed shipment.

3. For mixed wastes that are not sufficiently characterized to allow identification of appropriate treatment, this STP will contain schedules for characterizing such wastes. The milestones or target dates for such a schedule may include, but not be restricted to, (a) DOE's identification of the facility to receive the waste and any resulting schedule changes or (b) DOE's submittal of a proposed treatment schedule as described in this section.

2.3 ANNUAL SITE TREATMENT PLAN UPDATES AND SEMI-ANNUAL PROGRESS REPORTS

2.3.1 Purpose

This section provides mechanisms for (1) communicating and exchanging information about schedules, technology development, funding, and other concerns that affect the implementation of this STP; (2) providing Annual Updates and Semi-Annual Progress Reports; (3) proposing and establishing subsequent milestones; and (4) updating and proposing revisions to this STP.

2.3.2 Timing of Updates

By October 31 of each year after this STP is issued and the accompanying Order executed, DOE will provide to TDEC an Annual Update to the STP for review and comment. When revisions to the STP are proposed, the Annual Update will allow input from the public, affected states, and EPA. Each Annual Update will bring the STP current to the beginning of the current year (October 1). The Annual Update will minimize the paperwork necessary to document changes and will be handled by page changes to the extent practicable, and the changes will be marked to facilitate comparison to the previous STP. DOE shall provide Semi-Annual Progress Reports to TDEC by April 30 and October 31 of each year, beginning on April 30, 1996.

2.3.3 Update of STP

Both the Annual Updates and the Semi-Annual Progress Reports will update this STP.

2.3.3.1 Semiannual Progress Reports

The Semiannual Progress Reports will provide the following:

1. The amount of each LDR mixed waste stored on the Oak Ridge Reservation as follows:
   A. the estimated amount in storage at the end of the previous six month period and
   B. the estimated amount anticipated to be placed in storage in the next five fiscal years.

2. A description of the progress made up to the end of the previous six month period on treatment or technology development of each treatment facility or activity scheduled in the STP. If applicable, DOE will also describe current or anticipated alternative treatment technology that is being evaluated for use in lieu of treatment technologies or capacities identified in the STP. This description will include potential alternate commercial treatment and off-site DOE treatment capacity or technology development.
3. A description of DOE's funding for STP-related activities and any funding issues that may affect the schedule.

4. The status of any pending or planned extension, treatability variance, or no-migration petition.

5. In accordance with Section 2.4.2, information that has changed or that has not been included previously regarding waste form, waste code, and technology and capacity needs, including new waste streams.

6. Notification of the deletion of waste streams in accordance with Section 2.7.1.

7. Status of any new wastes for which notification has been provided during the six month reporting period.

8. Progress on DOE/NRC/EPA efforts to establish standards for control and release of residual radioactive material.

2.3.3.2 Annual Updates

1. The Annual Updates of this STP may contain requests for approval of changes. These requests for approval may, as appropriate, include: (1) proposed revisions or conditionally approved revisions; (2) proposed new milestones, in accordance with Section 2.2; and (3) other changes to the overall schedules.

2. The Annual Updates shall clearly identify proposed changes requiring approval under Section 2.8, "Procedures for Review and Approval," and Section 2.5, "Revisions."

3. DOE will make the Annual Updates publicly available. When an Annual Update includes proposed revisions to this STP, the provisions of Section 2.5, "Revisions," also apply to such proposed revisions.

2.3.4 Additional Information

TDEC may request, at any time, additional information on the status of specific activities undertaken pursuant to this STP and any funding issues relevant to it.

2.4 INCLUSION OF NEW WASTE STREAMS

2.4.1 Purpose

This section establishes a method for including new mixed waste streams on the Oak Ridge Reservation in the STP, including mixed wastes that are newly discovered, identified, generated during a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) clean-up, or received from off site in accordance with applicable permits, Orders and agreements, and mixed wastes that are generated through decontamination and decommissioning activities to the extent that such wastes cannot be included in an existing waste stream in Appendix A of this STP.

2.4.2 Notification

DOE shall, within forty-five days of its discovery, notify TDEC of newly found existing LDR mixed waste streams being generated or stored. DOE shall also notify TDEC of any new LDR mixed waste streams that are anticipated to be generated or stored on the Oak Ridge Reservation within forty-five (45) days of the decision to generate or store such waste. DOE will provide a description of the waste code, waste form, volumes, technology and capacity needs, and similar pertinent information in the notification. Additional details about the waste stream and the proposed plan and schedules, consistent with Section 2.2, "Compliance Schedules," will be provided within 45 days of notification for waste which, in the

absence of an STP, would be in violation of RCRA Section 3004(j). The information provided pursuant to this subsection is subject to TDEC's approval as provided for in Section 2.4.4.

2.4.3 Deliverables

If DOE cannot provide the information or schedules required by Section 2.4.2 because of inadequate characterization or because it is otherwise impracticable, DOE will include appropriate justification, supporting information, and proposed plans for approval as a deliverable under Section 2.8, "Procedures for Review and Approval," for developing such information and schedules consistent with Section 2.2, "Compliance Schedules."

2.4.4 Changes

DOE may propose changes to this STP to accommodate new waste streams. If such changes are required, DOE will submit the changes for approval as a deliverable under Section 2.8, "Procedures for Review and Approval." Also, DOE may propose revisions to this STP as necessary to accommodate new waste streams subject to Section 2.5, "Revisions."

2.5 REVISIONS

2.5.1 Definitions

A revision to this STP is (a) the addition of a treatment facility on the Oak Ridge Reservation or off-site, but within Tennessee, or technology development not previously included in this STP or (b) an extension to a milestone (including an extension by mutual agreement under Section 2.6 or a proposed milestone converting a target date under Section 2.2) for a period greater than one year. Changes in waste volume, the addition or deletion of waste streams or waste types, extensions, changes to milestones for a period less than a year, or changes to target dates will not by themselves constitute revisions.

2.5.2 Revision Methodology

Revisions to the STP may be made as follows:

2.5.2.1 Identification of revisions

DOE will indicate to TDEC the need to revise this STP and provide information supporting the basis for the revision as a deliverable pursuant to Section 2.8, "Procedures for Review and Approval." Under these procedures, within thirty (30) working days of receipt, TDEC may conditionally approve the revision, return it to DOE with comments so that changes can be made for resubmittal, or disapprove it. Conditional approval of a revision is a determination by TDEC that the revision is acceptable, subject to the results of public comment and consultation with affected states and EPA.

2.5.2.2 Review and approval of revisions

Within thirty (30) working days of granting conditional approval, TDEC will publish a notice of availability and make the revision to the STP available to the public for review and comment and to affected states and EPA for consideration and consultation. Revisions will be approved, approved with modification, or disapproved by TDEC within 6 months after TDEC's receipt of the proposed revision. TDEC will notify DOE of its decision. If DOE does not agree with TDEC's decision it may invoke the procedures of Section 2.10, "Disputes."

2.5.3 Notifications

To the extent practicable, comments from the public, affected states, and EPA on conditionally approved revisions will be obtained in conjunction with the Annual Update to the STP, as governed by Section 2.3, "Annual Site Treatment Plan Updates and Semi-Annual Progress Reports." However, if a conditionally approved revision is proposed to become effective before it could be addressed in the regularly scheduled Annual Update, TDEC will publish a notice of availability and consult with the affected states and EPA, as appropriate, within thirty (30) working days of such conditional approval.

2.6 DUTY TO PERFORM; DELAY IN PERFORMANCE

2.6.1 Implementation

DOE will implement this STP in accordance with the milestones set forth in this STP and with milestones subsequently developed pursuant to this STP. DOE shall adopt all reasonable measures to avoid or minimize delays in the implementation of this STP.

2.6.2 Milestones

A milestone will be extended upon receipt of a timely request for extension when good cause exists for the requested extension. Any request for an extension will be made to TDEC prior to the milestone date, either in writing or orally with a written follow-up request within ten (10) working days of the request. Any oral or written request will be provided to the project manager responsible for implementation of this STP. The written request will specify (1) the milestone that is sought to be extended, (2) the length of the extension sought, (3) the good cause(s) for the extension, and (4) any related milestone or target date that would be affected should the extension be granted.

2.6.3 Good Cause

Good cause for an extension includes (1) an event of Force Majeure, as defined below in Section 2.6.4, provided written notice of the event is given to TDEC in accordance with Section 2.6.9; (2) a delay caused by TDEC's failure to meet any requirement of this STP; (3) a delay caused by the good faith invocation of dispute resolution or the initiation of administrative or judicial action; (4) a delay caused, or likely to be caused, by the grant of an extension in regard to another milestone; (5) a delay caused by additional work agreed to by DOE and TDEC; and (6) any event or series of events mutually agreed to by DOE and TDEC as constituting good cause.

2.6.4 Force Majeure

An event of Force Majeure means any event arising from causes beyond the control of DOE that causes a delay in or prevents the performance of any obligation under this STP. Examples of events that may constitute a Force Majeure include, but are not limited to, acts of God; fire; war; insurrection; civil disturbance; explosion; unanticipated breakage or accident to machinery, equipment, or lines of pipe, despite reasonably diligent maintenance; adverse weather conditions that could not reasonably be anticipated; unusual delay in transportation; restraint by court order or order of public authority; inability to obtain, at reasonable cost and after exercise of reasonable diligence, any necessary authorizations, approvals, permits, or licenses due to action or inaction of any governmental agency or authority other than the DOE; lack of a sufficient appropriation to DOE for its nationwide environmental management activities despite good faith compliance by DOE with the procedures set forth in Section 2.9, "Funding;" and, delays caused by compliance with applicable statutes or regulations such as those governing

contracting, procurement, or acquisition procedures, despite the exercise of reasonable diligence. The listing of examples of events that may constitute a Force Majeure does not create a presumption that such events will in every instance be a Force Majeure.

2.6.5 Dispute Resolution

Lacking agreement of DOE and TDEC with respect to the existence of good cause, the parties may seek and obtain a determination through the dispute resolution process, Section 2.10.

2.6.6 Extension Requests

For extension requests by DOE, the following procedures will apply.

1. Within fifteen (15) working days of receipt of a written request for an extension of a milestone, TDEC will advise DOE in writing of its position on the request. If TDEC does not concur with the requested extension, it will include in its statement of nonconcurrence an explanation of the basis for its position.

2. If TDEC determines that the requested extension is warranted, then the affected milestone will be extended accordingly. If TDEC determines that all or part of the requested extension is not warranted, the milestone will not be extended except in accordance with a determination resulting from the dispute resolution process.

3. Within fifteen (15) working days of receipt of a statement of nonconcurrence with the requested extension, DOE may invoke dispute resolution. If DOE does not invoke dispute resolution within fifteen (15) working days of receipt of a statement of nonconcurrence, then DOE is deemed to accept TDEC's nonconcurrence and the existing schedule.

2.6.7 Extension Requests by the Tennessee Department of Environment and Conservation

For extension requests by TDEC, if DOE does not invoke dispute resolution within fifteen (15) working days after receiving written notice of the requested extension, the extension will become effective.

2.6.8 Extension Request Toll Actions

A timely and good faith request for extension will toll the initiation of any action to enforce the affected milestone until a final decision is reached on whether the requested extension will be approved, or until the party requesting the extension fails to cooperate in good faith to resolve any dispute over the request.

2.6.9 Notification

DOE will notify TDEC in writing within fifteen (15) working days after it becomes aware of events that DOE knows or should know constitute a Force Majeure event that may delay or prevent the performance of an obligation under this STP. Such notice will describe the cause and anticipated length of delay and mitigation measures being taken. After such a notification, any request for an extension based on a Force Majeure event will be made pursuant to Section 2.6.2, and the procedures of Section 2.6.6 will apply.

2.7 DELETION OF WASTES AND TERMINATION OF THE SITE TREATMENT PLAN

2.7.1 Deletion of Wastes

The requirements of this STP will terminate with regard to any mixed waste upon (1) completion of activities required pursuant to a milestone under this STP for treatment of such waste; (2) shipment of wastes off site for treatment and receipt of the certification of treatment to LDR standards, disposal or storage pending treatment, or disposal; (3) changes to statute or regulation or determinations of the regulatory authority that cause a waste or waste categories to be no longer subject to the requirements of RCRA or the LDR requirements of RCRA; (4) treatment in accordance with the conditions of an approved LDR treatability variance; or (5) mutual agreement between DOE and TDEC.

2.7.2 Termination of Plan

Inasmuch as the intent of the FFCAct requirement to develop an STP is to address noncompliance with RCRA Section 3004(j), this STP will terminate when there is no longer any LDR mixed waste, regardless of when generated, being stored on the Oak Ridge Reservation which, in the absence of an STP, would be in violation of RCRA Section 3004(j).

2.7.3 Notification

DOE will notify TDEC of such termination independently or in the Annual Updates to the STP. TDEC will provide DOE with a written response to the notification within 30 working days. TDEC's response to this notice will be subject to the provisions of Section 2.10, "Disputes."

2.8 PROCEDURES FOR REVIEW AND APPROVAL

2.8.1 Submission of Deliverables

Deliverables developed by DOE pursuant to this STP will be submitted by DOE to TDEC for review and comment as provided in this section. Deliverables include documents or notices signifying completion of milestones, identifying new wastes, and supporting proposed revisions as required or permitted under this STP. When TDEC approval of a deliverable is expressly required in this STP, the approval provisions in this section apply. Permit applications and National Environmental Policy Act (NEPA) documents will not be subject to the procedures of this section. Permit applications will be submitted and reviewed under applicable regulations, and NEPA documents will be submitted and reviewed under the DOE regulations implementing NEPA. Each submittal of a deliverable will specify the milestone or other provision of this STP that requires the submittal of that deliverable.

2.8.2 Transmittal of Deliverables

Unless otherwise noted, each deliverable will be transmitted directly to the TDEC project manager responsible for implementation of this STP.

Unless otherwise specified, any report or submittal provided pursuant to a schedule or deadline identified in or developed in this STP shall be sent by certified mail, return receipt requested, or similar method (including electronic transmission) which provides a written record of the sending and receiving dates, or hand delivered, to the following persons:

Tennessee Department of Tennessee Department of

Environment and Conservation
Division of Solid Waste Management
STP Coordinator
3711 Middlebrook Pike
Knoxville, Tennessee 37921

Environment and Conservation
Division of Remediation-Oak Ridge Office
STP Manager
761 Emory Valley Road
Oak Ridge Tennessee 37830

2.8.3 Review of Deliverables

TDEC will promptly review each deliverable submitted by DOE that is required to be approved pursuant to this STP. In the course of its review, TDEC may consult with DOE regarding the adequacy of each deliverable. Oral comments made during these discussions will not require a written response.

2.8.4 Deliverables Not Requiring Approval

Deliverables that do not require TDEC approval will be provided to TDEC for review and comment. If DOE disagrees with TDEC's comments, DOE will respond to TDEC's comments in writing, explaining DOE's position. If DOE has not received comments from TDEC within thirty (30) working days of submittal of the deliverable, it will be deemed that TDEC has no comments.

2.8.5 Actions by the Tennessee Department of Environment and Conservation

For any deliverable that requires TDEC approval under the provisions of this STP, the following procedures will apply:

2.8.5.1 Tennessee Department of Environment and Conservation actions

Within thirty (30) working days of receipt of a deliverable, TDEC will (1) approve, conditionally approve (if the deliverable is a revision), or disapprove the deliverable as submitted or (2) return the deliverable to DOE with comments so that changes can be made for resubmittal. Conditionally approved revisions will be approved or approved with modification after public review and comment and consultation with affected states and EPA pursuant to Section 2.5, "Revisions." TDEC may extend this review period for an additional thirty (30) working days by notifying DOE. This period may be further extended as agreed to by TDEC and DOE. Comments on the deliverable will be specific enough to allow DOE to make appropriate changes to the document. To the extent applicable, comments should refer to specific paragraphs of any sources of authority or references on which the comments are based, and, upon the request of DOE, TDEC will provide a copy of the cited authority or reference.

2.8.5.2 Conditional approval

If TDEC extends the review period for a deliverable, any milestones or target dates dependent upon the results of deliverable review will automatically be extended for an equivalent period. DOE will notify TDEC in writing of any enforceable milestones that need to be extended or revised.

2.8.5.3 Incorporation of comments

If TDEC returns the deliverable to DOE with comments within thirty (30) working days of receipt, DOE will incorporate the comments and retransmit the deliverable to TDEC. DOE may extend this period an additional thirty (30) working days by notifying TDEC. This period may be further extended as agreed to by TDEC and DOE. If DOE disagrees with TDEC's comments, and the parties are unable to resolve their disagreement, DOE may invoke the dispute resolution provisions of Section 2.10, "Disputes."

2.9 FUNDING

DOE shall, in good faith, take all necessary steps to obtain sufficient funding to comply with the provisions of this Plan. This shall be accomplished, as set forth in this section, through consultation with the TDEC and submission of timely budget requests.

1. DOE shall consult with the TDEC in formulating its annual DOE-OR Environmental Management budget requests as set forth in this section. By February 15 of each year, DOE shall provide TDEC with information or a briefing on the proposed DOE-OR Environmental Management budget request, including appropriate supporting documents. In the process of formulating its annual budget request, DOE may be subject to target funding guidance directed by the Office of Management and Budget (OMB). The information or briefing will address the impacts of such OMB target funding guidance. Budget information which is designated by DOE as proprietary information, pursuant to T.C.A. §68-212-109, will not be released to any other person or entity prior to submission by the President of his budget request to Congress unless authorized by DOE or unless the TDEC is required to do so by court order. DOE may seek to intervene in any proceeding brought to compel or enjoin release of this information. If allowed to intervene, DOE shall assert its interest in, and the legal basis for, maintaining the confidentiality of this information.

2. The parties shall attempt to reach agreement regarding work scope, priorities, schedules/milestones, and funding levels required to accomplish the purpose of the Plan. These discussions shall be conducted before DOE-ORO submits its annual budget request to DOE-HQ. TDEC shall, to the extent practicable, identify in its comments to DOE whether additional or accelerated activities recommended by the TDEC are believed by the TDEC to be outside of target funding levels.

3. DOE shall revise its budget request and supporting documents to resolve the comments of the TDEC to the extent agreed by the Parties. DOE-OR will submit to DOE-HQ its budget request and shall forward with it the target budget level funding and any unresolved issues regarding funding for additional or accelerated activities submitted by the TDEC, and any other unresolved issues raised by the TDEC. If these issues are not subsequently resolved prior to DOE's submission of its budget request to OMB, DOE-HQ shall forward with its budget request any such unresolved issues and related funding information to OMB. If the TDEC and DOE are unable to agree on milestones by the time of DOE-HQ's receipt of the initial OMB passback, or submittal of the President's budget request to Congress, whichever occurs first, the issues shall be elevated to Dispute Resolution. DOE has the right to indicate which milestones in any decision of the TDEC that DOE believes cannot be accomplished within OMB target funding levels. Failure to agree on adjustments to FY+1 or FY+2 milestones, or FY+3 targets in one year shall not prejudice DOE's right to request adjustments to these milestones in subsequent fiscal years or to dispute any decision of the TDEC regarding such future requests.

4. Upon receipt of funding for the fiscal year, DOE shall determine whether it can meet the schedule for that fiscal year based on funding received. If funds appropriated to DOE are not sufficient for its nationwide environmental management activities, then within fifteen (15) days of receipt of field allocation, DOE shall provide information on the allocation process and results to TDEC and may propose changes or revisions to the milestones or plan. If, within forty-five (45) days of receipt of field allocation, the Parties cannot agree to the adjustments of the milestones or plan based on funding received, the issue will be elevated to Dispute Resolution.

2.10 DISPUTES

2.10.1 Scope

Except as specifically set forth elsewhere in this STP, any action that leads to or generates a dispute regarding compliance with the STP is subject to resolution under this section.

2.10.2 Informal Resolution

DOE and TDEC will make reasonable efforts to resolve disputes informally as expeditiously as possible at the project manager level. If resolution cannot be achieved informally, the disputing party may elevate the dispute for resolution pursuant to this section.

2.10.3 Formal Resolution

To initiate formal dispute resolution, the disputing party will submit to the other party a written notice of dispute that specifies (1) the nature of the dispute, (2) the work affected by the dispute, (3) the disputing party's position with respect to the dispute, and (4) the information the disputing party is relying upon to support its position.

2.10.4 Dispute Resolution

Upon receipt of the notice of dispute, the appropriate DOE assistant manager and TDEC administrator for land and waste programs (or their respective delegates or successors) will engage in dispute resolution meetings or conference calls. If a resolution is not mutually agreed upon within 30 days, the dispute will be escalated to the Deputy Commissioner of TDEC. Within 30 days of escalation, the Deputy Commissioner will consult with the DOE manager and issue a final determination of TDEC. This 30-day period may be extended by mutual written agreement of the parties.

2.10.5 Schedule

DOE will incorporate the resolution and final determination into the appropriate plan, schedule, or procedure and proceed with implementation in accordance with the amended plan, schedule, or procedure within 45 days after resolution of a dispute, pursuant to the procedures specified in this STP, in order for Section 2.11, "Covenants and Reservations," to remain effective for the affected waste stream.

2.10.6 Consultation with Other Parties

EPA or states affected by a dispute may be consulted by the parties, as appropriate, as part of the dispute resolution process.

2.11 COVENANTS AND RESERVATIONS

2.11.1 Covenants

This STP and implementing Order will stand in lieu of any administrative, legal, and equitable actions that could otherwise be brought by TDEC against DOE, its contractors and subcontractors for violations of LDR by storage of mixed waste in excess of the time allowed, so long as DOE is in compliance with the STP and implementing Order as determined by TDEC or a court of competent jurisdiction.

3. LOW-LEVEL MIXED WASTE STREAMS

This chapter presents milestones and target dates for the mixed low-level waste (MLLW) remaining under the STP on Tables 3.4, 3.6, and 3.7, in relation to technology capability, regulatory integration, and economic discard limit waste. There are two general radiological categories of untreated mixed waste in inventory at the beginning of FY2021 that remain to be addressed by this plan; the MLLW[1] inventory and the mixed transuranic waste (MTRU) inventory. The remaining MLLW inventory discussed in this chapter is comprised of three Mixed Waste Inventory Report (MWIR) streams. This MLLW inventory includes untreated mixed and partially treated mixed waste, reported in Tables 3.4, 3.6, and 3.7. Refer to Chap. 4 for information regarding MTRU.

Treatment of MLLW will be implemented in accordance with the standards specified in Subpart D of Title 40, Code of Federal Regulations, Part 268 (40 CFR 268) and Tennessee Code Annotated Rule 0400-12-01-.10 governing solid and hazardous waste processing in Tennessee.

Schedules for mixed waste treatment are based on available funding and the time required (1) to develop or adapt appropriate technologies for treating unique mixed waste streams; (2) for treatment facilities to obtain necessary permits and licenses; (3) to solicit and obtain private sector services with necessary approvals to receive the waste for treatment; and (4) for treatment facilities to become operationally ready for waste to be received. For any classified mixed waste streams, schedules will also be based on (1) the vendor having necessary safeguards and security approvals to receive and disposition classified mixed waste, and (2) DOE Safeguards and Security having authorized shipment of the waste to the treatment facility. The objective of treatment will be to produce a final waste form that can be disposed.

3.1 LOW-LEVEL MIXED WASTE STREAMS CATEGORIES

This chapter includes three MWIR streams with milestones and reporting requirements. These MWIR streams are Dioxin and Furan Coded Waste (Table 3.4, see Sect. 3.1.3), Y-12 National Security Complex (Y-12) contaminated uranium residuals (Table 3.6, see Sect. 3.3), and Legacy Low-Level Radioactive Reactive Metals (Sodium and Lithium Shields) (Table 3.7, see Sect. 3.4).

3.1.1 Table 3.4 Waste Treatment Facility Returns

This waste stream has been treated and disposed.

3.1.2 Table 3.4 Classified MLLW - with organics and PCBs

This waste stream has been treated and disposed.

3.1.3 Table 3.4 Dioxin and Furan Coded Waste Streams

There were a total of 26 containers of dioxin and furan-coded waste in inventory at the end of FY2016. Ten of the containers were solid-phase waste and were shipped to EnergySolutions' Clive, UT facility during FY2017 for treatment via vacuum-assisted thermal desorption. Solid-phase treatment residual will be disposed after treatment, and liquid treatment residual will be returned to the East Tennessee Technology Park.

[1]MLLW is low-level radioactive waste, which is regulated under RCRA, TSCA, or both. Low-level radioactive waste is defined as waste that contains radioactivity and is not classified as high-level waste, transuranic (TRU) waste, or spent nuclear fuel, or the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content.

Eighteen containers of dioxin and furan-coded liquid-phase waste remain in inventory and currently have no path for treatment and disposal. This includes two containers of waste returned from treatability studies.

FY2022, 2023, and 2024 ~~FY2021, 2022, and 2023~~ milestones - DOE shall accomplish the following:

1. Complete shipment of MLLW with Dioxin and Furan Codes to a treatment facility after appropriate treatment technology becomes available at a facility with the necessary permits and licenses, approval to receive the waste is in place, and the treatment facility is operationally ready to receive the waste.

2. By December 31, 2021, DOE shall complete a liquid-phase dioxin and furan waste treatment study and submit a report to TDEC describing the results of the treatment study.

3. By the 30th day after the end of each quarter, DOE will provide TDEC with a quarterly report presentation providing the status of Table 3.4 disposition efforts. These quarterly reports should incorporate the following:

    a. Complete listing of STP Table 3.4 waste populations as of October 1 (first day of the current FY), including identification of the planned disposition facility for each waste population, quantities of waste shipped during the quarter per waste population, and the shipping destination of each.

    b. For each waste population, provide the status of treatment technology availability, approval to receive waste by the treatment facility, and treatment facility operational readiness to receive the waste.

    c. Waste population inventories in kilograms and by container count with identification of the mass of uranium (U)-235 in an enriched matrix for each population.

    d. Footnotes for each waste transfer in or out of the table, as well as between the waste streams, with a detailed explanation of the basis for the transfer.

In milestone 1 above, the referenced terms shall be defined as follows:

1. Appropriate Treatment Technology becomes Available

    Appropriate technology is available when a vendor has the ability to provide a technology that can successfully meet the treatment objectives.

2. Permits and Licenses are in Place

    Permits and licenses are in place when all permits and licenses required to operate a specific technology and process the waste to be treated have been fully approved by the cognizant regulatory authority and issued to the treatment facility.

3. The Facility is Operationally Ready to Receive the Waste

    A facility is considered operationally ready when all equipment necessary to provide a certain waste treatment service is fully operational and tested, and all permit and license requirements have been fully implemented.

FY2021 ~~FY2020~~ milestones completed:

1. Quarterly Reporting Milestones ***(October 22, 2020; January 21, 2021; April 22, 2021; and July 29, 2021)*** ~~(October 24, 2019; January 23, 2020; April 9, 2020; and July 23, 2020)~~

Previous FY milestones completed:

1. Quarterly Reporting Milestones
   (October 30, 2012; January 24, 2013; April 23, 2013; and July 25, 2013)
   (October 24, 2013; January 23, 2014; April 24, 2014; and July 31, 2014)
   (October 23, 2014; January 29, 2015; April 30, 2015; and July 23, 2015)
   (October 22, 2015; January 28, 2016; April 28, 2016; and July 28, 2016)
   (October 27, 2016; January 26, 2017; April 27, 2017; and July 27, 2017)
   (October 26, 2017; January 25, 2018; April 26, 2018; and July 26, 2018)
   (October 25, 2018; January 24, 2019; April 18, 2019; and July 25, 2019)
   (October 24, 2019; January 23, 2020; April 9, 2020; and July 23, 2020)

2. Complete shipment of reactive MLLW by June 30, 2014. (March 27, 2014)

3. Complete shipment of Classified MLLW by March 31, 2015. (March 4, 2015)

4. Complete shipment of mercury-contaminated MLLW after appropriate treatment technology becomes available at a facility with the necessary permits and licenses, approval to receive the waste is in place, and the treatment facility is operationally ready to receive the waste. (September 22, 2016)

5. By September 30, 2019, report to TDEC the technical, contractual, and regulatory feasibility of treating the dioxin and furan liquid-phase waste via a combination of stabilization and macroencapsulation under variances from the necessary regulatory agencies. (September 24, 2019)

Milestones mutually agreed to be replaced and removed from the STP:

1. Complete shipment of Classified MLLW and Classified MLLW with Dioxin and Furan Codes within one year after the appropriate treatment technology becomes available with the necessary permits and licenses, approval to receive classified material is in place, the treatment facility is operationally ready to receive the waste, and DOE Safeguards and Security has authorized shipment of the waste to the treatment facility.

2. Complete shipment of MLLW with Prohibited Codes (Dioxin and Furan Codes) to treatment facility within one year after the treatment facility notifies DOE that appropriate treatment technology becomes available with the necessary permits and licenses, approval to receive the waste is in place, and the treatment facility is operationally ready to receive the waste.

3.2 DISPOSAL AREA REMEDIAL ACTION SOILS AND DEBRIS

Disposition of the Disposal Area Remedial Action soils (MWIR No. M3306) was completed in FY2019. Stream M3306 did not have an inventory and was deleted from the STP, in accordance with Sect. 2.7.1, “Deletion of Wastes.”

3.3 NATIONAL NUCLEAR SECURITY ADMINISTRATION MIXED LOW-LEVEL WASTE

In August 2016, the National Nuclear Security Administration (NNSA) formally requested, and TDEC provided concurrence for, the addition of eighty-one (81) MLLW containers to Table 3.6 of the ORR STP. While similar to wastes previously covered under the STP, these items were not included in the STP, as they contained enriched uranium and recovery of the uranium was planned. Due to the presence of unwanted contaminants, recovery is no longer planned and this population is currently being managed as MLLW. Proper packaging and disposition of these items will require several years, so addition to the STP is appropriate. These eighty-one containers are hereafter referred to as the 7/28/2016 baseline inventory for MWIR Stream M3308.

Options to recover the uranium for beneficial use have been and will continue to be explored. Transfer of the material to the Savannah River Site for use in fuel production is considered a viable option; however, a final decision is not expected this fiscal year. If an agreement can be reached for beneficial use, the material will no longer be considered waste and a request will be made to remove it from the STP.

On March 11, 2020, the NNSA formally requested, and on March 12, 2020, TDEC provided concurrence for, the addition of six (6) MLLW containers of contact handled debris to Table 3.6 of the ORR STP under MWIR 3315.

Disposition schedules for the inventory of items in MWIR Stream M3308 are provided below.

FY2022, 2023, and 2024 ~~FY2021, 2022, and 2023~~ milestones - DOE shall accomplish the following:

1. By the 30th day after the end of each quarter, DOE will provide TDEC with a quarterly report presentation providing the status of Table 3.6 disposition efforts.

~~2. By 3/1/2021 ship all six containers of MWIR M3315 for treatment or disposal.~~

2. By 9/30/2022 ship a cumulative total of 49 items on the 7/28/2016 baseline inventory for MWIR Stream M3308 for treatment or disposal.

3. By 9/30/2023 ship a cumulative total of 57 items on the 7/28/2016 baseline inventory for MWIR Stream M3308 for treatment or disposal.

4. By 9/30/2024 ship a cumulative total of 65 items on the 7/28/2016 baseline inventory for MWIR Stream M3308 for treatment or disposal.

Target Dates

~~1. By 9/30/2024 ship a cumulative total of 65 items on the 7/28/2016 baseline inventory for MWIR Stream M3308 for treatment or disposal.~~

1. By 9/30/2025 ship a cumulative total of 73 items on the 7/28/2016 baseline inventory for MWIR Stream M3308 for treatment or disposal.

2. By 9/30/2026 ship a cumulative total of 81 items on the 7/28/2016 baseline inventory for MWIR Stream M3308 for treatment or disposal.

~~FY2020 and~~ ***FY***2021 milestones completed:

1. Quarterly Reporting Milestones ***(October 22, 2020; January 21, 2021; April 22, 2021; and July 29, 2021)*** ~~(October 24, 2019; January 23, 2020; April 9, 2020; and July 23, 2020)~~

~~2. By 9/30/2020, ship a cumulative total of 33 items on the 7/28/2016 baseline inventory for MWIR Stream M3308 for treatment or disposal (February 15, 2018)~~

2. By 9/30/2021, ship a cumulative total of 41 items on the 7/28/2016 baseline inventory for MWIR Stream M3308 for treatment or disposal. (August 2, 2018)

3. By 3/1/2021 ship all six containers of MWIR M3315 for treatment or disposal. (February 16, 2021)

Previous FY milestones completed:

1. Quarterly Reporting Milestones
   (October 30, 2012; January 24, 2013; April 23, 2013; and July 25, 2013)
   (October 24, 2013; January 23, 2014; April 24, 2014; and July 31, 2014)
   (October 23, 2014; January 29, 2015; April 30, 2015; and July 23, 2015)
   (October 22, 2015; January 28, 2016; April 28, 2016; and July 28, 2016)
   (October 27, 2016; January 26, 2017; April 27, 2017; and July 27, 2017)
   (October 26, 2017; January 25, 2018; April 26, 2018; and July 26, 2018)
   (October 25, 2018; January 24, 2019; April 18, 2019; and July 25, 2019)
   (October 24, 2019; January 23, 2020; April 9, 2020; and July 23, 2020)

2. September 30, 2013 – Complete the recovery process, including leaching or splitting, to create product that is acceptable for discard from 12 items on the baseline inventory and prepare for offsite treatment of disposal. (September 12, 2013)

3. September 30, 2014 – Ship a cumulative total of 12 items on the baseline inventory for MWIR Stream M3303A for treatment or disposal. (September 9, 2013)

4. September 30, 2015 – Ship or recover entirely a cumulative total of 24 items on the baseline inventory for MWIR Stream M3303A for treatment or disposal. (September 18, 2014)

5. September 30, 2016 – Ship or recover entirely a cumulative total of 36 items on the baseline inventory for MWIR Stream M3303A for treatment or disposal. (August 6, 2015)

6. September 30, 2017 – Ship or recover entirely a cumulative total of 48 items on the baseline inventory for MWIR Stream M3303A for treatment or disposal (represents 11 items from the 10/1/15 inventory). (March 10, 2016)

7. By 9/30/2017 ship 9 items on the 7/28/2016 baseline inventory for MWIR Stream M3308 for treatment or disposal. (June 15, 2017)

8. By 9/30/2018 ship a cumulative total of 17 items on the 7/28/2016 baseline inventory for MWIR Stream M3308 for treatment or disposal. (July 20, 2017)

9. September 30, 2018 – Ship or recover entirely a cumulative total of all 57 items on the baseline inventory for MWIR Stream M3303A for treatment or disposal (represents 9 items from the 10/1/15 inventory). (April 26, 2016)

10. By 9/30/2019 ship a cumulative total of 25 items on the 7/28/2016 baseline inventory for MWIR Stream M3308 for treatment or disposal. (August 31, 2017)

11. ***By 9/30/2020, ship a cumulative total of 33 items on the 7/28/2016 baseline inventory for MWIR Stream M3308 for treatment or disposal (February 15, 2018)***

3.4 LEGACY LOW-LEVEL RADIOACTIVE REACTIVE METALS (SODIUM AND LITHIUM SHIELDS)

In accordance with Section 2.4, "Inclusion of New Waste Streams," on March 14, 2017, TDEC approved the addition of sodium and lithium shields waste stream to the STP.

The sodium and lithium shields were constructed for use in experiments at the Tower Shielding Facility (TSF), Oak Ridge National Laboratory (ORNL). The shield containers are constructed of aluminum or stainless steel of varying sizes and shapes that were then filled with either sodium metal or lithium hydride material. The TSF operated from 1954 to 1992 and was designed and built for radiation-shielding studies. The historical records indicate the sodium shields were constructed at the Molten Salt Reactor for use in experiments in the 1971 time frame, while the lithium shields were constructed at Y-12 and used in experiments as early as 1961. A subset of the sodium and lithium shields contains uranium.

The sodium and lithium shields were initially used at the TSF to perform in-depth measurements of the neutron transport through the shield materials. Based on historical process knowledge, the shields are managed as radiologically contaminated containers. The shields are no longer present at this facility. The TSF is included in the Remedial Site Evaluation List (Appendix C) of the Federal Facility Agreement (FFA) for the ORR. The TSF is also included in the ORNL Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Surveillance and Maintenance Waste Handling Plan.

Until a disposition path is found, the shields will continue to be stored in a safe configuration that is protective of human health and the environment. The shields will be staged in accordance with waste storage container management criteria appropriate for solids that meets the conditions in 0400-12-01-.05(9)(a to g) (Title 40, CFR, Part 265.170 to 177):

FY2022, 2023, and 2024 ~~FY2021, 2022, and 2023~~ milestones – DOE shall accomplish the following:

1. By March 31, 2022, DOE shall submit a report describing the status of and steps taken to find a treatment and disposal option for the sodium and lithium shields.

~~FY2020 milestones completed:~~

~~1. By December 30, 2019, conduct an evaluation to determine available alternatives for treatment and disposal of the ORR inventory of sodium and lithium shields as necessary to meet RCRA LDR or equivalent, and provide a report to TDEC describing the alternatives identified. (Completed December 11, 2019)~~

Previous FY milestones completed:

1. By December 31, 2017, treat and dispose of 22 small sodium and lithium shields at an offsite treatment and disposal facility. (August 14, 2017)

2. By March 31, 2018, conduct an engineering evaluation that will describe the storage, treatment, or recycling plans for the remaining sodium and lithium shields. Upon completion of engineering

evaluation, additional milestones/target dates may be proposed. (March 27, 2018)

3. By October 31, 2018, submit a Class11 RCRA permit modification request to TDEC. This permit modification request will be for the purpose of changes to the RCRA-permitted unit to allow for storage of the shields. (Completed October 4, 2018)

4. By December 31, 2018, remove the present contents of the future shield storage building at ORNL in preparation for modifying the building. (Completed October 30, 2018)

5. By September 30, 2019, complete modifications to the future shield storage building at ORNL. (Completed September 4, 2019)

6. ***By December 30, 2019, conduct an evaluation to determine available alternatives for treatment and disposal of the ORR inventory of sodium and lithium shields as necessary to meet RCRA LDR or equivalent, and provide a report to TDEC describing the alternatives identified. (Completed December 11, 2019)***

3.5 MERCURY-CONTAMINATED MIXED WASTE

The letter from Revendra Awasthi and Ashwin Brahmbhatt to James Daffron, William McMillan, Brian Henry, and Johnny Moore, "Submittal of the Semi-Annual Progress Report – Site Treatment Plan for Mixed Waste on the United States Department of Energy Oak Ridge Reservation", dated May 14, 2019, requested that DOE provide the information and schedules required under Section 2.4.2 of the STP for mercury-bearing mixed waste streams or provide appropriate justification, supporting information and proposed plans for developing such information and schedules in the next Annual Update. The letter from John A. Mullis II to David Salyers, "Provision Of Information On Potential Mixed Wastes," dated March 28, 2019, indicates that future environmental restoration activities at the DOE Oak Ridge Reservation may generate up to 177,000 cubic yards of soil and debris containing sufficient concentrations of mercury to require treatment prior to disposal (e.g., be assigned a D009 hazardous waste code for mercury). In addition to this mixed waste volume, low-level (radiological) waste debris and soil, estimated at roughly two to three times the mixed waste volume, have been estimated to require disposal through cleanup of the Y-12 National Security Complex facilities and areas in the West End Mercury Area.

DOE has identified possible treatment options for anticipated mixed waste containing mercury in the "Strategic Plan for Mercury Remediation at the Y-12 National Security Complex Oak Ridge, Tennessee," (DOE/OR/01-2605&D2/R1), dated September 2017. Those options, as outlined in the document, are consistent with Federal and State RCRA requirements. DOE will conduct all treatment of identified mixed waste within this framework. At this time, however, specifics on the treatment to be carried out are still being investigated.

All practicable measures will be taken to remove/reduce elemental mercury content in waste streams prior to disposal. Once removed, elemental mercury will either be sent for long-term storage or treated and disposed of at offsite facilities consistent with RCRA requirements.

~~FY2020~~ ***Previous FY*** milestones:

By September 30, 2020, submit a detailed report with justification, on:

1. the specific LDR compliant treatment technology and a timeline/schedule leading to the treatment of the mixed mercury waste stream(s) to be generated prior to its eventual disposal. Include a list of potential permitted vendors who can perform the treatment utilizing this technology.

2. the characterization plan/schedule for the mixed mercury waste stream(s) to be generated. Include a list of potential licensed laboratories for this task.

   (DOE submitted a report for purposes of meeting the milestone on September 18, 2020. TDEC found the document to be deficient and returned it with comments on April 20, 2021. To date, DOE has not formally responded to TDEC's comments on the report although discussions are ongoing.)

3.6 CERTAIN TREATMENT TECHNOLOGIES AND STRATEGIES FOR MLLW

This section provides a discussion of how DOE utilizes certain treatment technologies and provisions of the Land Disposal Regulations as authorized in TN rule 0400-12-01-.10 [40 CFR 268]. This information is being providing as requested by TDEC.

Macroencapsulation of Hazardous Debris:
TN rule 0400-12-01-.10(3)(f) [40 CFR 268.45], Treatment Standards for Hazardous Debris, provide an alternate set of treatment standards for hazardous waste which meets the definition of debris as defined in the RCRA regulations. One technology authorized under the treatment standards for hazardous debris is macroencapsulation. There are no waste code exclusions for macroencapsulation under TN rule 0400-12-01-.10(3)(f) [40 CFR 268.45]. In some cases, DOE performs macroencapsulation (MACRO) of MLLW debris using what are generically called "MACRO bags." MLLW debris treated using MACRO bags are typically disposed at NNSS.

The types of MLLW debris that are most typically packaged in MACRO bags include, but are not limited to, wood, pieces of concrete, pipe, steel, and PPE. As required by the rules for hazardous debris, the debris placed into MACRO bags cannot contain free liquids. Waste that contains free liquids does not meet the definition of hazardous debris and must be treated pursuant to the general LDR treatment standards at TN rule 0400-12-01-.10(3) [40 CFR 268.40]. Please note that visible elemental mercury in a waste stream is free liquid and is a condition which prohibits a hazardous waste from being managed under the alternative standards for hazardous debris.

DOE also uses MACRO bags to treat MLLW debris contaminated with other RCRA-regulated contaminates other than mercury.

Management of Mercury-bearing MLLW:
Mercury-bearing MLLW can be divided into three categories:

- MLLW that is characteristically hazardous for mercury (D009) or has been assigned EPA Waste code U151, and has no visible mercury (debris and non-debris)
- MLLW (D009 or U151) that contains visible mercury (debris and non-debris)
- Radioactively contaminated elemental mercury

Waste with No Visible Mercury
DOE manages characteristically hazardous or U151-listed MLLW with no visible mercury consistent with the general D009 and U151 treatment standards at TN rule 0400-12-01-.10(3) [40 CFR 268.40]. Non-debris wastes are treated via RMERC or other technologies approved in the treatment facility's permit. These wastes are disposed offsite, typically at EnergySolutions (Clive) or at NNSS.

D009 or U151 MLLW with no visible mercury that meet the definition of debris are typically macroencapsulated using MACRO bags.

Wastes with Visible Mercury

Mercury-bearing D009 and U151 MLLW exist with mercury present in several different ways. In some wastes, mercury is present in the form of small reflective specs in the waste. In other wastes, mercury may have pooled in concave locations in the waste, inside of debris items that create a bowl-like feature, or in the bottom of the waste container. In each of these cases, the waste matrix itself is shipped for treatment using RMERC or other technologies approved in the treatment facility's permit consistent with the general D009 and U151 treatment standards in TN rule 0400-12-01-.10(3) [40 CFR 268.40]. The elemental mercury that has pooled in the waste or in the waste container is not typically separated onsite, but is shipped with the other waste in the container. The elemental mercury is identified in the LDR Notice as being subject to the Radioactively Contaminated Elemental Mercury treatment subcategory and is treated via amalgamation or as authorized in the treatment facility's permit. These wastes are disposed offsite, typically at EnergySolutions (Clive) or at NNSS.

Wastes containing free mercury cannot and are not managed pursuant to the alternative standards for debris. LLW which contains visible elemental mercury is managed as D009 MLLW.

Radioactively Contaminated Elemental Mercury

TN rule 0400-12-01-.10(3) [40 CFR 268.40] includes a separate treatment subcategory for D009 and U151 radioactively contaminated mercury. The treatment technology specified in TN rule 0400-12-01-.10(3) [40 CFR 268.40 for radioactively contaminated elemental mercury is amalgamation. MLLW this is radioactively contaminated mercury is shipped for treatment via amalgamation or as authorized in the treatment facility's permit. This waste is typically disposed at EnergySolutions (Clive) or NNSS.

MLLW Soil:

On some occasions DOE has treated and disposed MLLW that met the definition of soil in the RCRA regulations under the alternative standards for soil pursuant to TN Rule 0400-12-01-.10(3)(j) [40CFR 268.49]. Up to this point, it has not been common for the MLLW that has been generated to meet the definition of soil and to meet the requirements of the alternative LDR standard for soil.

3.7 ETTP NEWLY DISCOVERED HIGH RAD MLLW CONTAINER

During demolition of the K-1401-J Lab Building, a container of unknown material was found in a vertical concrete storage well under the building floor slab. The container found in the concrete well appears to have been fabricated from welded ferrous metal. The container is approximately 30 inches in diameter and 3 feet tall. The container is damaged from being hit with heavy equipment during removal of the K-1401-J slab. Since no contamination was found outside the container and nothing spilled from the container at the time of discovery, a smaller inner container is believed to be present.

The waste in the container was likely generated from research activities associated with filtering spent fuel through Fuller's Earth media to capture the cesium (Cs)-137 and strontium (Sr)-90 on the Fuller's Earth and allow plutonium, uranium, and americium to pass through and not be retained on the media.

The container has been packaged in a PacTec LiftPac®[2] bag and then loaded into a metal IP-1 B-25 box. The box and its contents are being evaluated for storage in a RCRA-permitted storage facility at ORNL.

The maximum dose coming off the welded ferrous container at contact is 3 R/hr. The maximum dose rates for the IP-1 B-25 box are 310 mR/hr on contact, 110 mR/hr at 30 cm, and 26 mR/hr general area.

This waste is characteristically hazardous for barium (D005).

UCOR LLC (an Amentum-led partnership with Jacobs) solicited treatability study proposals from vendors on or adjacent to the ORR to which this waste could be shipped out-of-commerce. The vendors notified UCOR that they could not perform the treatability study as they did not have hot cell-type facilities suitable for performance of the requested treatability study. This waste must be treated in a hot cell facility onsite or shipped offsite in specialized packaging.

Treatment and disposal options for this waste will continue to be sought.

FY2022, 2023, and 2024 milestones – DOE shall accomplish the following:

1. ***By September 30, 2022, DOE shall submit an update describing the status of and steps taken to find a treatment and disposal option for this waste.***

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[2]Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

Table 3.4 No path to disposal mixed low-level waste

Site MWIR	National MWIR	Sub-Group	Description	9/30/2021 (kg) actual	9/30/2021 (m^3) actual	GEN21 (kg) estimated	GEN21 (m^3) est.	Treatment Option
Organic Debris (Section 3.1)								
M1324		-	Organic Debris (Outside TSCAI WAC)	0.00	0.000	0	0.000	Balance of Inventory
Stream Count:		1	**Sub-Total:**	0.00	0.000	0	0.000	
Organic Liquids (Section 3.1)								
M1327		-	Organic Liquids (Outside TSCAI WAC)	0.00	0.000	0	0.000	Balance of Inventory
Stream Count:		1	**Sub-Total:**	0.00	0.000	0	0.000	
Aqueous Liquids (Section 3.1.3)								
M1414		-	Aqueous Liquids for Immob	4,868.00	4.868	0	0.000	Balance of Inventory
Stream Count:		1	**Sub-Total:**	4,868.00	4.868	0	0.000	
Inorganic Solids (Section 3.1)								
M1513	DP-W157	P	Inorganic Particulates for Thermal Treatment	0.00	0.000	0	0.000	Balance of Inventory
Stream Count:		1	**Sub-Total:**	0.00	0.000	0	0.000	
Containerized Soils (Section 3.1)								
M1531	DP-W161	-	Soils for Immobilization	0.00	0.000	0	0.000	Balance of Inventory
Stream Count:		1	**Sub-Total:**	0.00	0.000	0	0.000	
Inorganic Debris (Section 3.1)								
M1562	DP-W171	-	Heterogeneous Debris for Sorting and Segregation	0.00	0.000	0	0.000	Balance of Inventory
Stream Count:		1	**Sub-Total:**	0.00	0.000	0	0.000	
Treatment Facility Returns (Section 3.1.1)								
M1781	DP-W174	N	Mercury-Contaminated Returns	0.00	0.000	0	0.000	Balance of Inventory
M1782	DP-W178	N	Reactive Returns	0.00	0.000	0	0.000	Balance of Inventory
Stream Count:		1	**Sub-Total:**	0.00	0.000	0	0.000	
Stream Count:		1	**Grand Total:**	4,868.00	4.868	0	0.000	

Table 3.5 Mixed low-level waste with no milestones under the Site Treatment Plan

The CERCLA activities supporting Table 3.5 of the STP have been completed. Table 3.5 did not have an inventory and was deleted from the STP, in accordance with Sect. 2.7.1, "Deletion of Wastes."

Table 3.6 NNSA mixed low-level waste

Site MWIR	Description	Baseline Inventory Item Count 9/30/2021	Baseline Inventory Net Weight (kg) 9/30/2021
NNSA Mixed Low-Level Waste (Section 3.3)			
M3308*	Uranium Contaminated Solutions	35	300.6
M3315	CH Debris	-	-
Stream Count: 1	**Sub-Total:**	35	300.6
Stream Count: 1	**Grand Total:**	35	300.6

* Containers are predominantly poly bottles used for the safe storage of radioactive materials. Some solutions are phased and may contain a solid phase.

Table 3.7 Legacy reactive metals (sodium and lithium shields)

Site MWIR	Description	Baseline Inventory Item Count 12/15/2016	Baseline Inventory Gross* Weight (kg) 12/15/2016	Baseline Inventory Item Count 9/30/2021	Baseline Inventory Gross* Weight (kg) 9/30/2021
Legacy Low-Level Radioactive Reactive Metals (Sodium and Lithium Shields) (Section 3.4)					
M1587	Sodium and Lithium Shield Containers	65	85,197	43	84,657
Stream Count: 1	**Sub-Total:**	65	85,197	43	84,657
Stream Count: 1	**Grand Total:**	65	85,197	43	84,657

* Gross weight includes casing container material and internal non-sodium and non-lithium materials such as uranium. Net weight of sodium and lithium material is 59,795 kilograms as of 9/30/2018.

Table 3.8 ETTP newly discovered high rad MLLW

Site MWIR	*Description*	*Baseline Inventory Item Count 9/30/2021*	*Baseline Inventory Gross Weight (kg) 9/30/2021*
ETTP Newly Discovered High Rad MLLW (Section 3.7)			
M1588	*ETTP Newly Discovered High Rad MLLW*	*1*	*1,211*
Stream Count: *1*	***Sub-Total:***	*1*	*1,211*
Stream Count: *1*	***Grand Total:***	*1*	*1,211*

ETTP = East Tennessee Technology Park

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4A. TRANSURANIC MIXED WASTE STREAMS

(This chapter addresses transuranic (TRU) mixed waste streams managed by the DOE Oak Ridge Office of Environmental Management. Chapter 4B, "ORNL Site Office Managed Waste," addresses Office of Science TRU mixed waste.)

Background:

The MTRU on the ORR are all located at ORNL. These wastes, discussed in this chapter, are divided into two primary waste streams, remotely handled (RH)-transuranic sludges consisting of approximately ~~1,689,400~~ ***1,778,680*** kg and contact-handled (CH)- and RH-TRU debris and solids consisting of approximately ~~1,209,120~~ ***1,139,810*** kg. These waste streams comprise approximately ~~60%~~ ***57%*** of MTRU waste requiring treatment under this plan. Another ~~1,967,330 kg (~40%)~~ ***2,207,780 (~43%)*** of RH mixed low-level aqueous waste in active storage tanks at ORNL is reported in Table 4.3 because it is integrally associated with the management of RH-TRU sludges reported in Table 4.1.

Historical operations at ORNL resulted in generation of liquid radioactive waste, now in long-term storage in Bldg. 7830 with eight 50,000-gal tanks (i.e., the Melton Valley Storage Tanks [MVST]) and in Bldg. 7856 with six 100,000-gal tanks (i.e., the MVST Annex). The tank contents consist of a sludge layer containing TRU waste with a supernate top layer. Currently, the anticipated quantity of sludge/supernate to be processed for disposal is approximately 2000 cubic meters (~528,000 gal).

The strategy for compliance for processing of TRU debris and sludges is to repackage the debris and stabilize the sludges and ship the final waste form to the Waste Isolation Pilot Plant (WIPP) in Carlsbad, New Mexico or the Nevada National Security Site (NNSS), depending on the final characterization of the processed waste. Work to establish the TRU Waste Processing Center (TWPC) began in 1998 with an initial contract award to construct the facilities.

In September 2000, the scope of the waste to be processed was expanded to address TRU wastes from trenches within Melton Valley's Solid Waste Storage Area (SWSA) 5 North. With the exception of Trench 13, work to remove the waste from the Melton Valley trenches was completed under Atomic Energy Act authority in conjunction with an interim CERCLA action for Melton Valley. (Historical information regarding this additional scope can be found in previous Annual Updates and in the agreement between DOE and TDEC shown in Appendix B.) Work to retrieve waste from Trench 13 was discontinued in 2005 when unexpected pyrophoric material was encountered during excavation.

Milestones for processing RH TRU waste were initially established in 2007 prior to start-up of processing operations based on aggressive processing rate assumptions and the best available information regarding the physical and radiological properties of the waste. TWPC gained knowledge and operating experience once processing operations began, including the discovery of significant technical issues related to the properties of the waste that affected the initial processing rate assumptions. In previous updates to the STP, there were several extensions to both debris and processing milestones based on technical issues and other mutually agreed-to series of events.

These issues have included the complex nature of processing the TRU sludge waste, concerns associated with the need to minimize radiation dose rates to personnel working in the processing facilities, and ultimately, the need to redesign the sludge processing facility in order to separate the sludge processing activities from the debris activities.

The ability to complete processing of the MTRU waste was further complicated when the National TRU Program's Central Characterization Project (CCP), which accomplishes final certification of mixed transuranic wastes prior to shipment to WIPP, was temporarily removed from the TWPC in 2011. CCP

returned to TWPC in the fall of 2013 to support waste characterization and shipments with plans to begin shipping to WIPP in March of 2014. In February of 2014, there were two incidents that occurred at WIPP. As a result of those events, many changes have been made to the WIPP safety management programs and governing requirements. Shipments to WIPP resumed in August of 2017 and have continued with regular frequency resulting in a significant inventory reduction of CH-TRU waste from the Oak Ridge Reservation. Several changes to the existing WIPP Waste Acceptance Criteria (WAC) have been made (revision 8). WIPP WAC changes must be incorporated into WIPP certified programs' plans and implementing procedures. New requirements for WIPP certification include:

- Generator Site Technical Reviews
- Acceptable Knowledge Enhancements
- Interface Waste Document List
- Enhanced Chemical Compatibility Evaluation
- Basis of Knowledge of Evaluating Oxidizing Chemicals in TRU Waste
- WIPP Certified Program Acceptable Knowledge (AK) Assessments

The new Enhanced AK requirements have added significant technical evaluation requirements necessary to be completed to achieve final WIPP certification. Key certification activities such as Chemical Compatibility Evaluations and Basis of Knowledge Evaluation of Oxidizing Chemicals in TRU Waste extend the final certification significantly beyond the initial field characterization/certification activities and are completed prior to shipment of TRU waste to WIPP. DOE Headquarters has placed high priority on TRU waste disposition within the complex including Oak Ridge. TDEC will continue to monitor activities for TRU waste disposition to WIPP to ensure equitable commitment of WIPP transportation resources.

In addition to the WIPP events of 2014 on April 11, 2018 there was an incident at the Idaho National Laboratory site. A thermal event led to an energetic release of radioactive material from four drums of suspect TRU waste. A subsequent DOE investigation resulted in issuance of a preliminary safety alert in May 2019, followed by an Operating Experience Level 2 report requiring all sites to conduct an extent of condition review with focus on flammable gas hazards and potential energetic chemical reactions. These recent events involving reactions of radioactive oxide materials have resulted in significant safety analysis to ensure safe processing and to confirm the stability of potentially reactive materials before disposal. The remaining wastes planned for processing to meet the remaining STP milestones contain materials that have potential flammable gas hazards including deflagration with transition to detonation, and pyrophoric properties. Completion of additional safety analysis to establish engineering and administrative controls to address these technical issues will result in extension of existing STP milestones. These efforts associated with establishment of appropriate safety controls were expanded in 2020 upon discovery of a significant number of additional oxides requiring revision to the TWPC Documented Safety Analysis.

Results from project reviews, DOE Order requirements for demonstrating technology readiness, and lessons learned from sludge processing projects at other DOE sites emphasized the need to construct a test facility to achieve full-scale testing to support sludge processing facility design, construction, and operation to meet DOE requirements. The design for the test facility proceeds in parallel with the debris processing. The debris processing is performed by North Wind, and the design, construction, and testing for the Sludge Processing Facility Buildouts Project Sludge Test Area will be performed by another vendor.

DOE submitted a Life Cycle Planning Schedule to TDEC in September 2016, along with proposed milestones and targets for the sludge processing project. DOE is committed to working with the state of Tennessee to establish milestones and targets to demonstrate continued progress towards completion of sludge processing while the above changes are implemented. The proposed milestones and targets are in the TRU Sludge Milestone section and the TRU Sludge Target section, respectively.

DOE worked with TDEC to develop the following definitions, which would be used in measuring milestones.

Definitions:

Processing: For purposes of measuring the completion of milestones associated with processing a specific volume of waste from the stored legacy inventory, processing is defined as the physical steps required to prepare waste for final disposition as TRU waste to WIPP or low-level waste (LLW)/MLLW to NNSS or other disposal facility. Completion will be measured as accomplished when verification, appropriate remediation, and appropriate repackaging have been completed to support initial field characterization/certification. Volumetric milestones will be met when these physical processing steps have been completed. Volumes of waste in stored inventory refer to the original baseline inventory in FY2005, including legacy and projected newly generated volume. As of FY2017 the projected inventory is 1588 m^3 of CH waste, ~~691~~ ***695*** m^3 of RH waste, and 2000 m^3 of RH sludge.

Newly generated volumes of TRU waste include newly generated waste previously accepted by DOE-EM from DOE-SC, and newly generated waste managed by DOE-SC and reported to TDEC in the DOE Office of Science, ORNL STP submission.

Regulatory requirements for MLLW: Waste that is determined to be MLLW during characterization and processing of the TRU inventory will be subject to full compliance with RCRA and will be treated to meet LDRs within one year of discovery, unless treatment capacity is not available.

Removal of waste inventory from the STP: Waste will be removed from regulatory coverage under the STP when any of the following conditions are met:

1. Waste inventory determined to be MLLW will be removed from the STP when the waste has been treated to meet LDRs under RCRA.

2. Waste inventory determined to be TRU waste will be removed from the STP when the waste is shipped to WIPP.

3. Waste inventory determined to be LLW will be removed from the STP.

Waste Streams: Streams include CH waste, RH waste, and RH sludge. The volume of TRU waste identified in the STP includes wastes confirmed during final characterization activities to be MLLW or LLW. The STP also includes milestones for the evaluation of options for the disposition of the material in Trench 13 and for the plans to implement the agreed-upon outcome of the evaluation options.

FY2022, 2023, and 2024 ~~FY2021, 2022, and 2023~~ milestones - DOE shall accomplish the following:

1. Within 30 days of the end of each quarter, and for the duration of the TRU waste processing campaign, provide TDEC with a quarterly report presentation detailing the progress on the processing of the TRU waste inventory, including the status of WIPP certification for the processed waste and treatment of any MLLW discovered during processing. The presentation will also include the status of sludge build-out project design, testing, and construction activities.

   TRU Debris Milestones:

1. By ~~March 28, 2022~~ ***March 27, 2023***, complete physical preparation of 59 m^3 of technically challenging and co-located CH-TRU debris as well as STP waste inventory growth, enabling the final characterization of the waste for disposal. For purposes of this milestone, completion will be measured as accomplished when verification, appropriate remediation, and appropriate repackaging

have been completed to support initial characterization. This milestone will be subject to review and potential extension as part of the ~~FY22~~ ***FY23*** Annual Update of the STP based upon any continuing impacts due to the COVID-19 Global Pandemic, and technical issues associated with the discovery of additional oxide waste requiring safety-related controls.

2. By ~~October 28, 2022~~ ***October 27, 2023***, complete physical preparation of remaining inventory of 16 m^3 of technically challenging and co-located CH-TRU debris as well as STP waste inventory growth, enabling the final characterization of the waste for disposal. For purposes of this milestone, completion will be measured as accomplished when verification, appropriate remediation, and appropriate repackaging have been completed to support initial characterization. This milestone will be subject to review and potential extension as part of the ~~FY22~~ ***FY23*** Annual Update of the STP based upon any continuing impacts due to the COVID-19 Global Pandemic, and technical issues associated with the discovery of additional oxide waste requiring safety-related controls.

3. By ~~October 28, 2022~~ ***October 27, 2023***, complete physical preparation of the remaining inventory of 22 m^3 of RH-TRU debris inventory, enabling the final characterization of the waste for disposal. For purposes of this milestone, completion will be measured as accomplished when verification, appropriate remediation, and appropriate repackaging have been completed to support initial characterization. This milestone will be subject to review and potential extension as part of the ~~FY22~~ ***FY23*** Annual Update of the STP based upon any continuing impacts due to the COVID-19 Global Pandemic, technical issues associated with the discovery of additional oxide waste requiring safety-related controls, and waste subject to specialized requirements.

4. By ~~December 28, 2022~~ ***December 27, 2023***, accomplish final WIPP certification of all remaining RH-TRU debris waste inventory, as shown in Table 4.1 of the STP. (Date extended due to additional certification requirements under WIPP WAC, revision 8. TDEC recognizes that as of the WIPP WAC, revision 8, final WIPP certification is managed by the DOE Carlsbad Field Office.) This milestone will be subject to review and potential extension as part of the ~~FY22~~ ***FY23*** Annual Update of the STP based upon any continuing impacts due to the COVID-19 Global Pandemic, technical issues associated with the discovery of additional oxide waste, and waste subject to specialized requirements.

5. By ~~December 28, 2022~~ ***December 27, 2023***, accomplish final WIPP certification of all remaining CH-TRU debris waste inventory, as shown in Table 4.1 of the STP. (Date extended due to additional certification requirements under WIPP WAC, revision 8. TDEC recognizes that as of the WIPP WAC, revision 8, final WIPP certification is managed by the DOE Carlsbad Field Office.) This milestone will be subject to review and potential extension as part of the ~~FY22~~ ***FY23*** Annual Update of the STP based upon any continuing impacts due to the COVID-19 Global Pandemic, and technical issues associated with the discovery of additional oxide waste requiring safety-related controls.

TRU Sludge Milestones:

1. By ***June 30, 2022*** ~~October 31, 2021~~, complete sludge test area construction.

2. By ***November 30, 2022*** ~~March 31, 2022~~, provide status report on mock-up testing.

3. By ***January 30, 2024*** ~~May 30, 2023~~, complete mock-up testing for sludge processing.

Trench 13 Milestones:

In May 2014, informal dispute was invoked regarding the path forward for management of Trench 13 waste. Subsequently, TDEC and DOE agreed upon revised milestones for submittal of draft and detailed disposition plans for Trench 13 waste.

1. Within six months of the end of the dispute resolution process, DOE shall submit to TDEC a draft plan which addresses the disposition of the TRU waste remaining in Trench 13 located in SWSA 5 North in accordance with the agreed to outcome of the evaluation of options.

2. Within two months of TDEC concurrence with the draft disposition plan, DOE shall submit to TDEC a detailed plan which addresses the disposition of the TRU waste remaining in Trench 13 located in SWSA 5 North.

The dispute was resolved on October 4, 2017, and the Trench 13 target dates below meet the intent of Items 1 and 2 above.

TRU Sludge Target Dates:

1. By September 30, 2026, provide a preliminary (60%) design for the full-scale sludge processing facility.

After mockup testing progresses and the project matures, the following targets and/or milestones, subject to mutual agreement of TDEC and DOE, will be incorporated into future STP updates:

- Complete design of the full-scale sludge processing facility.
- Award a contract for construction of the full-scale sludge processing facility.
- Begin construction of the sludge processing facility buildouts required for housing TRU sludge.
- Complete processing of 50% of the TRU sludge inventory
- Complete processing of the remaining inventory of TRU sludge inventory

Trench 13 Target Dates:

1. By September 30, 2035, DOE shall submit to TDEC a revised Engineering Evaluation for removal and disposal of the waste from Trench 13.

2. By September 30, 2037, DOE shall begin work to remove and dispose the waste from Trench 13.

FY2021 ~~FY2020~~ milestones completed:

1. Quarterly Reporting Milestones ***(October 22, 2020; January 21, 2021; April 22, 2021; and July 29, 2021)*** ~~(October 24, 2019; January 23, 2020; April 9, 2020; and July 23, 2020)~~

~~2. By January 31, 2020, start sludge test area construction. (January 20, 2020)~~

Previous FY milestones completed:

1. Quarterly Reporting Milestones
   (October 30, 2012; January 24, 2013; April 23, 2013; and July 25, 2013)
   (October 24, 2013; January 23, 2014; April 24, 2014; and July 31, 2014)
   (October 23, 2014; January 29, 2015; April 30, 2015; and July 23, 2015)
   (October 22, 2015; January 28, 2016; April 28, 2016; and July 28, 2016)
   (October 27, 2016; January 26, 2017; April 27, 2017; and July 27, 2017)
   (October 26, 2017; January 25, 2018; April 26, 2018; and July 26, 2018)
   (October 25, 2018; January 24, 2019; April 18, 2019; and July 25, 2019)
   (October 24, 2019; January 23, 2020; April 9, 2020; and July 23, 2020)

2. By June 30, 2012, submit to TDEC a documented strategy for processing the approximately 2000 m^3 of RH sludge inventory. The strategy should describe the methodologies planned for processing the

waste, steps required for final certifications of waste, expected waste throughput capacity, and any expected improvements to be made to the facilities for processing the waste. (June 27, 2012)

3. By September 30, 2013, complete physical preparation of 283 m^3 of the remaining 567 m^3 of CH-TRU debris, enabling the final characterization of the waste for disposal. For purposes of this milestone, completion will be measured as accomplished when verification, appropriate remediation, and appropriate repackaging have been completed to support initial characterization. (February 2012)

4. By March 31, 2014, complete physical preparation of 275 m^3 of the remaining 550 m^3 of RH-TRU debris, enabling the final characterization of the waste for disposal. For purposes of this milestone, completion will be measured as accomplished when verification, appropriate remediation, and appropriate repackaging have been completed to support initial characterization. (January 13, 2014)

5. By June 30, 2014, provide to TDEC a sludge disposition project preliminary lifecycle planning schedule. (June 25, 2014)

6. By January 30, 2014, DOE shall submit to TDEC an engineering evaluation related to the disposition of the material in Trench 13 located in SWSA 5 North with analyses based on environmental risk, characterization of the material, and cost breakdown for proposed options. These options will include retrieval, in addition to short-term and long-term in-place management. (Completed on March 3, 2014, following TDEC agreement of a milestone extension to March 7, 2014.)

7. By March 31, 2015, complete physical preparation of 274 m^3 of CH-TRU debris, enabling the final characterization of the waste for disposal. For purposes of this milestone, completion will be measured as accomplished when verification, appropriate remediation, and appropriate repackaging have been completed to support initial characterization. (January 21, 2015)

8. By March 31, 2015, award a contract for the design of the TRU Sludge Processing Facility. (March 30, 2015)

9. By December 31, 2015, accomplish final WIPP certification of 50% of the remaining RH-TRU waste inventory, as shown in Table 4.1 of the STP. (April 2, 2015)

10. By December 31, 2015, accomplish final WIPP certification of 50% of the remaining CH-TRU waste inventory, as shown in Table 4.1 of the STP. (April 2, 2015)

11. By September 30, 2018, complete physical preparation of remaining 10 m^3 of technically challenging CH-TRU debris (part of the original 284 m^3 of the 3/31/2015 milestone), enabling the final characterization of the waste for disposal. For purposes of this milestone, completion will be measured as accomplished when verification, appropriate remediation, and appropriate repackaging have been completed to support initial characterization of CH-TRU debris, enabling the final characterization of the waste for disposal. (March 19, 2015)

12. By September 30, 2016, provide to TDEC an updated sludge disposition project lifecycle planning schedule. (September 26, 2016)

13. By September 30, 2016, provide to TDEC proposed milestones and/or targets for the following sludge disposition project activities:

    - Complete testing of sludge processing
    - Provide a preliminary (60%) design for the full scale sludge processing facility
    - Complete Design of the full-scale sludge processing facility

- Award a contract for construction of the full scale sludge processing facility

(September 26, 2016)

14. By May 14, 2017, complete sludge test area environmental characterization. (January 18, 2017)

15. By December 31, 2017 complete physical preparation of 242 m^3 of RH-TRU debris, enabling the final characterization of the waste for disposal. For purposes of this milestone, completion will be measured as accomplished when verification, appropriate remediation, and appropriate repackaging have been completed to support initial characterization. (Date extended due to impacts on waste processing associated with the WIPP suspension) (April 27, 2017)

16. By December 31, 2017, issue approved integrated system test plan revision. (October 6, 2017)

17. By September 30, 2018, complete physical preparation of 42 m^3 of CH-TRU debris inventory growth, enabling the final characterization of the waste for disposal. For purposes of this milestone, completion will be measured as accomplished when verification, appropriate remediation, and appropriate repackaging have been completed to support initial characterization. (July 25, 2017)

18. By September 30, 2018, complete physical preparation of 97 m^3 of RH-TRU debris inventory growth, enabling the final characterization of the waste for disposal. For purposes of this milestone, completion will be measured as accomplished when verification, appropriate remediation, and appropriate repackaging have been completed to support initial characterization. (September 28, 2018)

19. By October 31, 2018, start offsite vendor testing. (October 10, 2018)

20. ***By January 31, 2020, start sludge test area construction. (January 20, 2020)***

Milestones and targets mutually agreed to be replaced and removed from the STP:

1. By June 30, 2014, begin construction of the Sludge Processing Annex required for housing TRU sludge.
2. By June 30, 2018, complete processing of 50% of the TRU sludge inventory.
3. By December 31, 2019, complete processing of the remaining inventory of TRU sludge.

Table 4.1 ORR mixed transuranic waste streams under the Site Treatment Plan

Site MWIR	National MWIR	Sub-Group	Description	9/30/2021* (kg) actual	9/30/2021* (m^3) actual	GEN21 (kg) estimated	GEN21 (m^3) est.	Treatment Option
MTRU to be treated at TPF under the Site Treatment Plan								
M2305	OR-W044	-	CH-TRU Heterogeneous Debris	166,510	295	0	0	TWPC/WIPP
M2308	OR-W100	-	RH-TRU Heterogeneous Debris	973,300	227	0	0	TWPC/WIPP
M2344	OR-W097	-	Bethel Valley Evaporator Service Tanks (BVEST) – MTRU Sludge	278,600	190	0	0	TWPC/NNSS
M2345	OR-W098	-	Melton Valley Storage Tanks (MVST) – MTRU Sludge	1,500,080	1,000	0	0	TWPC/NNSS
Stream Count:		4	**Sub-Total:**	2,918,490	1,712	0	0	
Stream Count:		4	**Grand Total:**	2,918,490	1,712	0	0	

TPF = TRU Processing Facility

Streams M2306, M2307, M2313, M2320, and M2321 did not have an inventory and were deleted from the STP in accordance with Sect. 2.7.1, "Deletion of Wastes."

Note: For the purpose of measuring the completion of milestones in Chap. 4 of the STP, Table 4.1 is reporting the entire TRU solids inventory in streams M2305 and M2308. This inventory includes waste tracked as TRU mixed and waste tracked as TRU.

Table 4.2 ORR mixed transuranic waste with no milestones under the site treatment plan

The CERCLA activities supporting Table 4.2 have been completed. Streams M2311, M2341, and M2342 did not have an inventory and were deleted from the STP in accordance with Sect. 2.7.1, "Deletion of Wastes."

Table 4.3 ORR remote-handled liquid low-level waste

Site MWIR	National MWIR	Sub-Group	Description	9/30/2021* (kg) actual	9/30/2021* (m^3) actual	GEN21 (kg) estimated	GEN21 (m^3) est.	Treatment Option
RH Liquids to be treated at TPF								
M2354	OR-W039A	-	Bethel Valley Evaporator Service Tanks (BVEST) – MLLW RH Supernatant	667,860	560	0	0	TWPC/NNSS
M2355	OR-W039B	-	Melton Valley Storage Tanks (MVST) – MLLW RH Supernatant	1,539,920	1,280	0	0	TWPC/NNSS
Stream Count:		2	**Sub-Total:**	2,207,780	1,840	0	0	
Stream Count:		2	**Grand Total:**	2,207,780	1,840	0	0	

* Inventory quantities are rounded for reporting purposes.
TPF = TRU Processing Facility

Stream M2312 did not have an inventory and was deleted from the STP in accordance with Sect. 2.7.1, "Deletion of Wastes."

4B. ORNL SITE OFFICE MANAGED WASTE

Content will be added by the ORNL Site Office.

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5. HIGH-LEVEL MIXED WASTE STREAMS

No high-level mixed waste is generated, processed, or stored by facilities on the ORR.

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APPENDIX A.
Inventory Data for the Oak Ridge Reservation Mixed Waste Streams

Pages A-1 through A-2

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Appendix A – Inventory data for the Oak Ridge Reservation mixed waste streams

MWIR #	SUB	DESCRIPTION	MPC	RAD	MATRIX	FORM	EPA CODES	9/30/2021 (kg)	9/30/2021 (m3)	GEN21 (kg)	GEN21 (m3)	PREFERRED OPTION	OPTION #	SYSTEM #	PLAN CHAPTER
M1324	-	Organic Debris (Outside TSCAI WAC)	S3200	MLLW/CH	ORGANIC HOMOGENEOUS SOLIDS	solid		0.00	0.000	0	0.000	Balance of Inventory	DP-24	-	3.1.3
M1327	-	Organic Liquids (Outside the TSCAI WAC)	L2000	MLLW/CH	ORGANIC LIQUIDS	liquid		0.00	0.000	0	0.000	Balance of Inventory	DP-24	-	3.1.3
M1414	-	Aqueous Liquids for Immob	L1000	MLLW/CH	AQUEOUS LIQUIDS/SLURRIES	liquid	D001 D004 D007 D008 D009 D012 D013 D014 D015 D016 D017 D018 D019 D020 D021 D022 D023 D024 D025 D026 D027 D028 D029 D030 D031 D032 D033 D034 D036 D037 D038 D039 D040 D041 D042 D043 F001 F002 F003 F004 F005 F006 F007 F008 F009 F020 F027 F039 P002 P003 P004 P010 P011 P012 P014 P015 P022 P028 P029 P030 P037 P039 P047 P048 P050 P051 P059 P071 P075 P082 P089 P094 P098 P105 P106 P113 P116 P123 U001 U002 U003 U004 U005 U006 U007 U008 U009 U010 U011 U012 U018 U019 U020 U021 U022 U024 U025 U028 U029 U030 U031 U033 U035 U036 U037 U039 U041 U042 U043 U044 U045 U047 U050 U052 U055 U056 U057 U058 U060 U061 U063 U064 U069 U070 U072 U075 U076 U077 U078 U079 U080 U081 U083 U086 U088 U102 U103 U105 U106 U107 U108 U111 U112 U113 U117 U118 U119 U120 U121 U122 U123 U124 U125 U127 U128 U129 U131 U132 U133 U134 U136 U138 U144 U147 U148 U150 U151 U154 U158 U159 U161 U162 U165 U166 U167 U169 U170 U172 U176 U177 U180 U184 U187 U188 U190 U191 U196 U197 U201 U208 U209 U210 U211 U213 U218 U219 U220 U221 U222 U223 U225 U226 U227 U228 U235 U236 U237 U239 U240 U243 U244 U247 U249 U328 U353 U359 U404	5,724.00	5.724	0	0.000	Balance of Inventory	DP-24		3.1.3
M1513	P	Inorganic Particulates for Thermal Treatment	S3100	MLLW/CH	INORGANIC HOMOGENEOUS SOLIDS	solid		0.00	0.000	0	0.000	Balance of Inventory	DP-24	DP-S814	3.1.3
M1531	-	Soils for Immobilization	S4000	MLLW/CH	SOIL/GRAVEL	solid		0.00	0.000	0	0.000	Balance of Inventory	DP-24	DP-S814	3.1.3
M1588	***-***	***ETTP Newly Discovered High Rad MLLW***		***MLLW/CH***		***solid***	***D005***	***1,211.00***	***2.720***	***1,211.00***	***2.720***	***TBD***			***3.7***
M1562	-	Heterogeneous Debris for Sorting and Segregation	S5400	MLLW/CH	HETEROGENEOUS DEBRIS	solid		0.00	0.000	0	0.000	Balance of Inventory	DP-24	DP-S814	3.1.3
M1587	-	Sodium and Lithium Shield Containers	S5400	MLLW/CH	HETEROGENEOUS DEBRIS	solid	D001 D003	84,657.00	-	0	0.000	Balance of Inventory	-	-	3.4
M1781	-	Mercury Contaminated Returns		MLLW/CH	INORGANIC DEBRIS	solid		0.00	0.000	0	0.000	Balance of Inventory	-	DP-S814	3.1.1
M1782	-	Reactive Returns		MLLW/CH	INORGANIC DEBRIS	solid		0.00	0.000	0	0.000	Balance of Inventory	-	DP-S814	3.1.1
M2305	-	CH-TRU Heterogeneous Debris	S5400	MLLW/CH	HETEROGENEOUS DEBRIS	solid	D001 D003 D004 D005 D006 D007 D008 D009 D010 D011 D018 D031 SUSP	166,510.00	295.000	0	0.000	TWPC/WIPP	OR-03	OR-S005	4
M2308	-	RH-TRU Heterogeneous Debris	S5400	MTRU/RH	HETEROGENEOUS DEBRIS	solid	D006 D008 D009 SUSP	973,300.00	227.000	0	0.000	TWPC/WIPP	OR-03	OR-S005	4
M2344	-	Bethel Valley Evaporator Service Tanks (BVEST) - MTRU Sludge		MTRU/RH		solid		278,600.00	190.000	0	0.000	TWPC/WIPP	OR-05	-	4
M2345	-	Melton Valley Storage Tanks (MVST) - MTRU Sludge		MTRU/RH		solid		1,500,080.00	1,000.000	0	0.000	TWPC/WIPP	OR-05	-	4
M2354	-	Bethel Valley Evaporator Service Tanks (BVEST) - MLLW RH Supernatant		MTRU/RH		liquid		667,860.00	560.000	0	0.000	TWPC/WIPP	OR-03	-	4
M2355	-	Melton Valley Storage Tanks (MVST) - MLLW RH Supernatant		MTRU/RH		liquid		1,539,920.00	1,280.000	0	0.000	TWPC/WIPP	OR-03	-	4
M3308	-	Uranium Contaminated Solutions	L1000	MLLW/CH	AQUEOUS LIQUIDS/SLURRIES	liquid	D002 D004 D005 D006 D007 D008 D009 D010 D011 D030 D032 D033 D034 D036 D037 D038 D042 D043	300.6	-	0	0.000	~~TWPC/WIPP~~ ***TBD***	-	-	3.3
M3315	-	CH Debris	S5400	MLLW/CH	HETEROGENEOUS DEBRIS	solid	D006 D008 D009	0.0	-	0	0.000	TBD	-	-	3.3

APPENDIX B.
Dispute Resolution Agreement with the State of Tennessee under the Federal Facility Compliance Act Site Treatment Plan for the Oak Ridge Reservation

Pages B-1 through B-39

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APPENDIX C.
STP TRU Mixed Waste Formal Dispute Resolution

1. April 12, 2007 Letter from TDEC, "Mixed Transuranic (TRU) Waste – Formal Dispute Resolution Under the Site Treatment Plan (STP)" (C-1 to C-5)

2. May 1, 2007 Letter from DOE, "Formal Dispute Resolution for Mixed Transuranic Waste Under the Site Treatment Plan"(C-6 to C-7)

3. TRU Milestones Proposed by DOE on July 24, 2007 (C-8 to C-11)

4. July 29, 2008 Letter from DOE, "Submittal of Site Treatment Plan Milestone Document: Quarterly Report for Transuranic Waste Processing Activities, Third Quarter Fiscal Year 2007" (C-12 to C-14)

5. TRU Mixed Waste Formal Dispute Chronology (C-15 to C-16)

Pages C-1 through C-16

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