

**Transuranic Waste Processing Center (TWPC) Legacy Tank RH-TRU Sludge Processing
and Compliance Strategy – 13255**

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ABSTRACT

The U.S. Department of Energy (DOE) needs to safely and efficiently treat its “legacy” transuranic (TRU) waste and mixed low-level waste (LLW) from past research and defense activities at the Oak Ridge National Laboratory (ORNL) so that the waste is prepared for safe and secure disposal. The TWPC operates an Environmental Management (EM) waste processing facility on the Oak Ridge Reservation (ORR). The TWPC is classified as a Hazard Category 2, nonreactor nuclear facility. This facility receives, treats, and packages low-level waste and TRU waste stored at various facilities on the ORR for eventual off-site disposal at various DOE sites and commercial facilities. The Remote Handled TRU Waste Sludge held in the Melton Valley Storage Tanks (MVSTs) was produced as a result of the collection, treatment, and storage of liquid radioactive waste originating from the ORNL radiochemical processing and radioisotope production programs. The MVSTs contain most of the associated waste from the Gunite and Associated Tanks (GAAT) in the ORNL’s Tank Farms in Bethel Valley and the sludge (SL) and associated waste from the Old Hydro-fracture Facility tanks and other Federal Facility Agreement (FFA) tanks.

The SL Processing Facility Buildouts (SL-PFB) Project is integral to the EM cleanup mission at ORNL and is being accelerated by DOE to meet updated regulatory commitments in the Site Treatment Plan. To meet these commitments a Baseline (BL) Change Proposal (BCP) is being submitted to provide continued spending authority as the project re-initiation extends across fiscal year 2012 (FY2012) into fiscal year 2013.

Future waste from the ORNL Building 3019 U-233 Disposition project, in the form of U-233 dissolved in nitric acid and water, down-blended with depleted uranyl nitrate solution is also expected to be transferred to the 7856 MVST Annex Facility (formally the Capacity Increase Project (CIP) Tanks) for co-processing with the SL. The SL-PFB project will construct and install the necessary integrated systems to process the accumulated MVST Facilities SL inventory at the TWPC thus enabling safe and effective disposal of the waste. This BCP does not include work to support current MVST Facility Surveillance and Maintenance programs or the ORNL Building 3019 U-233 Disposition project, since they are not currently part of the TWPC prime contract.

The purpose of the environmental compliance strategy is to identify the environmental permits and other required regulatory documents necessary for the construction and operation of the SL- PFB at the TWPC, Oak Ridge, TN. The permits and other regulatory documents identified are

necessary to comply with the environmental laws and regulations of DOE Orders, and other requirements documented in the SL-PFB, Safety Design Strategy (SDS), SL-A-AD-002, R0 draft, and the Systems, Function and Requirements Document (SFRD), SL-X-AD-002, R1 draft. This compliance strategy is considered a “living strategy” and it is anticipated that it will be revised as design progresses and more detail is known. The design basis on which this environmental permitting and compliance strategy is based is the Wastren Advantage, Inc., (WAI), TWPC, SL-PFB (WAI_BL-B.01.06) baseline.

INTRODUCTION

The Remote Handled TRU Waste Sludge held in the Melton Valley Storage Tanks (MVSTs) was produced during the Manhattan Project and the twentieth century Cold War as a result of the collection, treatment, and storage of liquid radioactive waste originating from the ORNL radiochemical processing and radioisotope production programs. The DOE needs to safely treat its “legacy” TRU waste and mixed LLW from past research and defense activities at the ORNL in order to prepare the waste for safe and secure disposal. The MVSTs contain most of the associated SL waste from the GAAT in the ORNL’s Tank Farms in Bethel Valley Complex and the SL and associated waste from the Old Hydro-fracture Facility tanks.

The SL-PFB Project is integral to the EM cleanup mission at ORNL and is being accelerated by DOE to meet regulatory commitments in the Site Treatment Plan. To meet these commitments a BCP is being submitted to provide continued spending authority as the project re-initiation extends across FY2012 into fiscal year 2013.

Future waste from the ORNL Building 3019 U-233 Disposition project, in the form of U-233 dissolved in nitric acid and water, down-blended with depleted uranyl nitrate solution is also expected to be transferred to the MVST Annex (7856 Facility) for co-processing with the SL. The SL-PFB project will construct and install the necessary systems to process the accumulated SL inventory at the TWPC thus enabling disposal of the waste. This BCP does not include work to support ORNL Building 3019 U-233 Disposition project, as it has not yet been added to the TWPC prime contract.

SL-PFB’s environmental compliance strategy identifies the environmental permits and other regulatory required documents necessary for the construction and operation of the SL-PFB at the TWPC, Oak Ridge, TN. See Table I. The permits and other regulatory documents identified in this plan are necessary to comply with the environmental laws and regulations, DOE Orders, Tennessee Department of Environment Conservation (TDEC) and other requirements documented in the SL-PFB, Safety Design Strategy (SDS) and Systems, Function and Requirements Document (SFRD). This strategy is considered a living document and it is anticipated that it will be revised as design progresses and more detail is known.

OVERVIEW OF STRATEGIES

Regulatory compliance strategies are presented herein as “general strategies” and “specific strategies”. General strategies apply to all permits and approval processes. Implementing these strategies during permit acquisition will improve the success of acquiring each permit. Specific strategies apply to each specific permit and are summarized from the permit discussions for Federal and State permits, respectively. Permit strategies may change or be modified over time, depending upon the unique situations that apply to each particular permit. ORNL currently has two site-wide permitting programs: 1) the Clean Water Act (CWA) National Pollutant Discharge Elimination System (NPDES) permit; and, 2) the Clean Air Act (CAA) Title V air permit. If desired, the Storm Water Pollution Prevention Plan (SWPPP) and the site wide NPDES and Title V permits could be combined at a later time.

General Strategies

- ✓ Plan for environmental compliance early in the SL-PFB development, and coordinate with regulatory agencies early to verify list of permits/approvals that will be obtained prior to project implementation.
- ✓ Determine the project’s statement of purpose and need with consideration of future environmental compliance.
- ✓ Prepare a thorough project description of all process components that include sufficient flexibility such that simple changes in project design at later stages do not conflict with the project description.
- ✓ Incorporate adaptive management features into the SL-PFB as needed to address scientific uncertainties.
- ✓ Establish contacts between Program team members and regulators to:
 - Establish relationships and maintain historical and ongoing relationships to minimize surprises in the permitting process.
 - Leverage existing implementing agency relationships from other permitted and constructed projects.
 - Facilitate internal coordination to ensure consistency with respect to consultations with regulators.

Specific Strategies

- ✓ Complete NEPA Compliance requirements including Supplement Analysis (SA) and issuance of Record of Decision (ROD).
- ✓ Complete all Clean Water Act submittals
- ✓ Complete all Clean Air Act submittals
- ✓ Complete Federal Endangered Species Act submittals

The strategy and timing of activities to comply with the environmental laws and regulations applicable to construction and commissioning of the SL-PFB are delineated in this strategic

planning. Identified herein is an approach for environmental protection, compliance, and permitting, including:

- Environmental permitting and compliance activities for design, construction, and commissioning the SL-PFB
- Permitting and compliance schedule integrated with the technical baseline
- Monitoring and reporting requirements.

The execution of this strategy requires a coordinated effort by the DOE, TWPC Site contractor, WAI, TDEC and the Environmental Protection Agency (EPA).

REGULATORY AUTHORITY

The DOE is the regulatory authority for its radioactive material requirements under the *Atomic Energy Act of 1954* through DOE Order 435.1. DOE is responsible for regulating the nuclear, process, and radiological activities affecting worker safety at the TWPC. DOE reviews and approves the authorization basis prepared by the contractor, as required for designing, constructing, and commissioning the SL-PFB. DOE consults with the State of Tennessee regulators in aspects of the project that would affect both regulatory bodies.

The design basis on which this environmental permitting and compliance strategy is based is the WAI, TRU Waste Processing Center, Sludge Buildout (WAI_BL-B.01.06) baseline.

Compliance with Environmental Laws

Construction and commissioning of the SL-PFB requires compliance with the following Federal and State environmental laws:

- *Atomic Energy Act of 1954*
- *Clean Air Act of 1970*
- *Clean Water Act of 1977*
- *Emergency Planning and Community Right-to-Know Act of 1986*
- *Oak Ridge Federal Facility Agreement and Consent Order / Consent Decree, FFA-PM/96-020*
- *Hazardous Waste Management Act of 1983 – Tennessee Code (T.C.A. 68-212-201)*
- *National Environmental Policy Act of 1969 (NEPA)*
- *Resource Conservation and Recovery Act of 1976 (RCRA)*
- *Toxic Substances Control Act*
- *Tennessee Water Quality Control (T.C.A 69-3-101)*
- *Tennessee Air Pollution Control (T.C.A. 68-201-105)*
- *Tennessee NPDES and State Operating Permit (T.C.A. 69-3-108)*

The SL-PFB is committed to involving stakeholders throughout the design process, the permitting process, and during the construction and commissioning of the facilities. Formal and informal public interaction activities, if any, comply with regulatory requirements and meet the project's objectives for full disclosure to the stakeholders.

This package also provides support for project reviews and assessments for preliminary and final designs, for external technical reviews, for peer reviews, for Independent Project Reviews or External Technical Reviews, for External Technical Reviews, for Independent Technical Project Reviews, etc.

ORNL Federal Facility Agreement FFA-PM/96-020 and other Legal Mandates

Signed on November 21, 1989, between the DOE, EPA Region IV, and TDEC, the agreement describes the actions and timetable necessary to achieve compliance with the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) and Resources Conservation and Recovery Act (RCRA). Construction and operations of the SL-PFB must comply with permits issued by TDEC under its EPA-authorized *Hazardous Waste Management Act of 1983*, as well as permits issued under the Federal *Clean Air Act*. FFA-PM/96-020 governs and constrains overall SL-PFB facility startup activities regarding notification when new or dormant tanks are placed into or returned to service.

TDEC Commissioner's Order, September 1995, directed DOE to implement the Site Treatment Plan that mandates specific requirements for the treatment and disposal of ORNL's TRU waste.

Air Permits

TWPC is exempt from the "Prevention of Significant Deterioration" (PSD) permit program that applies to new major sources or major modifications at existing sources for pollutants (>100 tons/yr.) where the source is located in an attainment area or unclassifiable with the National Ambient Air Quality Standards (NAAQS). However, DOE must submit a permit application for PSD to TDEC which includes the following:

- Installation of the "Best Available Control Technology (BACT)"
- An air quality analysis
- An additional impacts analysis; and
- Public involvement.

Best Available Control Technology

BACT is an emissions limitation which is based on the maximum degree of control that can be achieved. It is a case-by-case decision that considers energy, environment, and economic impact. The BACT can be add-on control equipment or modification of the production processes or methods, including fuel cleaning or treatment and innovative fuel combustion techniques. The BACT may be a design, equipment, work practice, or operational standard if imposition of an

emissions standard is infeasible. TWPC employs best management practices on all process activities.

Air Quality Analysis

The air quality analysis demonstrates that new emissions emitted from a proposed major stationary source or major modification, in conjunction with other applicable emissions increases and decreases from existing sources, will not cause or contribute to a violation of any applicable National Ambient Air Quality Standards (NAAQS) or PSD increment. Generally, the analysis will involve (1) an assessment of existing air quality, which may include ambient monitoring data and air quality dispersion modeling results, and (2) predictions, using dispersion modeling, of ambient concentrations that will result from the applicant's proposed project and future growth associated with the project.

Class I areas are areas of special national or regional natural, scenic, recreational, or historic value for which the PSD regulations provide special protection. The Federal Land Manager (FLM), including the State or Indian governing body, where applicable, is responsible for defining specific Air Quality Related Values (AQRV's) for an area and for establishing the criteria to determine an adverse impact on AQRV's. If a FLM determines that a source will adversely impact AQRV's in a Class I area, the FLM may recommend that the permitting agency deny issuance of the permit, even in cases where no applicable increments would be exceeded. However, the permitting authority makes the final decision to issue or deny the permit.

Additional Impacts Analysis Required

The additional impacts analysis assesses the impacts of air, ground and water pollution on soils, vegetation, and visibility caused by any increase in emissions of any regulated pollutant from the source or modification under review, and from associated growth. Associated growth is industrial, commercial, and residential growth that will occur in the area due to the source.

The application for the “Notices of Construction for Radioactive Air Emissions” must be submitted to TDEC and the EPA. All air permit applications must be approved for SL-PFB facility construction to allow construction activities to proceed. The permits may be modified, as applicable, when the project approaches operational status.

Resource Conservation and Recovery Act of 1976

The State of Tennessee is an authorized State under Section 3006 of the federally mandated RCRA Act of 1976. TDEC 1200-01-11 regulations apply to all facilities that treat, store, and/or dispose of dangerous waste. TDEC administers the RCRA program in accordance with Federal standards and guidelines. To comply with RCRA, a Part B permit has been issued for the TWPC. This permit has been incorporated as *Resource Conservation and Recovery Act Part B Permit Renewal Application Oak Ridge National Laboratory Storage and Treatment Units, March 2007*. SL-PFB-specific permit conditions will be included in an amended permit application.

National Environmental Policy Act

In 2000, DOE issued the Final Environmental Impact Statement for Treating TRU Alpha Low-Level Waste at the Oak Ridge National Laboratory Oak Ridge, Tennessee. DOE published the ROD on treating TRU/Alpha Low-Level Waste at the Oak Ridge National Laboratory, Oak Ridge, TN,” (65 FR 8900), implementing the preferred alternative for treatment and disposal of TRU waste. This implemented an approach to TRU waste treatment that included privatizing the construction, operation, decontamination and decommissioning of a TRU Waste Treatment Facility. The waste to be treated is legacy waste, i.e., waste generated from past isotope production and research and development that supported national defense and energy initiatives. The legacy tank waste is currently stored or consolidated in the MVSTs, and legacy solid waste is stored in bunkers, subsurface trenches, and metal storage buildings. In 2008, DOE initiated an SA that addressed changes to the TWPC ROD since issuance of the Environmental Impact Statement dated August 2000. The original preferred alternative end product was determined to be a heightened security risk due to the powdered end product that would be easily dispersed and could contaminate large areas if an accident or malevolent act should occur. Based on value engineering studies, the preferred alternative was changed to a modified cementation approach that offers cost and operational benefits not available through the former preferred alternative. This SA is currently in review by DOE EM headquarters personnel. Approval is anticipated during FY13.

Executive Orders (EO)

EO #11990 is an overall wetlands policy for all agencies that manage Federal lands, sponsor Federal projects, or provide Federal funds to state or local projects. The order requires Federal agencies to follow avoidance, mitigation, and preservation procedures with public input before they propose new construction in wetlands.

EO #11988 is a flood hazard policy for all Federal agencies that manage Federal lands, sponsor Federal projects, or provide Federal funds to state or local projects. It requires that all Federal agencies take necessary action to reduce the risk of flood loss; restore and preserve the natural and beneficial values served by floodplains; and minimize the impacts of floods on human safety, health, and welfare. Specifically, EO #11988 dictates that all Federal agencies avoid construction or management practices that would adversely affect floodplains unless that agency finds that there is no practical alternative and the proposed action has been designed or modified to minimize harm to or within the floodplain.

EO #13112 requires Federal agencies to perform measures to minimize the spread of invasive species and to reintroduce native species where possible.

Other Local Permits and Requirements

No local permits are required for the proposed SL-PFB.

Table 1 presents a listing of activity descriptions and start and finish dates for related permits required for SL-PFB.

Table 1, Required Permits

SL-PFB Regulatory and Permit Compliance Strategy			
Activity Description	Start Date	Status Date	Finish Date
NPDES Waste Water Treatment Unit Permit Update - Update TWPC description to include sludge (SL) & supernate (SN) Processing.	12-Jun-12	7-Aug-12	25-Oct-12
Air Permit - Perform Rad Calculations to verify the TWPC total emissions will not exceed 0.1mrem/yr. SL/Supernate is included in current permit. No change from the change in location of the process.	1-Oct-12	8-Oct-12	30-Sep-13
SL Solidification Center (SC) Tanks	24-Jul-12	7-Aug-12	TBD
Minor Source determination for submittal to TDEC.			
New/Modified Permit Application (Type to be determined.)	27-Aug-12	7-Aug-12	28-Sep-12
Silos	24-Jul-12	N/A	26-Oct-12
Mass Balance Calculation	13-Aug-12	7-Aug-12	27-Aug-12
New/Modified Permit Application (What Type?)	28-Sep-12	N/A	26-Oct-12
Environmental Checklist - SL Test Area	14-Feb-12	7-Aug-12	30-Sep-13
Infrastructure balance of operations includes: H ₂ O, Power, excavation.			28-Feb-13
Temporary Power for Security Gate.			28-Sep-12
Monitoring/sampling well requirements to close out.			28-Feb-13
Test Area Tanks			
Systems description for test area to include test tank area with process details, controls for particulates, basic drawings, etc.	24-Jul-12		9-Aug-12
Test Area Process Flow, Mass Balance	24-Jul-12	N/A	9-Aug-12
CDM provided information for tank containment regulations to determine containment volume needed for test area.	10-Aug-12		23-Aug-12

Evaluate and submit minor source determination to TDEC	27-Aug-12		20-Sep-12
Construction	24-Jul-12	7-Aug-12	28-Aug-12
Excavation Permit.	TBD		TBD
SWPPP Compliance.	24-Jul-12	7-Aug-12	28-Sep-12
Waste Management			
Program for Disposal of Solid Waste in test area.	1-Oct-12	N/A	8-Nov-12
Program for Disposal of Solid Waste in SL-SC area.	1-Oct-12	N/A	TBD
NNSS Waste Acceptance Criteria	17-Apr-12	N/A	30-Sep-13
Data Quality Objectives Determination to support Characterization of final waste form.	1-Oct-12	N/A	30-Sep-13
Radiological	1-Oct-12	N/A	30-Sep-13
SL/Supernate Waste Characterization Test Plan	1-Oct-12	N/A	30-Sep-13
Shipping - DOE/DOT/NRC Requirements			
Chemicals: What we need to do other than follow the site procedures.	1-Oct-12	N/A	28-Feb-12
Sustainability Plan includes: Waste Minimization, Reuse and Recycling, Green Procurement, Green Construction.	30-Aug-12	N/A	15-Dec-12
Sensitive Areas: Wetlands/Flood Plain/Creek Wetland & Habitat Survey dated 11/16/2010			TBD
Spill Prevention Contamination Control (SPCC)			TBD
Emergency Preparedness/Response		1-Aug-12	TBD

CONCLUSION

The environmental compliance strategy delineated and discussed in this paper identifies the environmental permits and other regulatory required documents necessary for the construction and operation of the SL- PFB at the TWPC, Oak Ridge, TN. The permits and other regulatory documents identified comply with the environmental laws and regulations, DOE Orders, and other requirements documented in the SL-PFB, SDS and the SFRD. As can be seen in Table I, each and every activity necessary for the success of this program has its own start date and completion date which ensures no activity has been overlooked. Because strategy based games generally require a player to think through a sequence of solutions to determine the best way to defeat the opponent, it follows that a successful compliance strategy would also require its developers to strategically think through the morass of applicable rules and regulations that govern their path. By determining

the basic long-term goals and objectives of the SL-PFB, adoption of courses of action, and the allocation of resources necessary for carrying out these goals, the success of the SL-PFB compliance strategy is assured.

The strategy presented in this document is considered to be “*living*”; therefore, it will continue to evolve as the SL-PFB design and testing unfold.

ACRONYM LIST

AQRV-	Air Quality Related Values
BACT-	Best Available Control Technology
BCP-	Baseline Change Proposal
BL-	Baseline
CAA-	Clean Air Act
CERCLA-	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CWA-	Clean Water Act
DOE-	Department of Energy
DOT-	Department of Transportation
EM-	Environmental Management
EO-	Executive Orders
EPA-	Environmental Protection Agency
FFA-	Federal Facility Agreement
FLM-	Federal Land Manager
GAAT-	Gunite and Associated Tanks
LLW-	Low Level Waste
MVST-	Melton Valley Storage Tanks
NAAQS-	National Ambient Air Quality Standards
NPDES-	National Pollutant Discharge Elimination System
NRC-	Nuclear Regulatory Commission
ORNL-	Oak Ridge National Laboratory
ORR-	Oak Ridge Reservation
PSD-	Prevention of Significant Deterioration

RCRA-	Resources Conservation and Recovery Act
ROD-	Record of Decision
SA-	Supplement Analysis
SC-	Solidification Center
SDS-	Safety Design Strategy
SFRD-	Systems, Function and Requirements Document
SL-	Sludge
SL-PFB-	Sludge Processing Facility Buildouts
SPCC-	Spill Prevention, Control, and Countermeasures Plan
SWPPP-	Storm Water Pollution Prevention Plan
TCA-	Tennessee Code Annotated
TDEC-	Tennessee Department of Environment Conservation
TRU-	Transuranic
TWPC-	Transuranic Waste Processing Center