RPP-SPEC-63337
Revision 0

# Waste Management Area A-AX Closure Specification

**Prepared by**

**C. Henderson**
Columbia Energy & Environmental Services, Inc. for
Washington River Protection Solutions, LLC

Date Published
January 2020


Prepared for the U.S. Department of Energy
Office of River Protection

Contract No. DE-AC27-08RV14800

A-6007-231 (REV 0)

# TABLE OF CONTENTS

## LIST OF FIGURES



## LIST OF TABLES

# LIST OF TERMS

**Abbreviations and Acronyms**

| | |
|---|---|
| A-AX | 241-A Tank Farm and 241-AX Tank Farm |
| COR | Code of Record |
| CMS | corrective measures study |
| DOE | U.S. Department of Energy |
| HFFACO | *Hanford Federal Facility Agreement and Consent Order* |
| ORP | Office of River Protection |
| RCRA | *Resource Conservation and Recovery Act of 1976* |
| RFI | RCRA facility investigation |
| RPP | River Protection Project |
| SSC | structure, system, and component |
| SST | single-shell tank |
| WMA | Waste Management Area |

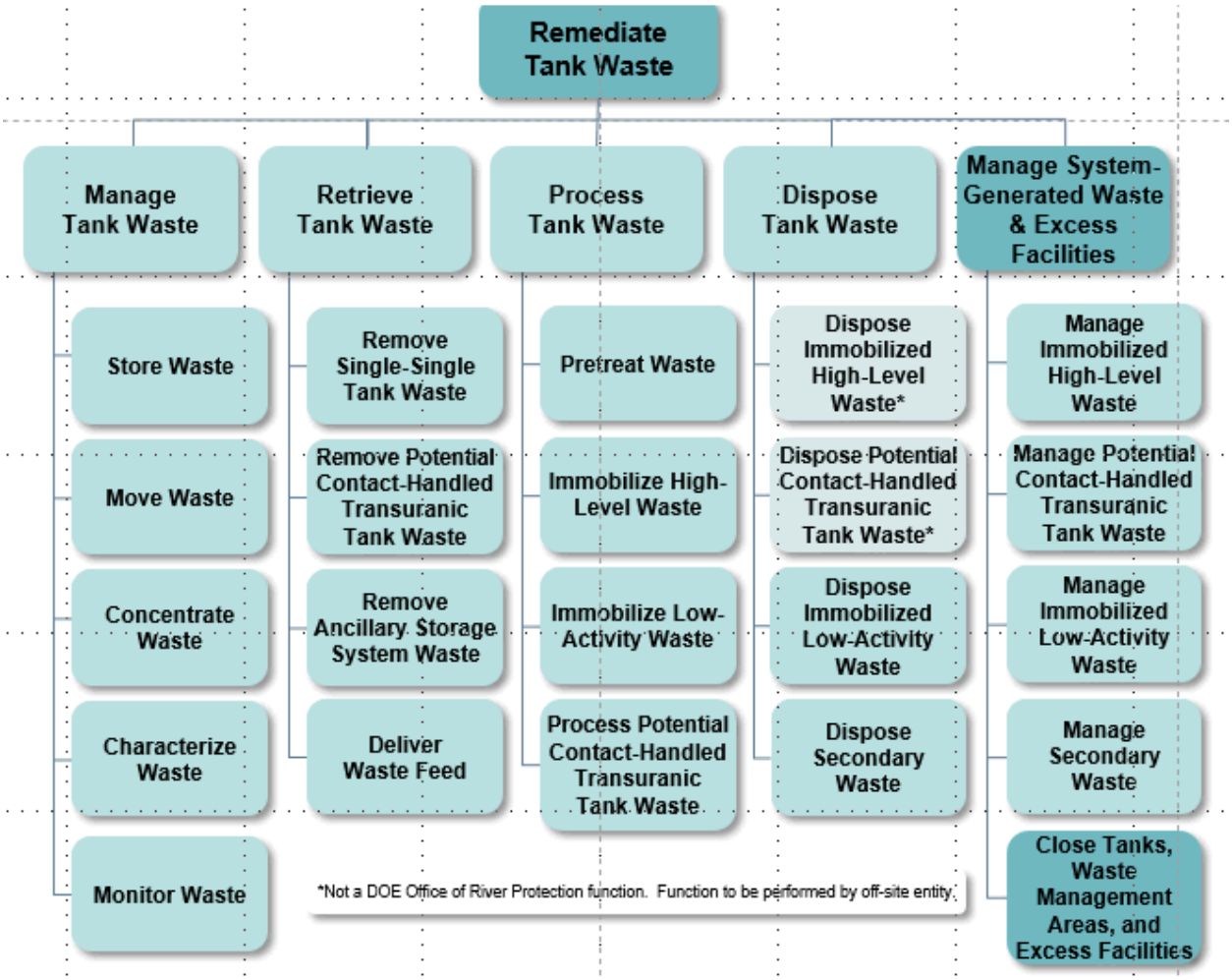
**Units**

| | |
|---|---|
| ft | foot |
| gal | gallon |
| in. | inch |
| mm | millimeter |
| psi | pounds per square inch |
| V | volt |
| $yd^3$ | cubic yard |
| yr | year |

# 1.0 SCOPE

This specification establishes the project-level functional, interface, performance, and design requirements for Waste Management Area (WMA) 241-A Tank Farm and 241-AX Tank Farm (A-AX) closure. This specification will be used as a basis for conceptual design of the WMA A-AX closure system. These requirements are derived from external requirements incorporated into the Tank Operations Contractor administrative procedures and standards. Mission requirements are addressed in RPP-51303, *River Protection Project Functions and Requirements*, which decomposes the River Protection Project (RPP) mission goal into two lower-tier functional levels and defines requirements for each function. Figure 1 shows the overall functional hierarchy and the darker blue boxes show the functional decomposition of the overall mission into the subordinate function applicable to WMA A-AX closure.

**Figure 1. River Protection Project Functional Hierarchy.**




Source: Adapted from RPP-51303, *River Protection Project Functions and Requirements.*

## 1.1 DESCRIPTION

| | |
|---|---|
| Project: | WMA A-AX Closure |
| Mission Objective: | Close WMA A-AX in accordance with approved closure plans and Record of Decision 78 FR 75913, "Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington," to landfill close the single-shell tank (SST) farms. |
| Mission Scope: | WMA A-AX closure includes final disposition of all structures, systems, and components (SSC) within the boundaries of the WMA. Closure actions will follow completion of waste retrieval and remediation of soil contamination in accordance with the *Resource Conservation and Recovery Act of 1976* (RCRA) facility investigation (RFI)/corrective measures study (CMS) process. WMA A-AX closure includes structural stabilization of below-grade structures, demolition of above-grade structures, and may include remediation of soil contamination following evaluation under the RCRA RFI/CMS process to provide long-term protection. |

## 1.2 WMA A-AX CLOSURE OVERVIEW

The U.S. Department of Energy (DOE), Office of River Protection (ORP) primary mission is to retrieve and treat Hanford Site tank waste and close the tank farms to protect the Columbia River. ORP is responsible for management and completion of the mission.

The regulatory framework for closing the SST system includes requirements for planning and protection of human health and the environment. The regulatory process for closure of WMA A-AX requires approval of the Washington State Department of Ecology for dangerous waste constituents, and of DOE for radioactive waste constituents. An overview of the regulatory framework for tank closure is provided in RPP-PLAN-40761, *Integrated Single-Shell Tank Waste Management Area Closure Plan*, and RPP-RPT-58858, *Tier 1 Closure Plan Single-Shell Tank System*. As noted in RPP-RPT-58858, there are a number of facility-specific closure decisions that are yet to be made through the regulatory process. Assumptions have been developed to form an initial planning basis.

The regulatory requirements for WMA A-AX closure will be established in future RCRA closure plans prepared in accordance with Ecology et. al. 1989, *Hanford Federal Facility Agreement and Consent Order* (HFFACO), and DOE closure plans prepared in accordance with DOE O 435.1, *Radioactive Waste Management*.

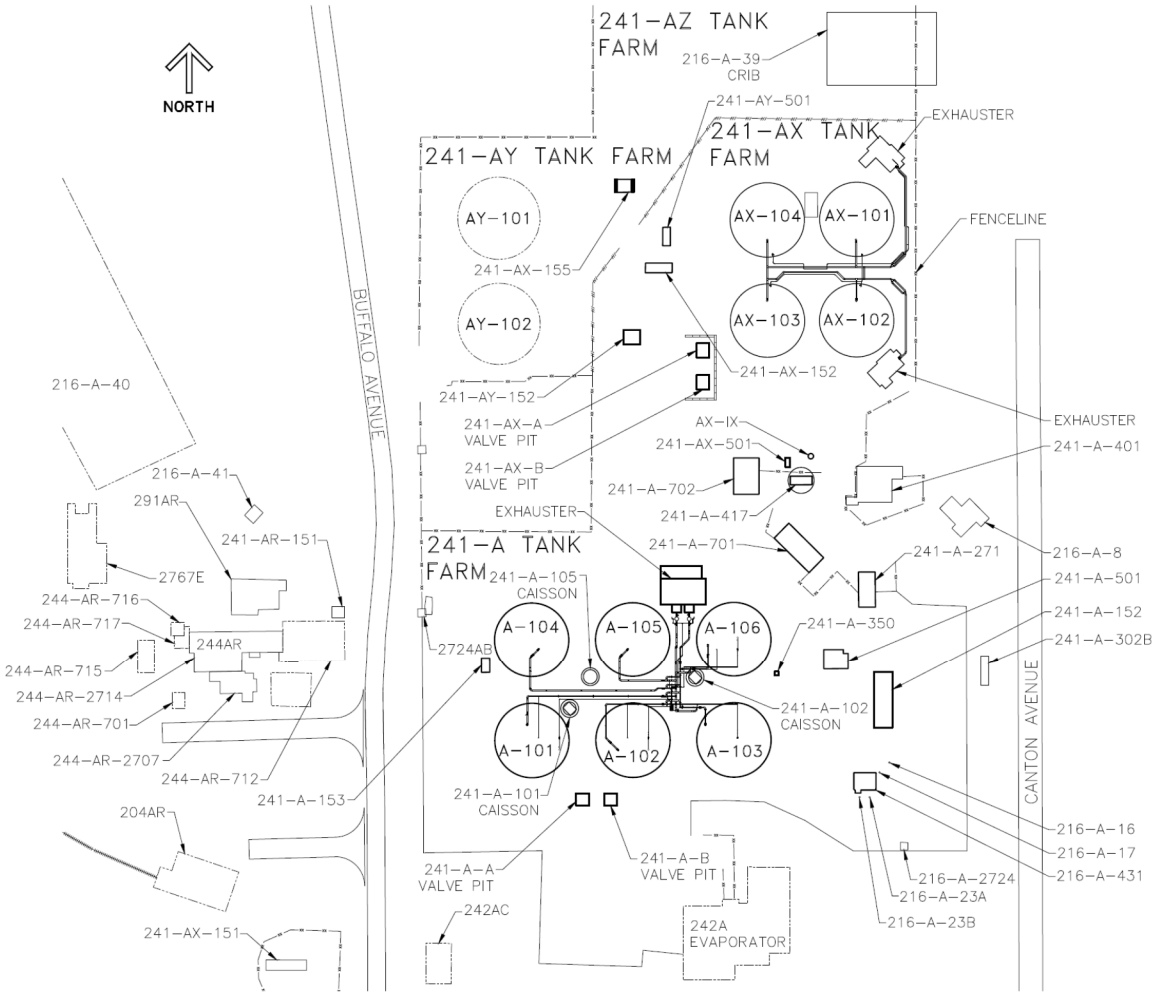
Prior to initiating closure, waste will have been removed from the tanks as required by HFFACO Milestone M45-00. In accordance with the HFFACO, a retrieval data report will be prepared following completion of waste retrieval from each tank, to document completion of waste retrieval activities. Additionally, waste will have been removed from ancillary equipment (e.g., catch tanks, vaults) to the extent required to meet regulatory requirements. WMA A-AX closure actions will follow completion of waste retrieval actions and will be performed using an incremental closure approach where individual components or groups of components are closed as DOE and regulatory approvals are received rather than waiting to close the entire WMA at once. Remediation of contaminated soils from past leaks and spills in WMA A-AX will be

evaluated using the RCRA RFI/CMS process and any corrective measures for contaminated soil will be implemented in concert with component closure actions.

Soil remediation requirements will be established through a RCRA corrective action implementation plan rather than in this specification. The RFI/CMS will be prepared at a future date. Any required soil remediation activities will be performed prior to or in coordination with WMA A-AX closure activities.

This specification establishes requirements for conceptual design of the WMA A-AX closure system. Figure 2 shows WMA A-AX and surrounding facilities. WMA A-AX consists of the 241-A Tank Farm, the 241-AX Tank Farm, and ancillary equipment associated with those tank farms.

**Figure 2. WMA A-AX Area Map.**



The current planning baseline for closing WMA A-AX is a landfill closure approach that includes the following assumed actions: below-grade structures will be structurally stabilized with grout to isolate residual contamination and prevent long-term subsidence; above-grade structures will be demolished; and a modified RCRA Subpart C closure cap will be constructed over the WMA. The modified RCRA Subpart C closure cap will be constructed either immediately following completion of the component closure actions or at some future date using a final closure cap as described in DOE/EIS-0391, *Final Tank Closure and Waste Management Environmental Impact Statement Hanford Site, Richland, Washington*. The timing and footprint for the WMA A-AX closure cap will require integration with ongoing operations in surrounding facilities and adjacent waste sites.

## 1.3 DOCUMENT OVERVIEW

The objective of this specification is to document the technical requirements for closure of below-grade tanks and structures, above-grade structures, ancillary equipment, and the final closure cap over WMA A-AX. This specification will be updated as facility-specific closure decisions are finalized.

The following assumptions were made in creating the closure functions and requirements:

- Landfill closure has been selected as the approach for closing the SST farms, as a result of the impracticability demonstration decision precluding clean closure (DOE/ORP-2014-02*, Clean Closure Practicability Demonstration for the Single-Shell Tanks*). Additionally, this approach is based on the assumption that the waste residuals in the tanks, SST structures, in-tank equipment, and ancillary equipment can be disposed of in place, in accordance with applicable federal and state regulations. The approach is to close the tank farms to WAC 173-303, "Washington State Hazardous Waste Management Act, Dangerous Waste Regulations," landfill standards, and DOE O 435.1 low-level radioactive waste standards.
- Tank closure activities include isolation of the tank, where necessary, and placement of grout material to structurally stabilize the tank structure and isolate residual waste.

This specification identifies the following requirements for WMA A-AX closure:

- Functions
- Interfaces
- Design requirements.

The following definitions apply to this specification:

- Shall – denotes a requirement
- Must – denotes a requirement.

# 2.0 APPLICABLE DOCUMENTS

Design requirements applicable to the closure system come from government and non-government source documents and various codes and standards consistent with the contract between ORP and Tank Operations Contractor Washington River Protection Solutions, LLC. Each document listed is invoked by one or more of the requirements found in this specification.

Except in those instances where Washington State has been granted regulatory authority by the Federal Government, the hierarchical relationship among requirements specified in Section 3.0 is as follows:

- Federal requirements (e.g., *Code of Federal Regulations*)
- Washington State requirements (e.g., *Washington Administrative Code*)
- Local ordinances
- DOE orders and standards
- National consensus codes and standards
- Hanford Site-specific codes and standards.

## 2.1 GOVERNMENT DOCUMENTS

The following government documents, of the exact issue shown, form a part of this specification to the extent specified herein and establishes the Code of Record (COR). In the event of conflict between the documents referenced herein and the contents of this specification, the contents of this specification are considered a superseding requirement.

DOE orders and regulatory documents, including those promulgated by the federal government and Washington State, constitute a part of this specification to the extent specified herein and are listed in Table 1.

Copies of specifications, standards, drawings, and publications required by suppliers in connection with specified procurement functions should be obtained from the contracting agency or as directed by the contracting agent.

**Table 1. Government Documents. (2 sheets)**

| Document Number | Title |
|---|---|
| **Federal Documents** | |
| 10 CFR 20, 1991 | "Standards for Protection Against Radiation," *Code of Federal Regulations* |
| 10 CFR 835, 2001 | "Occupational Radiation Protection," *Code of Federal Regulations* |
| 10 CFR 851, 2006 | "Worker Safety and Health Program," *Code of Federal Regulations* |
| 29 CFR 1910, 2002 | "Occupational Safety and Health Standards," *Code of Federal Regulations* |
| 40 CFR 265, 2019 | "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," *Code of Federal Regulations* |
| 78 FR 75913, 2013 | "Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington," *Federal Register* |
| DOE G 435.1-1, 1999 | *Implementation Guide for Use with DOE M 435.1-1*, U.S. Department of Energy |
| DOE/RL-92-36, Rev. 1, Release 84 | *Hanford Site Hoisting and Rigging Manual*, U.S. Department of Energy |

**Table 1. Government Documents. (2 sheets)**

| Document Number | Title |
|---|---|
| **Washington State Documents** | |
| WAC 173-303, 2014 | "Dangerous Waste Regulations", *Washington Administrative Code* |
| WAC 173-360-375, 2019 | "Cleanup and Reporting of Spills and Overfills," *Washington Administrative Code* |
| WAC 173-303-395, 2019 | "Other General Requirements," *Washington Administrative Code* |
| WAC 173-303-640, 2019 | "Tank Systems," *Washington Administrative Code* |
| WAC 173-400, 2018 | "General Regulation for Air Pollution Sources," *Washington Administrative Code* |
| WAC 163-460, 2014 | "Controls for New Sources of Toxic Air Pollutants," *Washington Administrative Code* |
| WAC 173-480, 2014 | "Ambient Air Quality Standards and Emission Limits for Radionuclides," *Washington Administrative Code* |
| WAC 246-247, 2019 | "Radiation Protection-Air Emissions," *Washington Administrative Code* |

## 2.2 NON-GOVERNMENT DOCUMENTS

The following non-government documents, of the exact issue shown, form a part of this specification to the extent specified herein and establishes the COR. In the event of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

National codes and standards and Hanford Site documents listed in Table 2 constitute a part of this specification to the extent specified herein.

Technical society and technical association specifications and standards are generally available for reference from libraries, or they may be obtained directly from the technical society or association.

**Table 2. Non-Government Documents. (2 sheets)**

| Document Number | Title |
|---|---|
| HNF-5183, Rev. 5O, 2019 | *Tank Farms Radiological Control Manual*, Washington River Protection Solutions, LLC, Richland, Washington. |
| NFPA 70, 2017 | *National Electrical Code,* National Fire Protection Association, Quincy, Massachusetts. |
| RPP-11802, Rev. 3B, 2015 | *Analysis of Record Summary for Single-Shell Tanks*, Washington River Protection Solutions, LLC, Richland, Washington. |
| RPP-53359, Rev. 0, 2012 | *One System River Protection Project Mission Functional Analysis,* Washington River Protection Solutions, LLC, Richland, Washington. |
| RPP-RPT-61675, Rev. 0, 2019 | *241-C 200 Series Single-Shell Tank Closure Grout Placement Test Report*, Washington River Protection Solutions, LLC, Richland, Washington. |
| RPP-SPEC-62583, Rev. 0, 2019 | *Functions & Requirements for Hanford Tank Farm Closure Grout Formulations*, Washington River Protection Solutions, LLC, Richland, Washington. |
| TFC-BSM-IRM_DC-C-02, Rev. F-16, 2018 | *Records Management,* Washington River Protection Solutions, LLC, Richland, Washington. |
| TFC-BSM-TQ-STD-01, Rev. E-1, 2018 | *Technical Staff and Technician Qualification Requirements*, Washington River Protection Solutions, LLC, Richland, Washington. |

**Table 2. Non-Government Documents. (2 sheets)**

| Document Number | Title |
|---|---|
| TFC-ENG-DESIGN-P-17, Rev. D-9, 2011 | *Design Verification,* Washington River Protection Solutions, LLC, Richland, Washington. |
| TFC-ENG-FACSUP-C-10, Rev. C-25, 2017 | *Control of Dome Loading and SSC Load Control,* Washington River Protection Solutions, LLC, Richland, Washington. |
| TFC-ENG-FACSUP-C-25, Rev. E-0, 2019 | *Hoisting and Rigging,* Washington River Protection Solutions, LLC, Richland, Washington. |
| TFC-ENG-STD-02, Rev. A-12, 2017 | *Environmental/Seasonal Requirements for TOC Systems, Structures, and Components,* Washington River Protection Solutions, LLC, Richland, Washington. |
| TFC-ENG-STD-06, Rev. D-2, 2019 | *Design Loads for Tank Farm Facilities*, Washington River Protection Solutions, LLC, Richland, Washington. |
| TFC-ENG-STD-07, Rev. H-3, 2017 | *Ventilation System Design Standard,* Washington River Protection Solutions, LLC, Richland, Washington. |
| TFC-ENG-STD-10, Rev. A-7, 2009 | *Drawing Standard,* Washington River Protection Solutions, LLC, Richland, Washington. |
| TFC-ENG-STD-12, Rev. E-0, 2017 | *Tank Farm Equipment Identification Numbering and Labeling Standard*, Washington River Protection Solutions, LLC, Richland, Washington. |
| TFC-ENG-STD-34, Rev. A-1, 2017 | *Standard for the Selection of Non-Metallic Materials in Contact With Tank Waste,* Washington River Protection Solutions, LLC, Richland, Washington. |
| TFC-ENG-STD-41, Rev. A-5, 2017 | *Electrical Installations,* Washington River Protection Solutions, LLC, Richland, Washington. |
| TFC-ESHQ-ENV_RM-C-04, Rev. C-0, 2018 | *Ensuring Water Quality*, Washington River Protection Solutions, LLC, Richland, Washington. |
| TFC-ESHQ-ENV-STD-03, Rev. A-10, 2018 | *Air Quality – Radioactive Emissions*, Washington River Protection Solutions, LLC, Richland, Washington. |
| TFC-ESHQ-FP-STD-02, Rev. D-1, 2018 | *Fire Protection Design Criteria*, Washington River Protection Solutions, LLC, Richland, Washington. |
| TFC-ESHQ-IH-STD-13, Rev. A-2, 2015 | *Illumination,* Washington River Protection Solutions, LLC, Richland, Washington. |
| TFC-ESHQ-RP_ADM-C-26, Rev. A-1, 2014 | *Radiological Design Review Process,* Washington River Protection Solutions, LLC, Richland, Washington. |
| TFC-ESHQ-RP_MON-C-11, Rev. C-2, 2011 | *High Radiation Areas Controls*, Washington River Protection Solutions, LLC, Richland, Washington. |
| TFC-PLN-43, Rev. B-2, 2011 | *Treatment, Storage and Disposal Facility Hazardous Waste Operations*, Washington River Protection Solutions, LLC, Richland, Washington. |

## 2.3 NON-GOVERNMENT, NON-CODE OF RECORD DOCUMENTS

The following non-government documents, of the exact issue shown in Table 3, are utilized in or referenced by this document. They form a part of this specification to the extent specified herein, but are not considered COR documents.

**Table 3. Non-Code of Record Inputs. (3 sheets)**

| Document Number | Title |
|---|---|
| ACI 304.2R, 2017 | *Guide to Placing Concrete by Pumping Methods,* American Concrete Institute, Farmington Hills, Michigan. |
| ASTM C39, 2018 | *Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens*, ASTM International, West Conshohocken, Pennsylvania. |
| ASTM C1611, 2018 | *Standard Test Method for Slump Flow of Self-Consolidating Concrete*, ASTM International, West Conshohocken, Pennsylvania. |
| ASTM C232, 2104 | *Standard Test Method for Bleeding of Concrete*, ASTM International, West Conshohocken, Pennsylvania. |
| HNF-2962, Rev. 0, 1998 | *A List of EMI/EMC Requirements,* Numatec Hanford Company, Richland, Washington. |
| H-14-010608, Sheet 1, Rev 7, 2019 | *Waste Storage Tank (WST) Riser Data,* Washington River Protection Solutions, LLC, Richland, Washington. |
| H-14-010608, Sheet 2, Rev 6, 2019 | *Waste Storage Tank (WST) Riser Data,* Washington River Protection Solutions, LLC, Richland, Washington. |
| H-14-010609, Sheet 1, Rev 7, 2019 | *Waste Storage Tank (WST) Riser Data,* Washington River Protection Solutions, LLC, Richland, Washington. |
| H-14-010609, Sheet 2, Rev 10, 2019 | *Waste Storage Tank (WST) Riser Data,* Washington River Protection Solutions, LLC, Richland, Washington. |
| H-14-030008, Sheet 4, Rev. 11, 2019 | *Electrical (EDS) One Line Diagram*, Washington River Protection Solutions, LLC, Richland, Washington. |
| H-14-030008, Sheet 5, Rev. 15, 2019 | *Electrical (EDS) One Line Diagram*, Washington River Protection Solutions, LLC, Richland, Washington. |
| H-14-030008, Sheet 13, Rev. 8, 2019 | *Electrical (EDS) Panelboard Schedule*, Washington River Protection Solutions, LLC, Richland, Washington. |
| H-14-030009, Sheet 15, Rev. 3, 2019 | *A/AX Retrieval One-Line Diagram,* Washington River Protection Solutions, LLC, Richland, Washington. |
| H-14-030009, Sheet 16, Rev. 10, 2019 | *A/AX Retrieval One-Line Diagram,* Washington River Protection Solutions, LLC, Richland, Washington. |
| H-14-030009, Sheet 29, Rev. 0, 2019 | *Electrical (EDS) Panelboard Schedule,* Washington River Protection Solutions, LLC, Richland, Washington. |
| H-14-108708, Sheet 1, Rev. 1, 2010 | *Pit Cover Plate A-350 CT Pumping*, Washington River Protection Solutions, LLC, Richland, Washington. |
| H-14-108714, Sheet 1, Rev. 0, 2010 | *Site Plan*, Washington River Protection Solutions, LLC, Richland, Washington. |
| H-14-110034, Sheet 1, Rev. 2, 2018 | *A/AX Infrastructure Water & Chemical Distribution Piping System*, Washington River Protection Solutions, LLC, Richland, Washington. |
| H-2-33294, Sheet 1, Rev. 3, 1968 | *Isolation Jumper Pit 241-AX-153 241-AX Tank Farm*, Atlantic Richfield Hanford Company, Richland, Washington. |
| H-2-44551, Sheet 1, Rev. 6, 1968 | *General Area Plan*, Bovay Engineers, Inc., Richland, Washington. |
| H-2-44575, Sheet 1, Rev. 2, 1964 | *Structural Leak Detection Pit Tank 102 & 104-AX*, Bovay Engineers, Inc., Richland, Washington. |
| H-2-44576, Sheet 1, Rev. 2, 1964 | *Structural – Leak Detection Pit Tanks 101 & 103-AX*, Bovay Engineers, Inc., Richland, Washington. |
| H-2-44577, Sheet 1, Rev. 2. 1964 | *Structural Leak Detection Pit Details*, Bovay Engineers, Inc., Richland, Washington. |
| H-2-44580, Sheet 1, Rev. 2, 1964 | *Structural 241-AX-152 Diverter Station Plans and Section,* Washington River Protection Solutions, LLC, Richland, Washington. |

**Table 3. Non-Code of Record Inputs. (3 sheets)**

| Document Number | Title |
|---|---|
| H-2-44582, Sheet 1, Rev. 3, 1965 | *Structural 241-AX-152 Diverter Station Removable Cover Blocks,* Washington River Protection Solutions, LLC, Richland, Washington. |
| H-2-44607, Sheet 1, Rev. 2, 1981 | *Structural & Piping Valve Pit*, Bovay Engineers, Inc., Richland, Washington. |
| H-2-55952, Sheet 1, Rev. 9, 1972 | *Diversion Box 241-A-152 Piping Layout*, Washington River Protection Solutions, LLC, Richland, Washington. |
| H-2-55953, Sheet 1, Rev. 3, 1956 | *Diversion Box 241-A-152 Concrete & Steel Details*, General Electric, Richland, Washington. |
| H-2-55953, Sheet 2, Rev. 4, 1956 | *Diversion Box Concrete & Steel Details*, General Electric, Richland, Washington. |
| H-2-55953, Sheet 3, Rev. 1, 1956 | *Diversion Box 241-A-152 Concrete & Steel Details*, General Electric, Richland, Washington. |
| H-2-55955, Sheet 1, Rev. 1, 1956 | *Diversion Box 241-A-152 Cover Slab Details*, General Electric, Richland, Washington. |
| H-2-56065, Sheet 1, Rev. 6, 1967 | *241-A Tank Farm Lighting & Power Outside Electrical Lines*, General Electric, Richland, Washington. |
| H-2-56121, Sheet 1, Rev. 2, 1956 | *Control Valve Pit Structural*, General Electric, Richland, Washington. |
| H-2-56129, Sheet 1, Rev. 1, 1987 | *Contact Condenser, 241-A-501 Valve Pit Piping Arrangement*, General Electric, Richland, Washington. |
| H-2-56785, Sheet 1, Rev. 2, 1959 | *Plot Plan & Finish Grading*, General Electric, Richland, Washington. |
| H-2-56800, Sheet 1, Rev. 4, 1987 | *Structural Concrete Tank 241-A-417 Plan, Section, & Details*, General Electric, Richland, Washington. |
| H-2-57452, Sheet 1, Rev. 3, 1958 | *Catch Tank Installation at Diversion Box 241-A-152* Washington River Protection Solutions, LLC, Richland, Washington. |
| H-2-57452, Sheet 2, Rev. 3, 1958 | *Details Catch Tank Installation at Diversion Box 241-A-152*, Washington River Protection Solutions, LLC, Richland, Washington. |
| H-2-61982, Sheet 1, Rev. 2, 1976 | *Transfer Box 241-A-153 Plans and Details*, Vitro Engineering Co., Richland, Washington. |
| H-2-61983, Sheet 1, Rev. 1, 1968 | *Structural and Civil Embedded Piping Transfer Box 241-A-153 Plans and Details*, Vitro Engineering Co., Richland, Washington. |
| H-2-61986, Sheet 1, Rev. 4, 1968 | *Civil 241-A Tank Farm Pump Pit Modifications and Valve Pit*, Vitro Engineering Co., Richland, Washington. |
| H-2-63829, Sheet 1, Rev. 1, 1973 | *Structural Valve Pits Plans, Sections, & Details*, Vitro Hanford Engineering Services, Richland, Washington. |
| H-2-63844, Sheet 1, Rev. 3, 1973 | *241-AX Tank Farm Direct Buried Lines Sections & Details*, Vitro Hanford Engineering Services, Richland, Washington. |
| H-2-64326, Sheet 1, Rev. 3, 1974 | *Civil Underground Piping Line 4021 – 3" By-Pass*, Vitro Hanford Engineering Services, Richland, Washington. |
| H-2-69148, Sheet 1, Rev. 1, 1977 | *Civil Plot Plan & Finish Grading*, Vitro Engineering Division, Richland, Washington. |
| H-2-69150, Sheet 1, Rev. 3, 1983 | *Structural Valve Pits 241-A-A & B & 241-AX-A & B*, Vitro Engineering Division, Richland, Washington. |
| H-2-69151, Sheet 1, Rev. 1, 1977 | *Structural Typical Details & General Notes*, Vitro Engineering Division, Richland, Washington. |
| H-2-69188, Sheet 1, Rev. 3, 1990 | *Piping Plan Valve Pits 241-A-A & B*, Vitro Engineering Division, Richland, Washington. |
| H-2-69189, Sheet 1, Rev. 2, 1977 | *Piping Sections & Details Valve Pits 241-A-A & B*, Vitro Engineering Division, Richland, Washington. |

**Table 3. Non-Code of Record Inputs. (3 sheets)**

| Document Number | Title |
|---|---|
| H-2-69194, Sheet 1, Rev. 2, 1983 | *Piping Plans & Details Flush Pits 241-A-A & B 241-AX-A & B*, Vitro Engineering Division, Richland, Washington. |
| H-2-69195, Sheet 1, Rev. 1, 1977 | *Piping Plan and Details Service Pits*, Vitro Engineering Division, Richland, Washington. |
| H-2-69244, Sheet 1, Rev. 3, 1983 | *Piping Plan Valve Pits 241-AX-A & B*, Vitro Engineering Division, Richland, Washington. |
| H-2-69245, Sheet 1, Rev. 1, 1977 | *Piping Sections & Details Valve Pits*, Vitro Engineering Division, Richland, Washington. |
| H-2-70538, Sheet 1, Rev. 3, 1981 | *Piping Arrangement Drainage Lift Station 241-A-350*, Vitro Engineering Co., Richland, Washington. |
| H-2-90359, Sheet 1, Rev. 2, 1990 | *Piping Diversion Box 241-AX-155*, Kaiser Engineers Hanford Company, Richland, Washington. |
| H-2-90690, Sheet 1, Rev. 1, 1983 | *Structural Diversion Box 241-AX-155 Plan and Misc Details*, Kaiser Engineers Hanford Company, Richland, Washington. |
| H-2-90690, Sheet 2, Rev. 1, 1983 | *Structural Diversion Box 241-AX-155 Misc Details*, Kaiser Engineers Hanford Company, Richland, Washington. |
| H-2-97644, Sheet 1, Rev. 0, 1987 | *Cover Block 241-AX-155 Modified*, Rockwell Hanford Operations, Richland, Washington. |
| RPP-8246, Rev. 0, 2001 | *Decision Analysis for Disposition of the 241-AX-152 Catch Tank,* CH2M HILL Hanford Group, Richland, Washington. |
| RPP-35484, Rev. 1, 2008 | *Field Investigation Report for Waste Management Areas C and A-AX*, Washington River Protection Solutions, LLC, Richland, Washington. |
| RPP-ENV-37956, Rev. 3, 2017 | *Hanford 241-A and 241-AX Tank Farms Leak Inventory Assessment Report*, Washington River Protection Solutions, LLC, Richland, Washington. |
| RPP-MP-003, Rev. 6b, 2011 | *Integrated Environment, Safety, and Health Management System, Description for the Tank Operations Contractor,* Washington River Protection Solutions, LLC, Richland, Washington. |
| RPP-RPT-57252, Rev. 1, 2018 | *241-A Farm Riser Utilization Evaluation*, Washington River Protection Solutions, LLC, Richland, Washington. |
| RPP-RPT-58858, Rev. 1, 2015 | *Tier 1 Closure Plan Single-Shell Tank System,* Washington River Protection Solutions, LLC, Richland, Washington. |

# 3.0 WMA A-AX CLOSURE SYSTEM FUNCTIONS AND REQUIREMENTS

This section provides a definition of the overall closure system and subsystems. This section also addresses the functional and performance requirements of the closure system and subsystems. Functional and physical interfaces of WMA A-AX are also defined here as well as providing characteristics of these interfaces.

## 3.1 CLOSURE SYSTEM DEFINITION

The WMA A-AX closure system shall structurally stabilize below-grade structures and facilities. This includes 100-series tanks (10 SSTs), diversion boxes, valve pits, catch tanks, and other below-grade SSCs, as necessary, to stabilize the below-grade structures and isolate residual waste. Above-grade structures and equipment shall be deactivated and removed to facilitate construction of a closure cap over the WMA.

The following functional description of what the WMA A-AX closure system must do is based on the applicable system functions. The following system functions (Table A-22 of RPP-53359, *One System River Protection Project Mission Functional Analysis*) are shown in bold and the associated functional requirements are listed below and discussed further in Section 3.2.1.

**Deactivate, isolate, interim close, and close WMAs per applicable regulations, and remediate contaminated soils, as required, from pipeline runs and past-practice waste management units.**

**Deactivate and isolate ancillary equipment and transfer structures, as well as deactivate, decontaminate, decommission, and demolish tank farm structures, treatment facilities, and ancillary structures used during the tank-waste remediation mission.**

- Close WMA A-AX:
  - Isolate and stabilize the tanks and below-grade structures
    - 100-series tanks
    - Catch tanks
    - Diversion boxes
    - Ancillary equipment
    - Structurally stabilize tanks and below-grade structures
    - Minimize water infiltration.
  - Decontaminate and decommission above-grade facilities and equipment
    - Demolish above-grade facilities
    - Dispose of waste debris.
  - Construct closure cap over WMA A-AX.

### 3.1.1 Closure Subsystems

The closure system consists of the in-tank and ex-tank equipment needed to structurally stabilize below-grade structures in WMA A-AX. These structures include 100-series SSTs (10), diversion boxes (8), catch tanks, and (3) associated ancillary SSCs. The closure system includes equipment for cutting and removing in-tank equipment, installing new access into tanks and

structures if required (e.g., core drilling), material delivery equipment, fill system equipment, fill material, monitoring, and ventilation equipment.

The following subsystems are envisioned for the tank closure system:

- Grout production
- Grout delivery
- Grout placement
- Ventilation system
- Monitoring system
- Electrical power distribution
- Raw water distribution
- Core drilling system.

### 3.1.2 Closure System Functional Requirements

The closure system and subsystems shall perform the following functions.

#### 3.1.2.1 Grout Production.

The closure system shall produce grout in accordance with the requirements of RPP-SPEC-62583, *Functions and Requirements for Hanford Tank Farm Closure Grout Formulations*.

#### 3.1.2.2 Grout Delivery.

The closure system shall deliver grout to WMA A-AX.

#### 3.1.2.3 Establish Access for Grout Placement.

The closure system shall establish access into existing tanks and below-grade structures if required for grout placement.

#### 3.1.2.4 Grout Placement

The closure system shall monitor and control placement of grout at WMA A-AX at a near continuous rate of between 30 and 60 $yd^3$/hour in accordance with RPP-RPT-61675, *241-C 200 Series Single-Shell Tank Closure Grout Placement Test Report*.

#### 3.1.2.5 Minimize Intrusion

The closure system shall minimize water infiltration and intrusion pathways in accordance with RPP-53359.

##### 3.1.2.5.1 Isolate Structures

The closure system shall isolate interconnected infrastructure to minimize the potential for water to infiltrate into stabilized structures and components.

##### 3.1.2.5.2 Decommission Wells

The closure system shall decommission drywells and groundwater monitoring wells within the footprint of the WMA.

#### 3.1.2.6 Remove Above-Grade Equipment

The closure system shall deactivate, demolish and remove above-grade equipment and facilities to grade level in WMA A-AX in accordance with RPP-53359.

#### 3.1.2.7 Install Final Closure Cap

The closure system shall provide a closure cap over WMA A-AX in accordance with WAC 173-303-665(6)(a) criteria.

#### 3.1.2.8 Post Closure Monitoring

The closure system shall provide for post-closure monitoring in accordance with WAC 173-303.

### 3.1.3 Closure System Performance Requirements

#### 3.1.3.1 Grout Formulation

The closure system shall produce grout with the following performance requirements in accordance with RPP-SPEC-62583.

##### 3.1.3.1.1 Flowability

The closure system shall produce grout that has flowability properties in accordance with ASTM C1611, *Standard Test Method for Slump Flow of Self-Consolidating Concrete*.

##### 3.1.3.1.2 Non-Segregating

The closure system shall produce grout that is non-segregating in accordance with ASTM C1611.

##### 3.1.3.1.3 Zero Bleed Water

The closure system shall produce grout with zero bleed water at 24 hours using a modified ASTM C232, *Standard Test Method for Bleeding of Concrete*, test method. The modified test method involves filling a 4-in. diameter by 8-in. high cylinder mold up to a level approximately 0.5 in. below the top and placing a lid on the cylinder mold. Bleed water is measured 24 hours following sample preparation.

##### 3.1.3.1.4 Compressive Strength

The closure system shall produce grout with a compressive strength of greater than 200 psi at 28 days in accordance with ASTM C39, *Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.*

#### 3.1.3.2 Closure Cap

The closure system shall include a final closure cap with the following performance requirements.

##### 3.1.3.2.1 Regulatory Requirements

The closure system cap shall meet regulatory requirements for RCRA landfill closure.

##### 3.1.3.2.2 DOE Requirements

The closure system cap shall meet the regulatory requirements for the DOE low-level waste disposal.

#### 3.1.3.3 Electrical Power Distribution

The closure system shall distribute power to closure subsystems if required.

## 3.2 WMA A-AX INTERFACE

This section identifies the major interfaces of the closure system. The following interface descriptions are intended to help define the system boundaries and identify specific physical interfaces. This section discusses the inputs from these interfacing systems and facilities.

### 3.2.1 Functional Interfaces

The closure system may interface with existing utilities and infrastructure. The following utilities are currently available at the 241-A and 241-AX Tank Farms:

- Electrical power system
- Raw water system.

The closure system shall interface with on-going tank farm operations in adjacent and surrounding facilities (241-AY Tank Farm, 241-AZ Tank Farm, and 242-A Evaporator).

### 3.2.2 Physical Interfaces

The closure system shall interface with below-grade structures in WMA A-AX. These include the 100-series tanks, catch tanks, vaults, diversion boxes, and other below-grade structures with void spaces that are large enough to require structural stabilization to prevent long-term subsidence. To the extent practical, the closure fill system design shall minimize the need for removal of existing equipment or modifications to the existing infrastructure (tanks). Characteristics of the physical interfaces with which the closure system shall interface are described in Section 3.3.2.

The SSCs associated with WMA A-AX are located within the footprint of the 241-A and 241-AX Tank Farms. There are SSCs within the 241-AX Tank Farm that are associated with the 241-AY Tank Farm (e.g., 241-AY-152 diversion box).

## 3.3 WMA A-AX CHARACTERISTICS

The closure system shall have both functional and physical interfaces with WMA A-AX. This section describes the characteristics of both the functional and physical interfaces.

### 3.3.1 Functional Interface Characteristics

The WMA A-AX functional interfaces with the closure system include electrical power and raw water.

#### 3.3.1.1 Electrical Power Transformation

The closure system may obtain 480VAC, 3 Phase, 60 Hz, electrical power for use from either motor control center A701-EDS-MCC-003 (H-14-030008, Sheets 4 and 5) located in building 241-A-701, or from the A/AX waste retrieval electrical distribution system at distribution panel AX241-EDS-DP-001 (H-14-030009, Sheets 15 and 16). One hundred twenty VAC power may be obtained from panel board A701-EDS-DP-115 (H-14-030008, Sheets 5 and 13) or from AX241-EDS-DP-002 (H-14-030009, Sheet 29). Should these panels not have spare 120VAC

capacity at the time of closure, power from either of the identified 480VAC sources may be transformed to 120VAC electrical power as needed for closure operations.

#### 3.3.1.2 Raw Water Distribution

The closure system may obtain raw water from the 241-A-285 Air and Service Water Building or from the 241-A/AX waste retrieval water distribution system (H-14-110034).

### 3.3.2 Physical Interface Characteristics

#### 3.3.2.1 WMA A-AX 100-Series Tanks

The 241-A Tank Farm contains six nominally 1,000,000-gal-capacity SSTs. The tanks consist of a 75-ft-diameter carbon steel liner inside a concrete tank. The tank steel bottoms intersect the sidewalls orthogonally, rather than the dished bottoms of earlier-designed tank farms. Each tank was originally equipped with 9 to 11 risers and a 20-in.-diameter vapor exhaust pipeline that penetrated the tank dome and 4 airlift circulators that were operated to suspend solids, mix the tank contents, and dissipate heat.

The 241-AX Tank Farm contains four 1,000,000-gal-capacity SSTs. The tanks are 75-ft-diameter carbon steel-lined concrete tanks. The tank steel bottoms intersect the sidewalls orthogonally (similar to the tanks in 241-A Tank Farm). Each tank was equipped with 54 risers that penetrated the tank dome and 22 airlift circulators that were operated to suspend solids, mix the tank contents, and dissipate heat.

The closure fill system shall interface with each 100-series tank by means of pits and risers located above the tank. Figure 3 shows the location of the pits and risers on tank 241-AX-104 (see drawing H-14-010609 for locations of pits and risers for tanks 241-AX-101 through 241-AX-104). Figure 4 shows the general location of the pits and risers on tanks 241-A-101 (see drawing H-14-010608 for locations of pits and risers on tanks 241-A-101 through 241-A-106).

RPP-RPT-57252, *241-A Farm Riser Utilization Evaluation,* details the 241-A Tank Farm risers suitable for installation of waste retrieval equipment. The suitable risers were selected based on availability, consistency in layout across tanks, ability to accommodate equipment, and optimization of the retrieval system but have yet to be installed. Riser utilization may change during final waste retrieval design. The configuration shown represents the current plans for waste retrieval and expected tank configuration following waste retrieval. The riser utilization recommended for tank 241-A-101 is shown in Figure 5 and the waste retrieval equipment is marked in blue.

In-tank equipment associated with waste retrieval is assumed to remain in the tanks at the beginning of closure. Equipment installations in the tank risers may change and could continue to change until all retrieval operations are completed. Details on the removal of in-tank equipment will be defined during final closure design.

**Figure 3. Location of Pits and Risers on Tank 241-AX-104.**

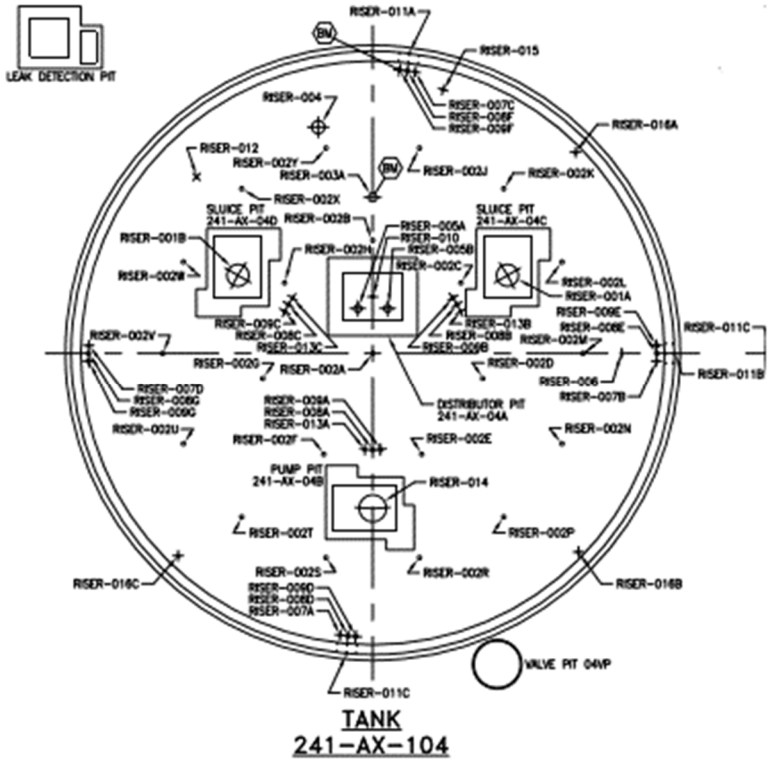



**Figure 4. Location of Pits and Risers on Tank 241-A-101.**

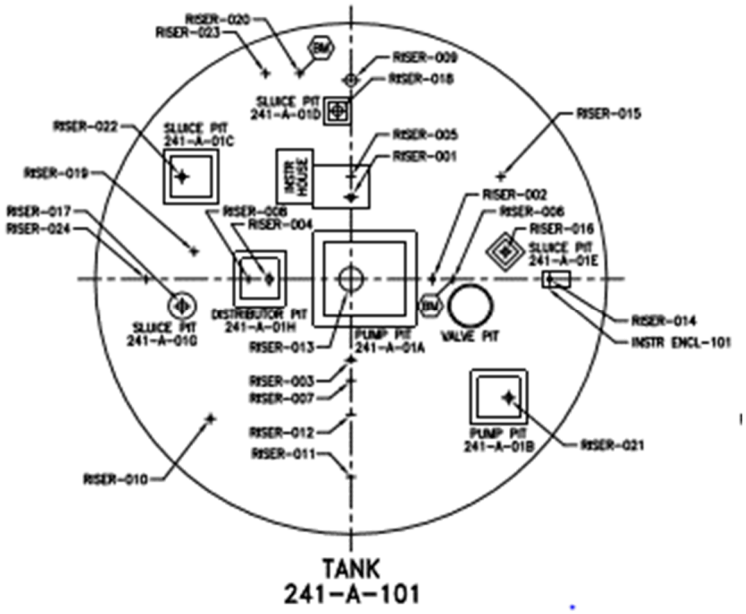
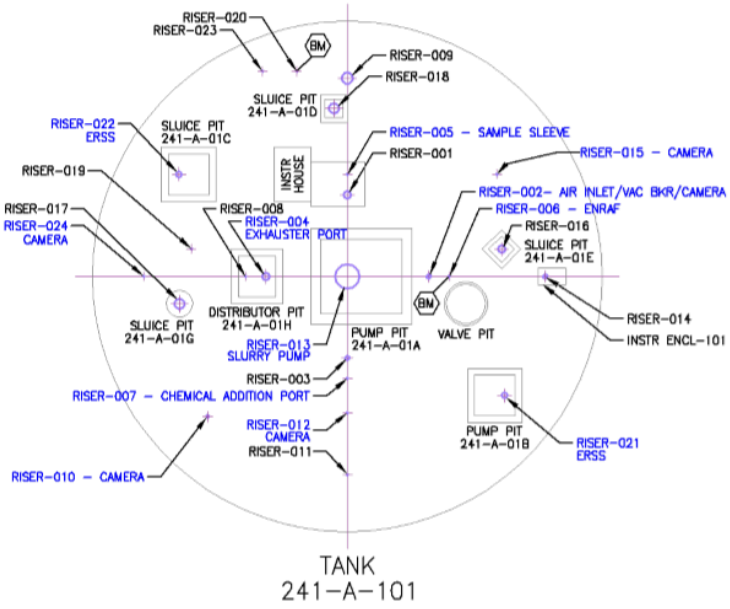


**Figure 5. 241-A-101 Riser Utilization Recommendations.**




### 3.3.2.2 WMA A-AX Catch Tanks

Catch tanks are components of tank farms that collect spills and/or leaks during waste transfers between processing facilities and tank farms. Catch tanks also received water from rainfall, snowmelt, and dust that entered the diversion boxes (the diversion boxes were later weather-proofed). There are three catch tanks in WMA A-AX: 241-A-350, 241-A-417, and 241-AX-152.

### 3.3.2.3 241-AX-152 Catch Tank

Catch tank 241-AX-152 is located southeast of tank 241-AX-103 in the 241-AX Tank Farm and is part of the 241-AX-152 diverter station. This catch tank sits beneath the 241-AX-152 diverter station and has an 11,000-gal capacity (RPP-8246, *Decision Analysis for Disposition of the 241-AX Catch Tank*).

Based on review of the drawings, there is no visible direct path from the top of the diverter pit to the 241-AX-152 catch tank (H-2-44580, *Structural 241-AX-152 Diverter Station Plans & Section*). There are two inspection tubes over the diverter pit and one smaller inspection tube over the pump pit (H-2-44582, *Structural 241-AX-152 Diverter Station Removable Cover Blocks*). The pump and diverter pits drain to the catch tank.

### 3.3.2.4 241-A-417 Catch Tank

Catch tank 241-A-417 is located to the south of the tanks within 241-AX Tank Farm (H-2-56785, *Plot Plan & Finish Grading*). This catch tank is a cylindrical concrete vault lined with a welded steel liner. The tank contains two overflow lines near the top of the vault to prevent overflow.

Above the catch tank are two pits, a pump pit and a valve pit, which drain to the catch tank (H-2-56800, *Structural Concrete Tank 241-A-417 Plan, Section, & Details).* The pump pit is

concrete and has overlapping concrete cover blocks with no apparent access risers. The total thickness of the overlapping cover blocks is 2 ft, 6 in. Both pits drain into the tank via sloped floors.

The catch tank itself contains six risers (two 12-in. and four 6-in.) that are buried approximately 2 ft, 6 in. below grade (H-2-56800). These risers are not visible from photographs but may be accessible if excavated. The cover blocks may need to be removed or new access be established by core drilling both chambers of the 241-A-417 pump pit.

#### 3.3.2.5 241-A-350 Catch Tank

Catch tank 241-A-350 is located to the southeast of tank 241-A-106 (H-14-108714, Sheet 1, *Site Plan*.) The catch tank is an 800-gal stainless steel tank with a reinforced-concrete pump pit. A pump pit drains to the catch tank below. The pit is connected to the tank with six risers (H-2-70538, *Piping Arrangement Drainage Lift Station 241-A-350*).

The concrete cover blocks on the pump pit have been removed and replaced with a steel cover plate with a riser (H-14-108708, *Pit Cover Plate A-350 CT Pumping*). Liquids have been removed from 241-A-350 using this riser to access the tank. The access to the pit requires further investigation and may require core drilling. Based on estimations from the drawing scale the cover block is around 20-in. thick.

### 3.3.3 WMA A-AX Diversion Boxes

Diversion boxes are below-grade, reinforced-concrete structures that provide a flexible method for transferring waste from a tank or facility to another tank or facility. The diversion boxes have concrete cover blocks that usually extend above grade. Cover blocks vary in thickness from box to box. Some diversion boxes are lined with steel.

Transfer lines are connected within diversion boxes by jumpers. Jumpers can be fixed or flexible and can be connected to varying nozzles in the boxes depending on the waste transfer route selected. The current condition of jumpers within diversion boxes is unknown.

The diversion boxes were designed to contain any waste that leaked from the waste transfer line connections. If waste leaked into a diversion box, it generally drained by gravity to nearby catch tanks where any spilled waste was stored and then pumped to SSTs. The following diversion boxes are located in or associated with WMA A-AX: 241-A-152, 241-A-153, 241-AX-151, 241-AX-152DS, 241-AX-153, and 241-AX-155.

#### 3.3.3.1 241-A-152 Diversion Box

Diversion box 241-A-152 is located on the east side of 241-A Tank Farm (H-2-56065, *241-A Tank Farm Lighting & Power Outside Electrical Lines*). The diversion box is 61 ft, ½ in. in length and 23.5 ft in width (H-2-55952, *Diversion Box 241-A-152 Piping Layout*) and contains three areas including a pipe pit, nozzle pit, and jumper storage (H-2-55953, Sheet 1, *Diversion Box 241-A-152 Concrete & Steel Details*).

A 29 ft by 8 ft, 1 in. cross-over encasement (H-2-55953, Sheet 3, *Diversion Box 241-A-152 Concrete & Steel Details*) containing the nozzle connections to catch tank 241-A-302B is located on the west side of the diversion box. The diversion box is 60 ft west of catch tank 241-A-302B and the diversion box connections are approximately 17 ft in elevation above the bottom of the tank.

The diversion box nozzle pit is covered with three layers of 18-in. cover blocks (H-2-55955, *Diversion Box 241-A-152 Cover Slab Details*). The cross-over encasement has an 18-in. cover block (H-2-55953, Sheet 3). The pump pit has a 1-ft cover block (H-2-55953, Sheet 2). Three risers extend above grade over the pump pit sump, including a 2-in.-diameter schedule 40 steel pipe with a screwed steel cap. Access to the diversion box nozzle pit and jumper storage area will require further investigation.

#### 3.3.3.2 241-A-153 Transfer Box

Transfer box 241-A-153 is located to the southwest of tank 241-A-104. The transfer box is 17 ft in length by 9.5 ft in width and contains 20 nozzle connections (H-2-61983, *Structural and Civil Embedded Piping Transfer Box 241-A153 Plans & Details*).

The transfer box is covered by five removable concrete cover blocks. The center cover block has a 3-in.-diameter core drill through block but no other access points (H-2-61982, *Transfer Box 241-A-153 Plans and Details*). Further investigation will be required.

#### 3.3.3.3 241-AX-152 Diverter Station

The 241-AX-152 diverter station is located to the west of 241-AX Tank Farm. The diverter station is above the 241-AX-152 catch tank (H-2-44580). The diverter station is 25 ft, 2 in. in length and 9 ft, 0 in. in width. The diverter station contains a pump pit and a diverter pit.

The pits of this diverter station have cover blocks, depicted on H-2-44582. The pump pit contains a diverter station 4-in.-diameter schedule 40 inspection tube. The diverter pits contains two 2-in.-diameter cleanout sleeves and a 12-ft schedule 40 inspection tube.

#### 3.3.3.4 241-AX-155 Diversion Box

The 241-AX-155 diversion box is located to the northwest of 241-AX Tank Farm. The diversion box is 12 ft, 4 in. in length and 9 ft, 4 in. in width (H-2-90359, *Piping Diversion Box 241-AX-155*).

The diversion box has three 3-ft, 4-in.-thick cover blocks (H-2-90690, Sheet 1, *Structural Diversion Box 241-AX-155 Plans and Misc. Details*). The south and center cover blocks each have a 6-in. schedule 40 access pipe (H-2-90690, Sheet 2, *Structural Diversion Box 241-AX-155 Misc. Details*). The north cover block has a 3-in. schedule 40 access pipe. The center cover block was modified to add an additional 2.5-in. schedule 40 access pipe (H-2-97644, *Cover Block 241-AX-155 Modified*.)

### 3.3.4 241-A Valve Pits

The 241-A Tank Farm contains three main valve pits that were used for routing waste transfers. These valve pits include 241-A-A, 241-A-B, and 241-A-501. Pits 241-A-A and 241-A-B are located in 241-A Tank Farm to the south of tanks 241-A-101 and 241-A-102. Pit 241-A-501 is located approximately 60 ft to the east of tank 241-A-106 (H-2-69148, *Civil Plot Plan & Finish Grading*). There is a flush pit directly to the north of each valve pit (H-2-69188, *Piping Plan Valve Pits 241-A-A & B*), flush pit 241-A-A and flush pit 241-A-B. Service pit 241-A is located directly to the west of the flush pits.

Valve pits 241-A-A and 241-A-B are constructed of 12-in. concrete walls and floor. The pits have an internal area of 10 ft by 12 ft (H-2-69189, *Piping Sections and Details Valve Pits 241-A-A & B*).

Valve pit 241-A-501 is constructed of 12-in. concrete walls and is approximately 13-ft deep (H-2-56121, *Control Valve Pit Structural*). The pit has an internal area of 14 ft by 23 ft (H-2-56129, *Contact Condenser, 241-A-501 Valve Pit Piping Arrangement*).

Flush pits 241-A-A and 241-A-B are constructed of 4 ft, 6 in.-long, 5-ft-diameter corrugated metal piping (H-2-69194, *Piping Plan & Details Flush Pits 241-A-A & B 241-AX-A & B*). The piping has been removed from the pits. The pits have been filled with sand.

Service pit 241-A is constructed of a galvanized corrugated metal pipe. The inner diameter of the pit is 5 ft (H-2-69195, *Piping Plan and Details Service Pits*.)

Access to valve pits 241-A-A and 241-A-B is through two 20-in.-thick cover blocks (H-2-69150, *Structural Valve Pits 241-A-A&B, 241-AX-A&B*). Each cover block has a 2-ft square manhole. The cover blocks over valve pit 241-A-A have twelve 3-in. schedule 40 pipe valve operator sleeve openings (H-2-69151, *Structural Typical Details & General Notes*). The cover blocks over valve pit 241-A-B also have three 3-in. schedule 40 pipe valve operator sleeve openings. One cover block over 241-A-B also has a 3-in. core drilled in one block.

Access to valve pit 241-A-501 is through a door on the north side of the pit. Two sets of stairs lead down to the door on the outside of the pit. An additional set of stairs lead to the bottom of the pit inside the door (H-2-56121).

Service pit 241-A is covered by a galvanized steel lid with handles (H-2-69194). No lid penetrations were required (H-2-69195).

The five raw water valve pits are associated with the 241-A Tank Farm tanks. There is no raw water valve pit associated with tank 241-A-105. The pits are 6-ft-diameter corrugated metal pipe with a sloped sheet metal roof (H-2-63829, *Structural Valve Pits Plans, Sections & Details*). The cover has a 4-ft square access hatch to provide access.

### 3.3.5 241-AX Farm Valve Pits

The 241-AX Tank Farm contains two main valve pits 241-AX-A and 241-AX-B that were also used for routing waste transfers. Both of these valve pits are located to the southwest of tank 241-AX-104 (H-2-69148). Associated with each valve pit is a flush pit; flush pit 241-AX-A to the northwest of valve pit 241-AX-A and flush pit 241-AX-B to the southwest of valve pit 241-AX-B. Service pit 241-AX is located to the west of the valve and flush pits (H-2-69244, *Piping Plan Valve Pits 241-AX – A & B*.)

Valve pits 241-AX-A and 241-AX-B area constructed of 12-in. concrete walls and floor. The pits have an internal area of 10 ft by 12 ft (H-2-69245, *Piping Sections and Details Valve Pits 241-AX-A & B*).

Flush pits 241-AX-A and 241-AX-B are constructed of 5-ft, 7-in.-long, 5-ft-diameter, corrugated metal piping (H-2-69194). As in 241-A Tank Farm, the piping has been removed from the pits. The pits have been filled with sand.

Service pit 241-AX is constructed of a galvanized corrugated metal pipe. The inner diameter of the pit is 5 ft (H-2-69195).

Access to valve pits 241-AX-A and 241-AX-B is through two 20-in.-thick cover blocks (H-2-69150). Each cover block has a 2-ft square manhole. The cover blocks over each pit have

fourteen 3-in. schedule 40 pipe valve operator sleeve openings (H-2-69150). One of the cover blocks over valve pit 241-AX-B also has a 3-in. core drilled in one block.

There are five raw water valve pits in 241-A Tank Farm, each associated with a tank except for valve pit 241-A-105. The valve pits for tanks 241-A-101 through 241-A-103 are near the center of the tanks to the east of the center pump pits (H-2-69148). The valve pits for tanks 241-A-104 and 241-A-106 are near the center of the tanks to the north of the center pump pits. The pits are constructed of 6-ft-diameter, galvanized corrugated metal piping (H-2-61986, *Civil 241-A Tank Farm Pump Pit Modifications and Valve Pit*). The pits are approximately 6 ft, 5 in. in length and have a sloped opening. The valve pits are covered with a 16 gauge, galvanized hatch cover (H-2-63829). Each hatch cover has a 4-ft square hatch opening.

Valve pit 241-AX-501 is a small pit located to the south of 241-AX Tank Farm (H-2-44551, *General Area Plan*). The valve pit is constructed with a 9-in. concrete floor and 18-in. concrete walls.

Valve pit 241-AX-501 is covered with a 2 ft, 10 in. cover block (H-2-44607, *Structural & Piping Valve Pit*). The valve pit can be accessed through a 4-in. schedule 40 pipe with a plug and lifting bail. There are also two 2.5-in. pipe sleeve openings that were used for valve handle extensions.

There are four leak detection pits in 241-AX Tank Farm, each associated with a tank. The leak detection pit for tank 241-AX-101 is located to the southwest of the tank and the leak detection pit for tank 241-AX-102 is located to the northwest of the tank. The leak detection pit for tank 241-AX-103 is located to the southwest of the tank and the leak detection pit for tank 241-AX-104 is located to the northwest of the tank (H-2-69148).

The leak detection pits for are constructed of 18 in. concrete walls and 12 in. concrete floors. The pits have and internal area of 5 ft by 5 ft. The pit details for tanks 241-AX-101 and 241-AX-103 are documented on H-2-44576, *Structural – Leak Detection Pit Tanks 101 & 103-AX*. The pit details for tanks 241-AX-102 and 241-AX-104 are documented on H-2-44575, *Structural Leak Detection Pit Tanks 102 & 104-AX*.

The leak detection pits are covered with 30 in. cover blocks (H-2-44577, *Structural Leak Detection Pit Details*). Each leak detection pit cover block contains a 4 in. schedule 40 pipe plug (H-2-44607).

The 241-AX-153 isolation pit is located to the northeast of diverter station 241-AX-152 as shown on H-2-64326, *Civil Underground Piping Line 4021-3" By-Pass*. The isolation pit is a 7 ft by 7.5-ft rectangle.

The isolation pit is covered by a 2.5-ft-thick cover block shown on H-2-33294, *Isolation Jumper Pit 241-AX-153 241-AX Tank Farm*. The cover block has two access points, which are 4 in. core drilled holes depicted on the drawing for valve extensions.

There are four raw water valve pits in 241-AX Tank Farm, each associated with a tank. The valve pits for tanks 241-AX-101 and 241-AX-103 are north of the tanks. The valve pits for tanks 241-AX-102 and 241-AX-104 are south of the tanks. The pits are constructed of 6-ft-diameter, galvanized corrugated metal piping (H-2-63844, *244-AX Tank Farm Direct Buried Lines Sections & Details*). The pits are approximately 6 ft, 5 in. in length, and partially buried with the bottom of the pit approximately 4 ft, 6 in. below grade. The valve pits are covered with a sloped sheet metal cover (H-2-63829) that has a 4-ft square access hatch.

### 3.3.6 Miscellaneous Below-Grade and Ancillary Equipment

In 241-A Tank Farm, the heat generated from the decay of radionuclides was sufficient to result in the evaporation of water from the wastes stored in the tanks. The water vapor and other off-gases were drawn from each tank through an underground 20-in.-diameter pipe that connects to an underground 24-in.-diameter pipe (i.e., vapor header). A similar vapor header was installed for the four tanks in 241-AX Tank Farm. An underground 20-in.-diameter pipe connects from each SST to an underground 24-in.-diameter pipe. The underground 24-in.-diameter pipe runs to the 241-AX-152 diverter station. From the 241-AX-152 diverter station, the underground 24-in.-diameter pipe from the 241-AX vapor header connects to the 241-A Tank Farm vapor header.

The 241-A Tank Farm vapor header connects to underground condensers and de-entrainment vessels and then enters the 241-A-431 fan house and de-entrainment building. The 241-A and 241-AX Tank Farms process condensate was removed from the 241-A and 241-AX Tank Farms off-gases and collected in tank 241-A-417. The off-gas was filtered and discharged through an exhaust stack. Initially, the condensate collected in tank 241-A-417 was either returned to 241-A or 241-AX Tank Farm SSTs or discharged to a crib. The tanks in 241-A Tank Farm were isolated from the ventilation header in the early 1980s.

The design of the ventilation header included a baffled, 20-in.-diameter pipe inside each tank. The 20-in.-diameter pipe that exits the tank is connected to a 24-in.-diameter stainless steel pipe header that is buried a minimum of 4-ft below grade. The 24-in. header ran between the tanks to the 241-A-431 ventilation building. Dresser couplings provided a compression seal on the outer surface of vapor header piping segments that are ~25 ft in length. A dresser coupling is also used to seal the 20-in.-diameter pipe from each tank to the 24-in. main vapor header. The couplings provide for expansion and contraction of the vapor header pipe segments. For additional detail and information for 241-A Tank Farm, see RPP-35484, *Field Investigation Report for Waste Management Areas C and A-AX*, or RPP-ENV-37956, *Hanford 241-A and 241-AX Tank Farms Leak Inventory Assessment Report*.

The tanks in 241-AX Tank Farm were vented to an underground vessel ventilation header that connected to 241-A Tank Farm and later to 241-AY Tank Farm. The purpose of this ventilation header was to remove off-gas and water vapor from these tanks, which were often operated with the wastes at boiling conditions.

Both the 241-A and 241-AX Tank Farms have pipeline encasements that were utilized to route below-grade transfer lines between tanks and facilities. The encasements are below grade and access generally requires excavation of the soil above the encasement.

### 3.3.7 Above-Grade Facilities

The following above-grade facilities are associated with WMA A-AX. Decontamination, deactivation, decommissioning, and demolition of these facilities shall be completed as a part of the overall WMA A-AX closure. The below-grade portions of these facilities shall be structurally stabilized by filling with grout. The specific interfaces will be established through closure design. The facilities include:

- 241-A-271 Control Building
- 241-A-431 Ventilation Building
- 241-A-701 Compressor and Motor Control Center

- 241-A-702 Ventilation System
- 241-AX-IX Ion Exchange Facility.

### 3.3.8 Closure Cap

The closure cap shall cover WMA A-AX following completion of all predecessor closure activities. The footprint of the closure cap has yet to be determined. Establishing the footprint for the closure cap requires integration with adjacent and nearby facilities for both scheduling and physical interfaces.

## 3.4 DESIGN REQUIREMENTS

The closure system shall be designed and constructed in accordance with the requirements of the following subsections.

### 3.4.1 Safety

The closure system shall be designed to protect workers, the public, the environment, and equipment in accordance with the requirements of this specification, and with the principles and procedures described in RPP-MP-003, *Integrated Environment, Safety, and Health Management System Description for the Tank Operations Contractor*.

#### 3.4.1.1 Personnel Safety

The closure system shall protect personnel from work-place hazards in accordance with the requirements of this section.

#### 3.4.1.2 Occupational Radiological Protection

The closure system shall be designed to protect workers from occupational exposures in accordance with the requirements of HNF-5183, *Tank Farms Radiological Control Manual*, and to keep personnel exposures as low as reasonably achievable.

#### 3.4.1.3 Occupational Safety and Health

The closure system shall incorporate design features that comply with applicable requirements of 29 CFR 1910, “Occupational Safety and Health Standards,” Subparts D, E, G, H J, L M, O, and S, as applicable; and TFC-PLN-43, *Treatment Storage and Disposal Facility Hazardous Waste Operations*.

### 3.4.2 Equipment Protection

The closure system shall be designed to prevent damage to other components.

#### 3.4.2.1 Design

The system shall be designed to ensure proper structural strength, compatibility with the waste, and corrosion protection in accordance with WAC 173-303-640(3) as appropriate for the equipment use and design life.

#### 3.4.2.2 Fire Protection

The closure system shall meet fire protection design requirements of TFC-ESQH-FP-STD-02, *Fire Protection Design Criteria*.

#### 3.4.2.3 Electrical Equipment

The closure system shall meet the requirements of TFC-ENG-STD-41, *Electrical Installations*, for electrical installations and NFPA 70, *National Electric Code*.

#### 3.4.2.4 Electromagnetic Radiation

The closure fill system shall comply with electromagnetic radiation emission requirements set forth in HNF-2962, *A List of EMI/EMC Requirements*.

### 3.4.3 Environmental Conditions

#### 3.4.3.1 Natural Environments

The closure fill system shall be designed for the natural environmental conditions specified in TFC-ENG-STD-02, *Environmental/Seasonal Requirements for TOC Systems, Structures, and Components*.

#### 3.4.3.2 Natural Phenomena Hazards

The closure fill system shall be designed to withstand the natural phenomena hazards conditions specified in TFC-ENG-STD-06, *Design Loads for Tank Farm Facilities*. The equipment used for placement of tank fill is designated performance category (PC-1M) since it is temporary equipment under the SST Retrieval and Closure category in TFC-ENG-STD-06.

#### 3.4.3.3 Induced Environments

The closure system shall be designed to perform in the chemical and radiation environment of the tanks and other structures. Following completion of waste retrieval activities for each tank, a retrieval data report will be prepared that defines the post-retrieval chemical and radiological inventories remaining in the tanks.

The closure system shall be designed to accommodate the temperature and high humidity resulting from the heat of hydration during grout curing. Additionally, the closure system shall be designed to accommodate a dust environment, as applicable, if dry material placement is utilized during structural stabilization.

#### 3.4.3.4 Spill Protection and Controls

The system shall incorporate spill prevention and control features in accordance with 40 CFR 265.193, “Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, Preparation, Evaluation, and Response”; WAC 173-360-375, “Cleanup and Reporting of Spills and Overfills”; and WAC 173-303-640, “Dangerous Waste Regulations, Tank Systems,” with the most stringent requirement taking precedence.

#### 3.4.3.5 Non-Radioactive Airborne Emissions

The system shall be designed to comply with the non-radioactive airborne emissions requirements contained in WAC 173-400, “General Regulation for Air Pollution Sources,” and WAC 173-460, “Controls for New Sources of Toxic Air Pollutants.”

#### 3.4.3.6 Radioactive Airborne Emissions

The system shall be designed to comply with radioactive airborne emissions requirements contained in WAC 246-247, “Radiation Protection, Air Emissions.”

#### 3.4.3.7 Radiation Protection of the Public and Environment

The system shall incorporate design features that limit the combined radioactive ambient airborne emissions from all RPP facilities in compliance with 10 CFR 20, "Standards for Protection Against Radiation," and WAC 246-247. Radioactive airborne emissions from other Hanford Site major facilities shall be considered when designing the system to be in compliance with TFC-ESHQ-ENV-STD-03, *Air Quality – Radioactive Emissions*.

#### 3.4.3.8 Monitoring of Liquid Effluent Discharges to the Environment

The system shall be designed to comply with the requirements for limiting waste water discharge in accordance with TFC-ESHQ-ENV_RM-C-04, *Ensuring Water Quality.*

### 3.4.4 Materials, Processes and Parts

#### 3.4.4.1 Toxic Products and Formulations

The closure system shall comply with the following requirements for toxic materials.

##### 3.4.4.1.1 Lead

Lead shall not be used unless the lead is encapsulated and identified with a permanent tag.

##### 3.4.4.1.2 Toxic Substances

Materials listed in the *Toxic Substances Control Act of 1976*, including polychlorinated biphenyls, shall not be incorporated into the closure system.

### 3.4.5 Tank Dome Loading

The closure system shall not exceed a maximum allowable load of greater than limits documented in RPP-11802, *Analysis of Record Summary for Single-Shell Tanks*, prior to grouting tanks.

### 3.4.6 Ventilation Systems

Ventilation systems shall be designed in accordance with TFC-ENG-STD-07, *Ventilation System Design Standard*.

### 3.4.7 Nameplates and Product Marking

New equipment and/or modifications to existing equipment shall be labeled in a standardized format in accordance with the tank farm labeling program, as specified in the following:

- TFC-ENG-STD-12, *Tank Farm Equipment Identification Numbering and Labeling Standard*
- WAC 173-303-395(6), "Dangerous Waste Regulations, Other General Requirements"
- WAC 173-303-640(5)(d), "Dangerous Waste Regulations, Tank Systems."

### 3.4.8 Reliability, Maintainability, Transportability, Flexibility

#### 3.4.8.1 Reliability

The closure system shall use readily available and proven materials, equipment, and technologies, and be modular in design. The closure system shall have the reliability and availability to meet the mission schedule.

#### 3.4.8.2 Maintainability

The closure system shall be designed for ease of maintenance. Components that require preventative maintenance or predictive maintenance shall be accessible to maintenance personnel.

#### 3.4.8.3 Transportability

Contractor-furnished equipment shall be designed to be transportable and be compatible with DOE/RL-92-36, *Hanford Site Hoisting and Rigging Manual*.

#### 3.4.8.4 Flexibility and Expansion

The closure system design shall consider features that allow for ease of movement and operational flexibility to be able to adapt to different risers and connect to other tanks.

### 3.4.9 Infrastructure Requirements

Active utilities such as power, water, sewer, and monitoring systems that support tank farm operations after WMA A-AX closure shall be rerouted to outside the footprint of the WMA A-AX closure cap.

### 3.4.10 Decontamination and Decommissioning

The closure system shall be designed for ease of decontamination during operation and for decommissioning at the end of the system life.

### 3.4.11 Closure Cap Requirements

#### 3.4.11.1 Design Life

The closure cap shall have a design life of 500 years (DOE G 435.1-1, *Implementation Guide for use with DOE M 435.1-1*).

#### 3.4.11.2 Maintenance

The closure cap shall minimize the need for ongoing maintenance (WAC 173-303).

#### 3.4.11.3 Stability

The closure system cap shall have long-term stability.

#### 3.4.11.4 Evapotranspiration

The closure cap shall provide evapotranspiration for precipitation collected on the closure cap.

#### 3.4.11.5 Surface Water Control

The closure cap shall control surface water run-on and run-off (DOE G 435.1-1).

#### 3.4.11.6 Infiltration

The closure cap shall limit infiltration to less than 0.02 in./yr (0.5 mm/yr).

#### 3.4.11.7 Erosion

The closure cap shall prevent wind/water erosion (DOE G 435.1-1).

The closure system shall minimize potential pathways for infiltration including pumps, sluicers, and long-length equipment that will be entombed in-place.

### 3.4.12 Other Design Requirements

#### 3.4.12.1 Documentation

Records, documents, and drawings pertinent to design functions shall be controlled in accordance with TFC-BSM-IRM_DC-C-02, *Records Management*. Engineering documents shall be developed in accordance with TFC-ENG-STD-10, *Drawing Standard.*

#### 3.4.12.2 Nuclear Safety

Nuclear safety requirements shall be determined by the hazardous conditions associated with closure as evaluated in the process hazards analysis.

#### 3.4.12.3 Personnel and Training

The closure fill system shall be designed to be installed, and post-closure evaluation equipment maintained and managed, by personnel trained and qualified to the levels of training described in TFC-BSM-TQ-STD-01, *Technical Staff and Technician Qualification Requirements.*

#### 3.4.12.4 Design Verification

Design verifications shall be conducted in accordance with TFC-ENG-DESIGN-P-17, *Design Verification*, and ensure compliance with the requirements of this specification.

## 4.0 REFERENCES

10 CFR 20, 1991, "Standards for Protection Against Radiation," Code of Federal Regulations

10 CFR 835, 2001, "Occupational Radiation Protection," Code of Federal Regulations

10 CFR 851, 2006, "Worker Safety and Health Program," Code of Federal Regulations

29 CFR 1910, 2002, "Occupational Safety and Health Standards," Code of Federal Regulations

40 CFR 265.193, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, Preparation, Evaluation, and Response," *Code of Federal Regulations*, as amended.

78 FR 75913, 2013, Record of Decision: Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington, U.S. Department of Energy

ACI 304.2R, 2017, *Guide to Placing Concrete by Pumping Methods*, American Concrete Institute, Farmington Hills, Michigan.

ASTM C39, 2018, *Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens*, ASTM International, West Conshohocken, Pennsylvania.

ASTM C1611, 2018, *Standard Test Method for Slump Flow of Self-Consolidating Concrete*, ASTM International, West Conshohocken, Pennsylvania.

ASTM C232, 2104, *Standard Test Method for Bleeding of Concrete*, ASTM International, West Conshohocken, Pennsylvania.

DOE/EIS-0391, 2009, *Final Tank Closure and Waste Management Environmental Impact Statement Hanford Site, Richland, Washington*, Rev. 0, U.S. Department of Energy, Richland, Washington.

DOE G 435.1-1, *Implementation Guide for use with DOE M 435.1-1*, U.S. Department of Energy, Washington, D.C.

DOE O 435.1, *Radioactive Waste Management*, U.S. Department of Energy, Washington, D.C.

DOE/ORP-2014-02, 2014, Clean Closure Practicability Demonstration for the Single-Shell Tanks, U.S. Department of Energy, Office of River Protection, Richland, Washington.

DOE/RL-92-36, 2017, Hanford Site Hoisting and Rigging Manual, Rev. 1, Release 83, U.S. Department of Energy, Richland Operations Office

Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order – Tri-Party Agreement*, 2 vols., as amended, State of Washington Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

H-14-010608, 2019, *Waste Storage Tank (WST) Riser Data*, Revision 7, Sheet 1, Washington River Protection Solutions, LLC, Richland, Washington.

H-14-010608, 2019, *Waste Storage Tank (WST) Riser Data*, Revision 6, Sheet 2, Washington River Protection Solutions, LLC, Richland, Washington.

H-14-010609, 2019, *Waste Storage Tank (WST) Riser Data*, Revision 7, Sheet 1, Washington River Protection Solutions, LLC, Richland, Washington.

H-14-010609, 2019, *Waste Storage Tank (WST) Riser Data*, Revision 10, Sheet 2, Rev 10, Washington River Protection Solutions, LLC, Richland, Washington.

H-14-030008, 2019, *Electrical (EDS) One Line Diagram*, Revision 11, Sheet 4, Washington River Protection Solutions, LLC, Richland, Washington.

H-14-030008, 2019, *Electrical (EDS) One Line Diagram*, Revision 15, Sheet 5, Washington River Protection Solutions, LLC, Richland, Washington.

H-14-030008, 2019, *Electrical (EDS) Panelboard Schedule*, Revision 8, Sheet 13, Washington River Protection Solutions, LLC, Richland, Washington.

H-14-030009, 2019, *A/AX Retrieval One-Line Diagram*, Sheet 15, Rev. 3, Washington River Protection Solutions, LLC, Richland, Washington.

H-14-030009, 2019, *A/AX Retrieval One-Line Diagram*, Revision 10, Sheet 16, Washington River Protection Solutions, LLC, Richland, Washington.

H-14-030009, 2019, *Electrical (EDS) Panelboard Schedule*, Revision 0, Sheet 29, Washington River Protection Solutions, LLC, Richland, Washington.

H-14-108708, 2010, *Pit Cover Plate A-350 CT Pumping*, Revision 1, Sheet 1, Washington River Protection Solutions, LLC, Richland, Washington.

H-14-108714, 2010, *Site Plan*, Revision 0, Sheet 1, Washington River Protection Solutions, LLC, Richland, Washington.

H-14-110034, 2018, *A/AX Infrastructure Water & Chemical Distribution Piping System*, Revision 2, Sheet 1, Washington River Protection Solutions, LLC, Richland, Washington.

H-2-33294, 1968, *Isolation Jumper Pit 241-AX-153 241-AX Tank Farm,* Revision 3, Sheet 1, Atlantic Richfield Hanford Company, Richland, Washington.

H-2-37860, *Civil Plot plan & Details 244-AR Effluent Control,* Revision 4, Sheet 1, U.S. Atomic Energy Commission, Richland, Washington.

H-2-44551, 1968, *General Area Plan*, Revision 6, Sheet 1, U.S. Atomic Energy Commission Hanford Atomic Products Operation, Richland, Washington.

H-2-44575, 1964 *Structural Leak Detection Pit Tanks 102 & 104-AX* Revision 2, Sheet 1, U.S. Atomic Energy Commission Hanford Atomic Products Operation, Richland, Washington.

H-2-44576, 1964, *Structural – Leak Detection Pit Tanks 101 & 103-AX*, Revision 2, Sheet 1, U.S. Atomic Energy Commission Hanford Atomic Products Operation, Richland, Washington.

H-2-44577, 1964, *Structural Leak Detection Pit Details*, Revision 2, Sheet 1, U.S. Atomic Energy Commission Hanford Atomic Products Operation, Richland, Washington.

H-2-44580, 1964, *Structural 241-AX-152 Diverter Station Plans & Section,* Revision 2, Sheet 1, U.S. Atomic Energy Commission Hanford Atomic Products Operation, Richland, Washington.

H-2-44582, 1965, *Structural 241-AX-152 Diverter Station Removable Cover Blocks,* Revision 3, Sheet 1, U.S. Atomic Energy Commission Hanford Atomic Products Operation, Richland, Washington.

H-2-44607, 1981, *Structural & Piping Valve Pit,* Revision 2, Sheet 1, U.S. Atomic Energy Commission Hanford Atomic Products Operation, Richland, Washington.

H-2-44683, 1991, *241-AX-152 Diverter Station Piping & Equipment Arrangement – Sections* Revision 6, Sheet 1, U.S. Atomic Energy Commission Hanford Atomic Products Operation, Richland, Washington.

H-2-44752, 1972, *Structural Plans & Elevations 241-AX-151 Diverter Station* Revision 4, Sheet 1, U.S. Atomic Energy Commission Hanford Atomic Products Operation, Richland, Washington.

H-2-44753, 1965, *Structural 241-AX-151 Diverter Station Sections & Details* Revision 2, Sheet 1, U.S. Atomic Energy Commission Hanford Atomic Products Operation, Richland, Washington.

H-2-44575, 1964, *Structural Leak Detection Pit Tank 102 & 104-AX*, Revision 2, Sheet 1, Bovay Engineers, Inc., Richland, Washington.

H-2-44576, 1964 *Structural – Leak Detection Pit Tanks 101 & 103-AX*, Revision 2, Sheet 1, Bovay Engineers, Inc., Richland, Washington.

H-2-44577, 1964, *Structural Leak Detection Pit Details*, Revision 2, Sheet 1, Bovay Engineers, Inc., Richland, Washington.

H-2-44758, 1965, *Structural 241-AX-151 Diverter Station Removable Cover Blocks*, Revision 1, Sheet 1, U.S. Atomic Energy Commission Hanford Atomic Products Operation, Richland, Washington.

H-2-44580, 1964, *Structural 241-AX-152 Diverter Station Plans and Section*, Revision 2, Sheet 1, Washington River Protection Solutions, LLC, Richland, Washington.

H-2-44582, 1965, *Structural 241-AX-152 Diverter Station Removable Cover Blocks*, Revision 3, Sheet 1, Washington River Protection Solutions, LLC, Richland, Washington.

H-2-44607, 1981, *Structural & Piping Valve Pit*, Revision 2, Sheet 1, Bovay Engineers, Inc., Richland, Washington.

H-2-55919, 1953 *Waste Storage Tanks Pump Pit Details*, Revision 0, Sheet 1, U.S. Atomic Energy Commission Hanford Works, Richland, Washington.

H-2-55952, 1972, *Diversion Box 241-A-152 Piping Layout*, Revision 9, U.S. Atomic Energy Commission Hanford Works, Richland, Washington.

H-2-55953, 1956, *Diversion Box 241-A-152 Concrete & Steel Details*, Revision 3 of Sheet 1, Revision 4 of Sheet 2, Revision 1 of Sheet 3, U.S. Atomic Energy Commission Hanford Works, Richland, Washington.

H-2-55953, 1956, *Diversion Box Concrete & Steel Details*, Revision 4, Sheet 2, General Electric, Richland, Washington.

H-2-55953, 1956, *Diversion Box 241-A-152 Concrete & Steel Details*, Revision 1, Sheet 3, General Electric, Richland, Washington.

H-2-55955, 1956, *Diversion Box 241-A-152 Cover Slab Details*, Revision 1, Sheet 1, U.S. Atomic Energy Commission Hanford Works, Richland, Washington.

H-2-56065, 1967, *241-A Tank Farm Lighting & Power Outside Electrical Lines*, Revision 6, Sheet 1, U.S. Atomic Energy Commission Hanford Works, Richland, Washington.

H-2-56121, 1956, *Control Valve Pit Structural,* Revision 2, Sheet 1, U.S. Atomic Energy Commission Hanford Atomic Products Operation, Richland, Washington.

H-2-56129, 1987, *Contact Condenser, 241-A-501 Valve Pit Piping Arrangement*, Revision 7, Sheet 1, U.S. Atomic Energy Commission Hanford Works, Richland, Washington.

H-2-56785, 1959, *Plot Plan & Finish Grading*, Revision 2, Sheet 1, U.S. Atomic Energy Commission Hanford Atomic Products Operation, Richland, Washington.

H-2-56800, 1987, *Structural Concrete Tank 241-A-417 Plan Sections & Details,* Revision 4, Sheet 1, U.S. Atomic Energy Commission Hanford Atomic Products Operation, Richland, Washington.

H-2-57452, 1958, *Catch Tank Installation at Diversion Box 241-A-152,* Revision 3 of Sheet 1, Revision 2 of Sheet 2, U.S. Atomic Energy Commission Hanford Atomic Products Operation, Richland, Washington.

H-2-57452, 1958, *Details Catch Tank Installation at Diversion Box 241-A-152*, Revision 3, Sheet 2, Washington River Protection Solutions, LLC, Richland, Washington.

H-2-61982, 1976, *Transfer Box 2412-A-153 Plans and Details,* Revision 2, Sheet 1, U.S. Atomic Energy Commission Richland Operations Office, Richland, Washington.

H-2-61983, 1968, *Structural and Civil Embedded Piping Transfer Box 241-A153 Plans & Details*, Revision 1, Sheet 1, U.S. Atomic Energy Commission Richland Operations Office, Richland, Washington.

H-2-61986, 1968, *Civil 241-A Tank Farm Pump Pit Modifications and Valve Pit* Revision 4 of Sheet 1, Revision 1 of Sheet 2, U.S. Atomic Energy Commission Richland Operations Office, Richland, Washington.

H-2-63829, 1973, *Structural Valve Pits Plans, Sections & Details,* Revision 1, Sheet 1, U.S. Atomic Energy Commission Richland Operations Office, Richland, Washington.

H-2-63844, 1973, *244-AX Tank Farm Direct Buried Lines Sections & Details*, Revision 3, Sheet 1, U.S. Atomic Energy Commission Richland Operations Office, Richland, Washington.

H-2-64326, 1974, *Civil Underground Piping Line 4021-3" By-Pass*, Revision 3, Sheet 1, U.S. Atomic Energy Commission Richland Operations Office, Richland, Washington.

H-2-69148, 1977, *Civil Plot Plan & Finish Grading*, Revision 1, Sheet 1, U.S. Atomic Energy Commission Richland Operations Office, Richland, Washington.

H-2-69150, 1983, *Structural Valve Pits 241-A-A&B, 241-AX-A&B*, Revision 3, Sheet 1, U.S. Atomic Energy Commission Richland Operation Office, Richland, Washington.

H-2-69151, 1977, *Structural Typical Details & General Notes,* Revision 1, Sheet 1, U.S. Atomic Energy Commission Richland Operations Office, Richland, Washington.

H-2-69188, 1990, *Piping Plan Valve Pits 241-A-A & B*, Revision 3, Sheet 1, U.S. Atomic Energy Commission Richland Operations Office, Richland, Washington.

H-2-69189, 1977, *Piping Sections and Details Valve Pits 241-A-A & B*, Revision 2, U.S. Atomic Energy Commission Richland Operations Office, Richland, Washington.

H-2-69194, 1983, *Piping Plan & Details Flush Pits 241-A-A & B 241-AX-A & B*, Revision 2, Sheet 1, U.S. Atomic Energy Commission Richland Operations Office, Richland, Washington.

H-2-69195, 1977, *Piping Plan and Details Service Pits*, Revision 1, Sheet 1, U.S. Atomic Energy Commission Richland Operations Office, Richland, Washington.

H-2-69244, 1983, *Piping Plan Valve Pits 241-AX – A & B*, Revision 3, Sheet 1, U.S. Atomic Energy Commission Richland Operations Office, Richland, Washington.

H-2-69245, 1977, *Piping Sections and Details Valve Pits 241-AX-A & B*, Revision 1, Sheet 1, U.S. Atomic Energy Commission Richland Operations Office, Richland, Washington.

H-2-70538, 1981, *Piping Arrangement Drainage Lift Station 241-A-350,* Revision 3, Sheet 1, Energy Research and Development Administration Richland Operations Office, Richland, Washington.

H-2-90359, 1990, *Piping Diversion Box 241-AX-155*, Revision 2, Sheet 1, U.S. Department of Energy Richland Operations Office, Richland, Washington.

H-2-90690, 1983, *Structural Diversion Box 241-AX-155 Plans and Misc. Details*, Revision 1 of Sheet 1, Revision 1 of Sheet 2, U.S. Department of Energy Richland Operations Office, Richland, Washington.

H-2-90690, 1983, *Structural Diversion Box 241-AX-155 Misc Details*, Revision 1, Sheet 2, Kaiser Engineers Hanford Company, Richland, Washington.

H-2-97644, 1987, *Cover Block 241-AX-155 Modified,* Revision 0*,* Sheet 1, U.S. Department of Energy Richland Operations Office, Richland, Washington.

H-14-030008, 2019, *Electrical EDS One Line Diagram*, Revision 11 of Sheet 4, Revision 15 of Sheet 5, and Revision 8 of Sheet 13, U.S. Department of Energy, Office of River Protection, Richland, Washington.

H-14-030009, 2019, *A/AX Retrieval One-Line Diagram*, Revision 3 of Sheet 15, Revision 9 of Sheet 16, Revision 0 of Sheet 29, U.S. Department of Energy, Office of River Protection, Richland, Washington.

H-14-108708, 2010, *Pit Cover Plate A-350 CT Pumping*, Revision 1 of Sheet 1, Revision 1 of Sheet 2, Revision 1 of Sheet 3, U.S. Department of Energy Office of River Protection, Richland, Washington.

H-14-110034, 2018, *A/AX Infrastructure Water & Chem distribution Piping Plan*, Revision 2, Sheet 1, U.S. Department of Energy Office of River Protection, Richland, Washington.

HNF-2962, 1998, *A List of EMI/EMC Requirements*, Rev. 0, Numatec Hanford Company, Richland, Washington.

HNF-5183, 2019, *Tank Farms Radiological Control Manual*, Washington River Protection Solutions, Rev. 5O, LLC, Richland, Washington.

NFPA 70, 2017, *National Electrical Code*, National Fire Protection Association, Quincy, Massachusetts.

*Resource Conservation and Recovery Act of 1976*, 42 USC 6901 et seq, as amended.

RPP-8246, 2001, *Decision Analysis for Disposition of the 241-AX Catch Tank*, Revision 0, CH2M Hill Hanford Group, Inc., Richland, Washington.

RPP-11802, 2013, *Analysis of Record Summary for Single-Shell Tanks*, Rev. 3A, Washington River Protection Solutions, LLC, Richland, Washington.

RPP-35484, 2008, *Field Investigation Report for Waste Management Areas C and A-AX*, Revision 1, CH2M Hill Hanford Group, Inc., Richland, Washington.

RPP-51303, 2012, *River Protection Project Functions and Requirements,* Revision 0, Washington River Protection Solutions, LLC, Richland, Washington.

RPP-53359, 2012, *One System River Protection Project Mission Functional Analysis,* Revision 0, Washington River Protection Solutions, LLC, Richland, Washington.

RPP-MP-003, 2011, *Integrated Environment, Safety, and Health Management System, Description for the Tank Operations Contractor*, Rev. 6b, Washington River Protection Solutions, LLC, Richland, Washington.

RPP-RPT-57252, 2014, *241-A Farm Riser Utilization Evaluation,* Revision 0, Washington River Protection Solutions, LLC, Richland, Washington, Richland, Washington.

RPP-RPT-58693, 2019, *Engineered System Data Package for Waste Management Area A-AX,* Revision 0, Washington River Protection Solutions, LLC, Richland, Washington.

RPP-RPT-58858, 2015, *Tier 1 Closure Plan Single-Shell Tank System*, Rev. 1, Washington River Protection Solutions, LLC, Richland, Washington.

RPP-RPT-61675, 2019, *241-C 200 Series Single-Shell Tank Closure Grout Placement Test Report*, Rev. 0,Washington River Protection Solutions, LLC, Richland, Washington.

RPP-ENV-37956, 2014, *Hanford 241-A and 241-AX Tank Farms Leak Inventory Assessment Report*, Revision 2, Washington River Protection Solutions, LLC, Richland, Washington.

RPP-PLAN-40761, 2012, *Integrated Single-Shell Tank Waste Management Area Closure Plan,* Revision 4, Washington River Protection Solutions, LLC, Richland, Washington.

RPP-SPEC-62583, 2019, *Functions & Requirements for Hanford Tank Farm Closure Grout Formulations*, Draft, Washington River Protection Solutions, LLC, Richland, Washington.

*Toxic Substances Control Act of 1976*, 15 USC 53 et seq, as amended.

TFC-BSM-IRM_DC-C-02, 2018, *Records Management*, Rev. F-16, Washington River Protection Solutions, LLC, Richland, Washington.

TFC-BSM-TQ-STD-01, 2018, *Technical, Technician, and Support Staff Qualification Requirements*, Revision E-1, Washington River Protection Solutions, LLC, Richland, Washington.

TFC-ENG-DESIGN-P-17, 2011, *Design Verification*, Rev. D-9, Washington River Protection Solutions, LLC, Richland, Washington.

TFC-ENG-FACSUP-C-10, 2017, *Control of Dome Loading and SSC Load Control*, Rev. C-25, Washington River Protection Solutions, LLC, Richland, Washington.

TFC-ENG-FACSUP-C-25, 2016, *Hoisting and Rigging*, Rev. D, Washington River Protection Solutions, LLC, Richland, Washington.

TFC-ENG-STD-02, 2017, *Environmental/Seasonal Requirements for TOC Systems*, Rev. A-12, Structures, and Components, Washington River Protection Solutions, LLC, Richland, Washington.

TFC-ENG-STD-06, 2017, *Design Loads for Tank Farm Facilities*, Rev. D-0, Washington River Protection Solutions, LLC, Richland, Washington.

TFC-ENG-STD-07, 2017, *Ventilation System Design Standard*, Rev. H-3, Washington River Protection Solutions, LLC, Richland, Washington.

TFC-ENG-STD-10, 2009, *Drawing Standard*, Rev. A-7, Washington River Protection Solutions, LLC, Richland, Washington.

TFC-ENG-STD-12, 2017, *Tank Farm Equipment Identification Numbering and Labeling Standard*, Rev. E-0, Washington River Protection Solutions, LLC, Richland, Washington.

TFC-ENG-STD-34, 2017, *Standard for the Selection of Non-Metallic Materials in Contact With Tank Waste*, Rev. A-1, Washington River Protection Solutions, LLC, Richland, Washington.

TFC-ENG-STD-41, 2017, *Electrical Installations*, Rev. A-5, Washington River Protection Solutions, LLC, Richland, Washington.

TFC-ESHQ-ENV_RM-C-04, 2018, *Ensuring Water Quality*, Revision B-1, Washington River Protection Solutions, LLC, Richland, Washington.

TFC-ESHQ-ENV-STD-03, 2018, *Air Quality – Radioactive Emissions*, Revision A-10, Washington River Protection Solutions, LLC, Richland, Washington.

TFC-ESHQ-FP-STD-02, 2018, *Fire Protection Design Criteria*, Rev. D-1, Washington River Protection Solutions, LLC, Richland, Washington.

TFC-ESHQ-IH-STD-13, 2015, *Illumination*, Rev. A-2, Washington River Protection Solutions, LLC, Richland, Washington.

TFC-ESHQ-RP_ADM-C-26, 2014, *Radiological Design Review Process*, Rev. A-1, Washington River Protection Solutions, LLC, Richland, Washington.

TFC-ESHQ-RP_MON-C-11, 2011, *High Radiation Areas Controls*, Rev. C-2, Washington River Protection Solutions, LLC, Richland, Washington.

TFC-PLN-43, 2011, *Treatment, Storage and Disposal Facility Hazardous Waste Operations*, Rev. B-2,Washington River Protection Solutions, LLC, Richland, Washington.

WAC 173-303, 2014, *Dangerous Waste Regulations*, Washington Administrative Code

WAC 173-303-395, 2019, *Other General Requirements*, Washington Administrative Code

WAC 173-303-640, 2019, *Tank Systems*, Washington Administrative Code

WAC 173-360-375, "Cleanup and Reporting of Spills and Overfills," *Washington Administrative Code*, as amended.

WAC 173-400, 2018, *General Regulation for Air Pollution Sources*, Washington Administrative Code.

WAC 173-460, 2014, *Controls for New Sources of Toxic Air Pollutants*, *Washington Administrative Code*, as amended.

WAC 173-480, 2014, *Ambient Air Quality Standards and Emission Limits for Radionuclides*, Washington Administrative Code

WAC 246-247, 2019 "Radiation Protection-Air Emissions," Washington Administrative Code

# INFORMATION CLEARANCE REVIEW AND RELEASE APPROVAL

## Part I: Background Information

Title: Waste Management Area A-AX Closure Specification

Information Category:
☐ Abstract ☐ Journal Article ☐ Summary
☐ Internet ☐ Visual Aid ☐ Software
☐ Full Paper ☑ Report ☐ Other

Publish to OSTI? ☐ Yes ☑ No

| Trademark/Copyright "Right to Use" Information or Permission Documentation | Yes ☐ | NA ☑ |
|---|---|---|

Document Number: RPP-SPEC-63337 Revision 00 Date: January 2020

Author: Klages, Deanna L

## Part II: External/Public Presentation Information

Conference Name: N/A

Sponsoring Organization(s): N/A

Date of Conference: N/A Conference Location: N/A

Will Material be Handed Out? ☐ Yes ☑ No Will Information be Published? ☐ Yes ☑ No *(If Yes, attach copy of Conference format instructions/guidance.)*

## Part III: WRPS Document Originator Checklist

| *Description* | *Yes* | *N/A* | *Print/Sign/Date* |
|---|---|---|---|
| Information Product meets requirements in TFC-BSM-AD-C-01? | ☐ | ☑ | |
| Document Release Criteria in TFC-ENG-DESIGN-C-25 completed? (Attach checklist) | ☐ | ☑ | |
| If product contains pictures, safety review completed? | ☐ | ☑ | |

## Part IV: WRPS Internal Review

| *Function* | *Organization* | *Date* | *Print Name/Signature/Date* |
|---|---|---|---|
| Subject Matter Expert | WRPS | 01/07/2022 | Klages, Deanna L Approved - IDMS data file att. |
| Responsible Manager | WRPS | 02/02/2022 | Bergeron, Marcel P Approved - IDMS data file att. |
| Other: | | | |

## Part V: IRM Clearance Services Review

| *Description* | *Yes* | *No* | *Print Name/Signature* |
|---|---|---|---|
| Document Contains Classified Information? | ☐ | ☒ | If Answer is "Yes," ADC Approval Required<br>Print Name/Signature/Date |
| Document Contains Information Restricted by DOE Operational Security Guidelines? | ☐ | ☒ | Reviewer Signature:<br>Print Name/Signature/Date |
| Document is Subject to Release Restrictions?<br>*If the answer is "Yes," please mark category at right and describe limitation or responsible organization below:* | ☐ | ☒ | Document contains:<br>☐ Applied Technology ☐ Protected CRADA<br>☐ Personal/Private ☐ Export Controlled<br>☐ Proprietary ☐ Procurement – Sensitive<br>☐ Patentable Info. ☐ OUO<br>☐ Predecisional Info. ☐ UCNI<br>☐ Restricted by Operational Security Guidelines<br>☐ Other (Specify) |
| Additional Comments from Information Clearance Specialist Review? | ☐ | ☒ | Information Clearance Specialist Approval<br>APPROVED<br>By Sarah Harrison at 2:20 pm, Feb 07, 2022<br>Print Name/Signature/Date |

**When IRM Clearance Review is Complete – Return to WRPS Originator for Final Signature Routing (Part VI)**

# INFORMATION CLEARANCE REVIEW AND RELEASE APPROVAL

## Part VI: Final Review and Approvals

| *Description* | *Approved for Release* | | *Print Name/Signature* | |
|---|---|---|---|---|
| | *Yes* | *N/A* | | |
| WRPS External Affairs | ☒ | ☐ | McKenna, Mark | Approved - IDMS data file att. |
| WRPS Office of Chief Counsel | ☒ | ☐ | Kneese, Kyle C | Approved - IDMS data file att. |
| DOE – ORP Public Affairs/Communications | ☒ | ☐ | Tyree, Geoffrey T | Approved - IDMS data file att. |
| Other: ORP SME | ☒ | ☐ | Blackwell, Becky | Approved - IDMS data file att. |
| Other: | ☐ | ☐ | | |

Comments Required for WRPS-Indicate Purpose of Document:

Document was requested by State of Washington, Department of Ecology, to support their review and comment of RPP-PLAN-64407, Waste Management Area Integration Study - Waste Management Area A-AX which was TPA Milestone M-045-97, submitted in September 2021.

***APPROVED***
***By Sarah Harrison at 2:20 pm, Feb 07, 2022***

**Approved for Public Release; Further Dissemination Unlimited**

**Information Release Station**

Was/Is Information Product Approved for Release? ☒ Yes ☐ No

If Yes, what is the Level of Releaser? ☑ Public/Unrestricted ☐ Other (Specify) _____

Date Information Product Stamped/Marked for Release: 02/07/2022

**Was/Is Information Product Transferred to OSTI?** ☐ **Yes** ☒ **No**

**Forward Copies of Completed Form to WRPS Originator**

- <workflow name="**(SEH) Normal - RPP-SPEC-63337 Rev0**" id="**334013453**">
  - <task name="**Clearance Process**" id="**0**" date-initiated="**20220202T1048**" performer="**SARAH E HARRISON**" performer-id="**252341659**" username="**h5635746**">
    <comments>**Due Wednesday February 16th 2022 - COB Please approve the Waste Management Area A-AX Closure Specification, Revision 0, submitted by Deanna Klages for public release.**</comments>
  </task>
  <task name="**Add XML**" id="**1**" date-done="**20220202T1049**" />
  <task name="**Manager Approval**" id="**41**" date-due="**20220207T1048**" date-done="**20220202T1202**" performer="**MARCEL P BERGERON**" performer-id="**172635544**" username="**h0006384**" disposition="**Approve**" authentication="**true**" />
  <task name="**Document Reviewer1**" id="**54**" date-due="**20220207T1202**" date-done="**20220203T1017**" performer="**MARK MCKENNA**" performer-id="**182697281**" username="**h1903617**" disposition="**Public Release**" authentication="**true**" />
  <task name="**Document Reviewer2**" id="**53**" date-due="**20220207T1202**" date-done="**20220207T0822**" performer="**KYLE C KNEESE**" performer-id="**333687981**" username="**h1513870**" disposition="**Public Release**" authentication="**true**" />
  <task name="**Document Reviewer3**" id="**52**" date-due="**20220207T1202**" date-done="**20220207T1325**" performer="**REBECCA I BLACKWELL**" performer-id="**242759597**" username="**h9138590**" disposition="**Public Release**" authentication="**true**" />
  <task name="**Doc Owner Clearance Review**" id="**13**" date-due="**20220208T1325**" date-done="**20220207T1333**" performer="**DEANNA L KLAGES**" performer-id="**5225435**" username="**h0088972**" disposition="**Send On**" authentication="**true**" />
  <task name="**Milestone 1**" id="**24**" date-done="**20220207T1333**" />
  <task name="**ORP Document Reviewer1**" id="**57**" date-due="**20220209T1333**" date-done="**20220207T1352**" performer="**GEOFFREY T TYREE**" performer-id="**6158846**" username="**h0068565**" disposition="**Public Release**" authentication="**true**" />
  <task name="**Doc Owner Reviews ORP Comments**" id="**61**" date-due="**20220208T1352**" date-done="**20220207T1402**" performer="**DEANNA L KLAGES**" performer-id="**5225435**" username="**h0088972**" disposition="**Send On**" authentication="**true**" />
  <task name="**Milestone 2**" id="**62**" date-done="**20220207T1402**" />
  <task name="**Verify Doc Consistency**" id="**4**" date-due="**20220208T1402**" date-done="**20220207T1406**" performer="**SARAH E HARRISON**" performer-id="**252341659**" username="**h5635746**" disposition="**Cleared**" authentication="**true**" />
</workflow>