# DOCUMENT RELEASE AND CHANGE FORM

Prepared For the U.S. Department of Energy, Assistant Secretary for Environmental Management
By Hanford Tank Waste Operations & Closure LLC, (H2C)
Contractor For U.S. Department of Energy, Hanford Field Office

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Hanford Waste Management Area B-BX-BY Tank and Ancillary Equipment Residual Waste Inventory Estimates

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The purpose of this report is to provide preliminary radiological and non-radiological inventory estimates for waste residuals in tanks and ancillary equipment in the 241-B, 241-BX and 241 BY Tank Farms at the time of closure. These inventory estimates will be used as source terms for the Waste Management Area (WMA) B-BX-BY performance assessment and will be revised as needed as additional information is obtained.

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Calculation Number/Revision/Title: RPP-RPT-65494, 00-Hanford Waste Management Area B-BX-BY Tank and Ancillary

Scope of Review[1]: Spreadsheets and Data Tables

Engineer/Analyst: Jim Field (See DRCF OR SmartPlant for approvals)

Organization Manager: Heather Baune (See DRCF OR SmartPlant for approvals)

| Yes | No[2] | NA | | |
|---|---|---|---|---|
| ☒ | ☐ | ☐ | a. | The calculation was formatted in accordance with Attachment A of TFC-ENG-DESIGN-C-10. |
| ☒ | ☐ | ☐ | b. | The objective/purpose of the calculation is clearly stated and the problem is completely defined by the purpose statement. |
| ☒ | ☐ | ☐ | c. | Analytical and technical approaches and results are reasonable and appropriate. |
| ☒ | ☐ | ☐ | d. | Input data are adequately described, referenced to their source, and checked for consistency with original source information. |
| ☒ | ☐ | ☐ | e. | Necessary assumptions are reasonable, explicitly stated, and technically justifiable. Assumptions requiring verification prior to use are clearly stated and identified/tracked using TBD/HOLD numbers. |
| ☒ | ☐ | ☐ | f. | For both qualitative and quantitative data, uncertainties are recognized and discussed and the data is presented in a manner to minimize design interpretations. |
| ☒ | ☐ | ☐ | g. | Mathematical derivations were checked, including dimensional consistency of results. |
| ☒ | ☐ | ☐ | h. | Calculations are sufficiently detailed such that a technically qualified person can understand the analysis without requiring recourse to the originator. |
| ☒ | ☐ | ☐ | i. | Calculations were verified, including review that correct input data are used, equations are correctly applied to the problem being analyzed, correct units are used, and results are reasonable and appropriate. |
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| ☐ | ☐ | ☒ | l. | Software is used in accordance the requirements prescribed by the Software Owner.[4] This includes adherence to limits of use, training requirements, software settings, specific software checklists, usage logs, error report checks, etc. |
| ☐ | ☐ | ☒ | m. | Software input reports and input files are attached. |
| ☐ | ☐ | ☒ | n. | The input was correctly entered/modeled in the Software, and consistent with the calculation document. |
| ☐ | ☐ | ☒ | o. | Software output is consistent with the input and with the results reported in the calculation document. |
| ☐ | ☐ | ☒ | p. | Multiple-Use spreadsheets are used in accordance with TFC-ENG-DESIGN-C-32, and identified by file name, version, HISI ID#, and as applicable; the SMP or Spreadsheet Verification Form. |
| ☒ | ☐ | ☐ | q. | Single-Use spreadsheets used in the calculation have adequate explanation of their method, are identified by file name, and checked/verified as part of the calculation. |
| ☒ | ☐ | ☐ | r. | Data or results presented in tables and graphs have been checked against original source. |
| ☒ | ☐ | ☐ | s. | The number of significant digits is appropriate and consistent. |
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| ☒ | ☐ | ☐ | v. | Results and conclusions address all points in the purpose. |
| ☒ | ☐ | ☐ | w. | Referenced documents are retrievable or otherwise available and the version or revision of each reference is cited. |
| ☐ | ☐ | ☒ | x. | Impacts on requirements have been assessed and change documentation initiated to incorporate revisions to affected documents, as appropriate. |
| ☐ | ☐ | ☒ | y. | The design media matches the calculations. |

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Checkbox Justifications:

[1] If less than the entire calculation was checked, the scope of the check should be discussed.

[2] If any blocks are checked "No", a justification must be provided here or attached.

[3] Does not apply to non-computational software (e.g. Word®, Visio®).

[4] The Software Owner is responsible for managing software, including requirements, in accordance with TFC-BSM-IRM_HS-C-01.

**RPP-RPT-65494**
**Revision 0**

# Hanford Waste Management Area B-BX-BY Tank and Ancillary Equipment Residual Waste Inventory Estimates

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Hanford Tank Waste Operations & Closure, LLC (H2C)

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Hanford Tank Waste Operations & Closure

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## EXECUTIVE SUMMARY

The purpose of this report is to provide preliminary radiological and non-radiological inventory estimates for waste residuals in tanks and ancillary equipment in the 241-B, 241-BX and 241-BY Tank Farms at the time of closure. These inventory estimates will be used as source terms for the Waste Management Area (WMA) B-BX-BY performance assessment and will be revised as needed as additional information is obtained.

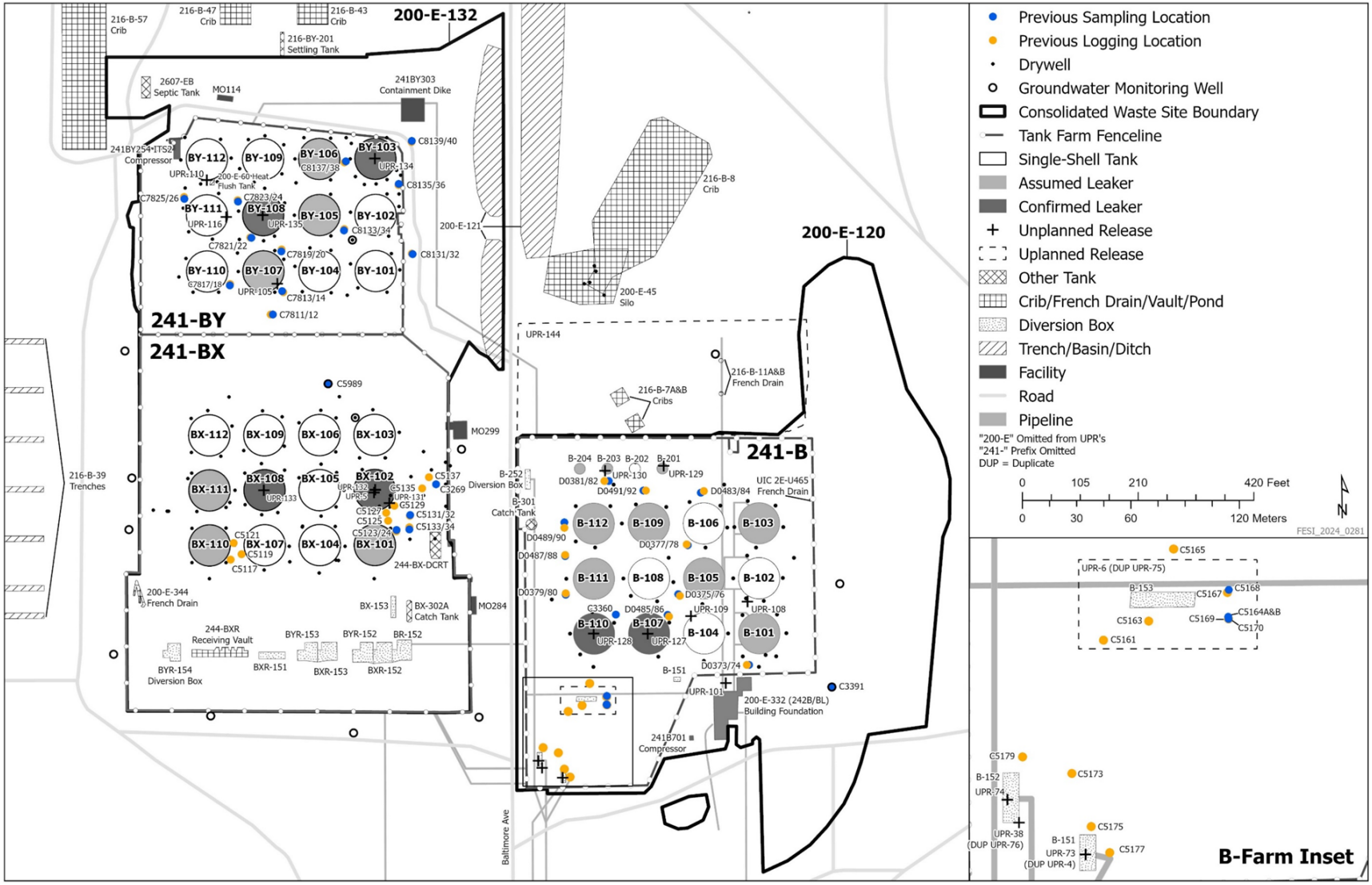
This report estimates residual inventories based on information available and conditions through February 1, 2025 and presents chemical and radiological inventory estimates for residual waste remaining in WMA B-BX-BY single-shell tanks (SSTs) and associated transfer equipment after tank waste is retrieved. Residual inventory estimates are important to environmental assessments and closure decisions as most environmental impacts are linearly proportional to the amount of soluble contaminants left in tanks/equipment (this document) or the amount of contaminant released to the soil (RPP-RPT-49089, *Hanford B-Farm Leak Inventory Assessments Report*; RPP-RPT-47562, *Hanford BX-Farm Leak Inventory Assessments Report*; and RPP-RPT-43704, *Hanford BY-Farm Leak Inventory Assessment Report*).

Figure ES-1 shows major components of WMA B-BX-BY expected to contain residual waste including:

- 16 SSTs in 241-B Tank Farm used for waste retrieval and storage,
- 12 SSTs in 241-BX Tank Farm used for waste retrieval and storage,
- 12 SSTs in 241-BY Tank Farm used for waste retrieval and storage,
- Ancillary equipment, including catch tanks, pipelines, pits and diversion boxes used to transfer waste to and from the SSTs.

The WMA B-BX-BY SSTs were constructed to store process waste from Hanford nuclear operations. Millions of gallons of nuclear waste were stored in the WMA B-BX-BY SSTs. Some of the 241-B, 241-BX and 241-BY SSTs were sluiced in the 1950s to make room for additional waste. The SSTs received additional waste through 1980. In the late 1990s and early 2000s liquid waste was pumped out of the tanks, reducing the inventory of soluble constituents in the drainable liquid and mobile constituents in the tanks. Waste retrieval operations are planned to remove the remaining waste from the SSTs to the limit of technology , consistent with the *Hanford Federal Facility Agreement and Consent Order* (HFFACO) (Ecology et al. 1989). As of February 1, 2025, no waste has been retrieved from WMA B-BX-BY SSTs. After waste is retrieved, residual waste will be sampled and a more complete inventory set will be available. Following retrieval, the SSTs, infrastructure and surrounding soils in WMA B-BX-BY will be closed in accordance with applicable State and Federal regulations.

**Figure ES-1. Waste Management Area B-BX-BY.**



This report presents post-retrieval residual waste inventory estimates for SSTs and associated ancillary equipment in WMA B-BX-BY based on information available as of February 1, 2025. Given the uncertainty in the volume of waste that can be retrieved, the current Best-Basis Inventory (BBI) estimate (no retrieval) can be used as an upper bound for the WMA B-BX-BY SST residual inventories. BBI estimates scaled to a waste volume of 360 $ft^3$ for 100-series tanks and 30 $ft^3$ for 200-series tanks (the HFFACO retrieval goal) are used as base case estimates (Table ES-1).

**Table ES-1. Sets of Waste Management Area B-BX-BY Residual Waste Inventory Estimates in this Report.**

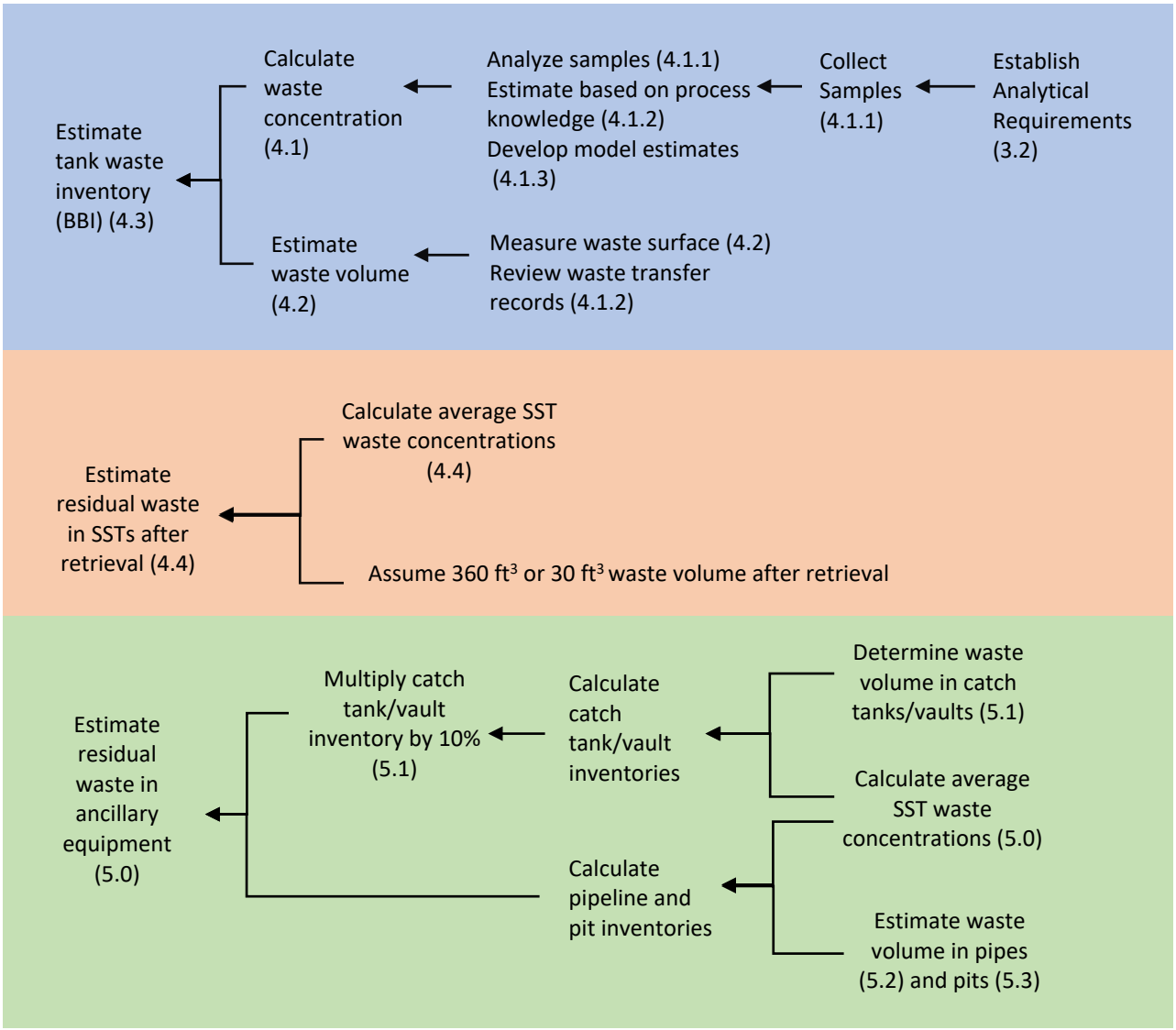
| **Single-Shell Tanks** |
|---|
| Single-shell tank (SST) Best-Basis Inventory (BBI) Inventories and waste volumes as of February 1, 2025 scaled to 360 $ft^3$ or 30 $ft^3$ (Hanford Federal Facility Agreement and Consent Order [Ecology et al. 1989] retrieval goal) |
| Upper Bound: SST BBI Inventories and volumes as of February 1, 2025 (no retrieval) |
| **Catch Tanks** |
| February 1, 2025 BBI weighted average waste concentrations in SSTs (for applicable farms) multiplied by 10% of current waste volume (90% retrieval) |
| February 1, 2025 BBI weighted average waste concentrations in SSTs (for applicable farms) multiplied by current waste volume (no retrieval) |
| **Diversion Boxes and Valve Pits** |
| February 1, 2025 BBI weighted average waste concentrations in SSTs (for applicable farms) and waste volume estimates based on bottom and side surface areas of structures and assumed thickness of waste on the surfaces |
| **Pipelines** |
| February 1, 2025 BBI weighted average waste concentration for SSTs (in applicable farms), and waste volume estimates assuming waste occupies 5% of unplugged pipeline volumes and 100% of plugged lines |

Figure ES-2 illustrates the overall process to estimate post-retrieval residual waste inventories. The figure shows three major process steps:

1. estimate tank waste inventory,
2. estimate residual waste in tanks, and
3. estimate residual waste in ancillary equipment.

The first major process step is to estimate the current tank waste inventory. The BBI process was established to estimate current tank waste inventories for a standard set of chemicals and radionuclides. In the BBI process, waste concentration and volume estimates are established and combined to calculate inventories. Available analytical data are evaluated to identify which data best represent the waste concentrations in an SST. When analytical data are not available for a chemical or radionuclide, waste concentrations are estimated based on waste process information. Waste volume estimates in the BBI are based on tank measurements and/or waste transfer information.

**Figure ES-2. Process to Estimate Residual Waste Inventories.**




The next major process step is to estimate residual waste inventories in the SSTs after retrieval and at the time of closure. The inventories were determined by multiplying February 1, 2025 BBI waste concentrations by 360 $ft^3$ or 360 $ft^3$ for 200-series SSTs (the retrieval goal).

The third major process step was to estimate waste residuals in ancillary equipment (catch tanks, diversion boxes, valve pits and pipelines). As for the SSTs, the first step is to estimate the current inventory of waste in ancillary equipment. Because little information is available for waste in catch tanks and pipelines, it was assumed that the composition of waste in ancillary equipment is bounded by the weighted average composition of waste in the BBI. The current waste volumes for catch tanks were based on measurements. Base case residual waste volumes were estimated assuming that 90% of the waste in catch tanks is retrieved. The amount of waste remaining in pipelines, diversion boxes and valve pits is unknown. Based on operations information, most of the waste has been flushed. Hence, the waste volume is expected to be

small compared to catch tank and SST post-retrieval residuals. Waste volume estimates were developed based on the length and size of pipelines, surface area of diversion boxes and valve pits, and operations information.

This report describes the assumptions, technical basis and uncertainty for each of the three major process steps to estimate residual waste inventories. The uncertainty of estimates varies depending on the quality and completeness of available information and includes retrieval uncertainties, model and process knowledge uncertainties, analytical uncertainty, and residual volume uncertainties.

Table ES-1 shows inventory estimates derived in this report for catch tanks, diversion boxes, valve pits and pipelines.

Table ES-2 shows residual volume, and chemical and radionuclide inventory estimates for measured residual inventories based on BBI inventories as of February 1, 2025. Appendix A includes inventory estimates for each SST and type of ancillary equipment for 25 chemicals and 46 radionuclides reported in the BBI.

Final estimates for residual inventories remaining at closure will be further evaluated after completing 241-B, 241-BX and 241-BY Tank Farm retrievals and documented in future data packages or supporting documents.

**Table ES-2. Estimated Waste Management Area B-BX-BY Residual Inventories.**

| Inventory Estimates[a] | Volume (kgal) | Chemicals (kg) | Radionuclides (Ci)[e] |
|---|---|---|---|
| **241-B Tank Farm** | | | |
| BBI Single-Shell Tank Inventory 2/1/2025 | 1,935 | 5,140,000 | 1,060,000 |
| Single-Shell Tank Residuals[b] | 33.2 | 93,200 | 18,300 |
| Catch Tank/Vault Inventory 2/1/2025 | 5.54 | 14,700 | 3,050 |
| Catch Tank Vault residuals at Closure[c] | 0.554 | 1,470 | 305 |
| Diversion Boxes[d] | 0.017 | 44.8 | 9.28 |
| Pipelines[d] | 0.757 | 2,010 | 417 |
| **241-BX Tank Farm** | | | |
| BBI Single-Shell Tank Inventory 2/1/2025 | 1462 | 3,750,000 | 1,090,000 |
| Single-Shell Tank Residuals[b] | 32.3 | 85,000 | 33,200 |
| Catch Tank/Vault Inventory 2/1/2025 | 38.8 | 99,400 | 28,800 |
| Catch Tank Vault residuals at Closure[c] | 3.88 | 9,940 | 2,880 |
| Diversion Boxes/Valve Pits[d] | 0.061 | 157 | 45.6 |
| Pipelines[d] | 0.750 | 1,920 | 557 |
| **241-BY Tank Farm** | | | |
| BBI Single-Shell Tank Inventory 2/1/2025 | 3,884 | 15,900,000 | 4,200,000 |
| Single-Shell Tank Residuals[b] | 32.3 | 131,000 | 34,500 |
| Catch Tank/Vault Inventory 2/1/2025 | 1.13 | 4,630 | 1,220 |
| Catch Tank Vault residuals at Closure[c] | 0.113 | 463 | 122 |
| Diversion Boxes/Valve Pits[d] | 0 | 0 | 0 |
| Pipelines[d] | 0.990 | 4,060 | 1,070 |

[a] See Appendix A for specific volumes and chemical and radionuclide inventories.

[b] Assumes Best-Basis Inventory (BBI) Concentrations and single-shell tanks (SSTs) are retrieved to the retrieval goal of 360 $ft^3$ for 100-series SSTs , and 30 $ft^3$ for 200-series SSTs.

[c] Assumes 90% retrieval for catch tanks and vaults and BBI tank weighted average waste concentrations.

[d] Waste volume and inventory estimates for pits, diversion boxes and pipelines (see Section 5.0) and weighted average waste concentrations.

[e] Radionuclides are decayed to January 1, 2022.

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## Abbreviations and Acronyms

| | |
|---|---|
| BBI | best-basis inventory |
| $BiPO_4$ | bismuth phosphate |
| DOE | U.S. Department of Energy |
| DQO | data quality objective |
| DST | double-shell tank |
| Ecology | State of Washington Department of Ecology |
| EIS | environmental impact statement |
| FFTF | Fast Flux Test Facility |
| HDW | Hanford Defined Waste |
| HFFACO | Hanford Federal Facility Agreement and Consent Order |
| ITS | in-tank solidification |
| ITS-1 | 241-BY In-Tank Solidification Unit #1 |
| ITS-2 | 241-BY In-Tank Solidification Unit #2 |
| PA | performance Assessment |
| PCB | polychlorinated biphenyl |
| PNNL | Pacific Northwest National Laboratory |
| PUREX | Plutonium Uranium Extraction (Plant) |
| RCRA | *Resource Conservation and Recovery Act of 1976* |
| REDOX | Reduction-Oxidation (S Plant) |
| RSD | relative standard deviation |
| SD | standard deviation |
| SST | single-shell tank |
| TC & WM | Tank Closure and Waste Management |
| TWINS | Tank Waste Information Network System |
| wt% | weight percent |
| WMA | Waste Management Area |

**Waste Types**

| | |
|---|---|
| 1C | first-cycle decontamination waste |
| 1C1 | $BiPO_4$ first-cycle decontamination waste and coating waste (1944-49) |
| 2C | second-cycle decontamination waste |
| 2C1 | $BiPO_4$ first-cycle decontamination waste and coating waste (1950-56) |
| 2C2 | $BiPO_4$ second-cycle decontamination waste (1950-1956) |
| 224 | Lanthanum fluoride process 224 Building waste (1949-1956) |
| B-Slt | Saltcake from 242-B Evaporator operation (1951-1954) |
| BY-Slt | Saltcake from in-tank solidification in 241-BY farm (1965-1974) |
| CSR | Supernate from which the cesium has been removed by ion exchange |
| CWP2 | PUREX cladding waste, aluminum clad fuel (1963-1967) |
| CWR1 | REDOX cladding waste, aluminum clad fuel (1952-1960) |
| DE | Diatomaceous earth |
| DW | Decontamination waste |
| ITS | in-tank solidification |
| IX | Ion exchange waste: may include cesium recovery waste, B-Plant, or strontium recovery waste |
| LW | Laboratory waste |
| MW1 | $BiPO_4$ Metal Waste (1944-1949) |
| MW2 | $BiPO_4$ Metal Waste (1950-1956) |
| OWW | Organic wash waste |
| P2 | PUREX waste managed as high-level waste (1963-1967) |
| PFeCN | Ferrocyanide scavenging waste, TBP supernate scavenged in 244-CR Vault |
| R1 | REDOX R1 waste managed as high-level waste (1952-1958) |
| R2 | REDOX R2 waste managed as high-level waste (1959-1966) |
| R-Slt | Saltcake from self-concentration in 241-S and 241-SX Farms (1952 1966) |
| S-Slt | Saltcake from the 242-S Evaporator (1977-1980) |
| T-Slt | Saltcake from the 242-T Evaporator (1965-1976) |
| TBP | Tributyl phosphate, uranium recovery waste (1952-1957) |

# 1. INTRODUCTION

## 1.1 OVERVIEW

This report provides inventory estimates for waste residuals remaining in Waste Management Area (WMA) B-BX-BY after retrieval is completed. The estimates are based on knowledge of tank farm inventories as of February 1, 2025. Current knowledge includes waste volume measurements and estimates, analysis of tank samples and process knowledge estimates of tank waste composition. Projected residual estimates are the assumed amount of waste and the composition of waste remaining in tanks and ancillary equipment after retrievals are completed.

Residual waste inventories were previously estimated in support of the Tank Closure and Waste Management (TC & WM) Environmental Impact Statement (EIS) (DOE/EIS-0391, *Final Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington*). The EIS estimates, based on information available as of December 1, 2002, serve as a comparison case for the WMA B-BX-BY performance assessment (PA). The updated inventory estimates summarized in this document provide a technical basis for a preliminary WMA B-BX-BY PA for potential impacts from waste residuals remaining in single-shell tanks (SSTs) and ancillary equipment after site closure. Inventory estimates and associated potential impacts are expected to be revised after the SSTs and selected ancillary equipment are retrieved and additional post-retrieval sample information is obtained.

This report presents updated residual waste inventory estimates based on more current information. In addition to completing the EIS, updates since December 1, 2002 include the following:

a. Updated Best-Basis Inventory (BBI) data for SSTs and ancillary equipment data and information were obtained

b. Hanford tank waste process model estimates were updated (RPP-19822, *Hanford Defined Waste Model – Revision 5.0*).

This report describes the assumptions, technical basis and uncertainty for residual waste inventory estimates. Chapter 1 presents an overview and background for the report. Chapter 2 presents the purpose and scope of the report. Assumptions and data quality objectives (DQOs) are discussed in Chapter 3. Chapter 4 describes the technical basis for WMA B-BX-BY SST residual waste inventory projections after retrieval. Chapter 5 presents inventory estimates for catch tanks, diversion boxes, and pipelines. The uncertainty of estimates presented varies depending on the quality and completeness of available information and includes retrieval uncertainties, model and process knowledge uncertainties, analytical uncertainty, and residual volume uncertainties. Chapter 6 discusses inventory uncertainty.

## 1.2 BACKGROUND

### 1.2.1 History of Waste Management Area B-BX-BY Tank Farms

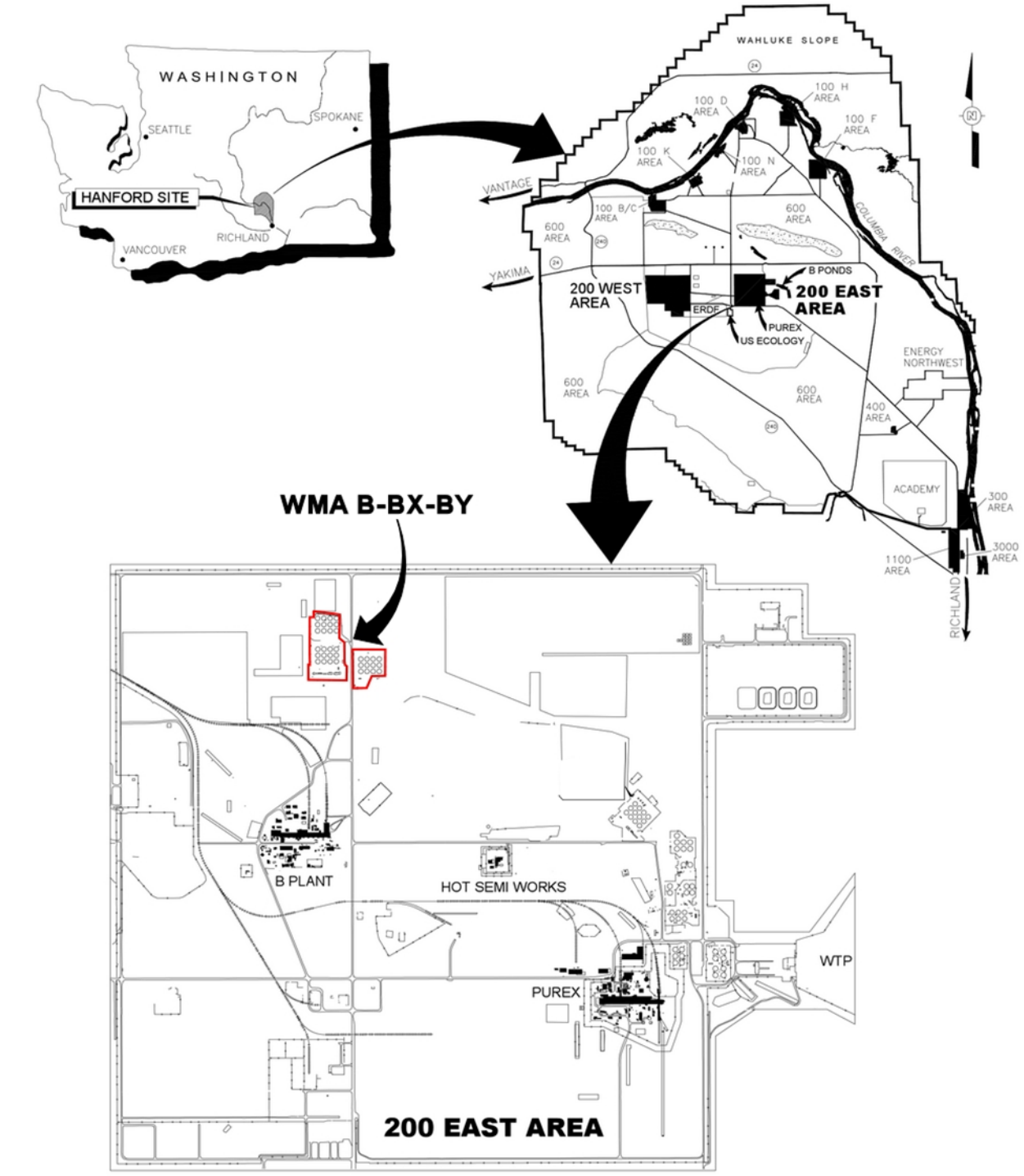
The 241-B, 241-BX, and 241-BY Tank Farms are located in the 200 East Area of the Central Plateau of the Hanford Site (Figure 1-1). Figure 1-2 shows WMA B-BX-BY and surrounding facilities.

The 241-B Tank Farm (B Farm) was constructed from 1943 to 1944. B Farm initially received metal waste (MW) and first-cycle (1C) and second-cycle (2C) decontamination waste from B Plant. Tanks 241-B-101 through 241-B-103 were sluiced for uranium recovery and most of the MW, 1C, and 2C waste were removed in 1953. Some of the tanks were modified to accept in-tank solidification (ITS) (241-BY In-Tank Solidification Unit #1 [ITS-1] and 241-BY In-Tank Solidification Unit #2 [ITS-2]) evaporator bottoms (saltcake from 242-B Evaporator operation [1951-1954] [B-Slt]) waste. Supernate was removed from the tanks and starting in 1963 the tanks received Plutonium Uranium Extraction Plant (PUREX) waste managed as high-level waste (P2) and PUREX cladding waste (CWP2). From 1969 to 1973 the tanks received ion exchange (IX) waste, processed to remove cesium before discharging to the cribs, then the tanks received additional B-Slt waste. The smaller 200-series B Farm tanks received 224 (lanthanum fluoride process 224 Building) and MW flush waste in 1952 and 1953. Table 1-1 shows waste types received in B Farm tanks.

The 241-BX Tank Farm (BX Farm) was constructed from 1948 to 1949. Tanks 241-BX-101 through 241-BX-106 received B Plant MW and U Plant waste until 1950. These tanks were sluiced for uranium recovery. Tanks 241-BX-107 through 241-BX-112 initially received B Plant 1C waste and B Plant waste. Table 1-2 shows waste types received in BX Farm Tanks.

Tanks 241-BY-101 through 241-BY-106 received B Plant MWs, after tanks in BX Farm were filled. Tanks 241-BY-107 through 241-BY-110 received B Plant 1C waste and tributyl phosphate, uranium recovery waste (1952-1957) (TBP) waste. Tanks 241-BY-111 and 241-BY-112 were used for temporary storage of metal waste. Tanks 241-BY-104 through 241-BY-108 and 241-BY-110 received ferrocyanide scavenging waste. Tanks 241-BY-101 through 241-BY-106, 241-BY-111 and 241-BY-112 were sluiced for uranium recovery in 1954 and 1955 (WHC-SD-WM-TI-648, *Tank Characterization Reference Guide*). The ITS process was also used to reduce tank wastes from 1965 through 1974. Two ITS systems were installed, ITS-1 for tanks 241-BY-101 and 241-BY-102 and ITS-2 for tanks 241-BY-111 and 241-BY-112 (RPP-RPT-43704, *Hanford BY-Farm Leak Inventory Assessment Report*). Condensate from the ITS process was discharged to cribs and the concentrate was discharged to WMA B-BX-BY SSTs. Between 1968 and 1978, ITS tanks received waste from fractionation operations in B Plant from aged PUREX and Reduction-Oxidation (S Plant) wastes that had been reprocessed through B Plant to recover $^{137}Cs$ and $^{90}Sr$. A portion of this reprocessed waste from the IX separation used was directed to some WMA B-BX-BY SSTs. Table 1-3 shows waste types received in 241-BY Tank Farm (BY Farm) tanks.

**Figure 1-1. Location Map of Waste Management Area B-BX-BY in the 200 West Area of the Hanford Site.**



Waste transfers to the B Farm, BX Farm and BY Farm SSTs continued through the late 1970s and early 1980s (see Tables 1-1, 1-2 and 1-3), after which supernatant and interstitial liquids were pumped out to the extent practical and the SSTs were declared interim stabilized.

### 1.2.2 Waste Management Area B-BX-BY Single-Shell Tanks

WMA B-BX-BY is part of the Hanford Site SST system and is comprised of B Farm, BX Farm and BY Farm, as well as a limited area outside these farms. The WMA B-BX-BY study area has 40 SSTs, used to store waste from B Plant, U Plant and PUREX processes. The tank farms consist of the following.

B Farm:

- Twelve 100-series SSTs, each with 533,000-gal capacity
- Four 200-series SSTs, each with 55,000-gal capacity
- Five diversion boxes
- One Catch Tank
- One French Drain
- Waste transfer lines
- Multiple drywells around each 100-series SST used as leak detection systems
- Tank ancillary equipment.

BX Farm:

- Twelve 100-series SSTs, each with 533,000-gal capacity
- Eight diversion boxes
- One Double-Contained Receiver Tank
- One Catch Tank
- One Vault
- One French Drain
- Waste transfer lines
- Multiple drywells around each 100-series SST used as leak detection systems
- Other tank ancillary equipment.

BY Farm:

- Twelve 100-series SSTs, each with 750,000-gal capacity
- Waste transfer lines
- Multiple drywells around each 100-series SST used as leak detection systems
- Other tank ancillary equipment.

All SSTs in B Farm, BX Farm, and BY Farm consist of a concrete shell and a single-walled liner of carbon steel, buried for protection at ground surface. The leak-tight steel liners cover the tank bottoms and extend up the sidewalls.

**Figure 1-2. Map of Waste Management Area B-BX-BY and Surrounding Area.**

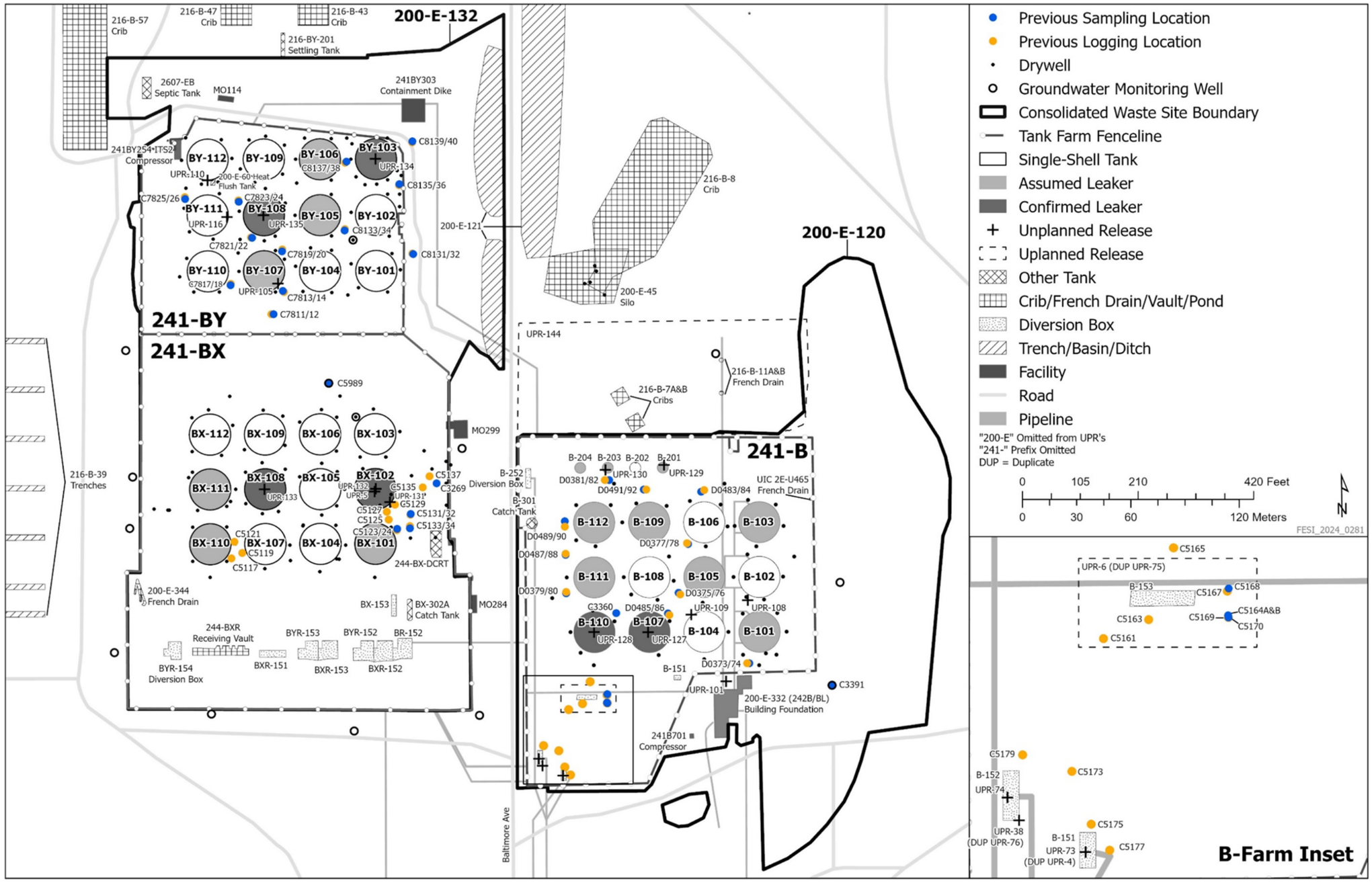


**Table 1-1. Waste Types Received into 241-B Tank Farm 100- and 200-Series Single-Shell Tanks.**

| Year | 241-B-101 | 241-B-102 | 241-B-103 | 241-B-104 | 241-B-105 | 241-B-106 | 241-B-107 | 241-B-108 | 241-B-109 | 241-B-110 | 241-B-111 | 241-B-112 | 241-B-201 | 241-B-202 | 241-B-203 | 241-B-204 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1945 | MW1 | MW1 | — | — | — | — | 1C1 | 1C1 | — | 2C1 | 2C1 | | — | — | — | — |
| 1946 | MW1 | MW1 | MW1 | 2C1 | — | — | 1C1 | 1C1 | 1C1 | 2C1 | 2C1 | 2C1 | — | — | — | — |
| 1947 | — | — | — | 2C1 | 2C1 | 2C1 | — | — | — | — | — | — | — | — | — | — |
| 1948 | — | — | — | 2C1 | 2C1 | 2C1 | — | — | — | 2C1 | 2C1 | 2C1 | — | — | — | — |
| 1949 | — | — | — | 2C1 | 2C1 | 2C1 | — | — | — | — | — | — | — | — | — | — |
| 1950 | — | — | — | 2C2 | 2C2 | 2C2 | — | — | — | 2C2 | 2C2 | 2C1 | — | — | — | — |
| 1951 | — | — | — | — | — | — | — | — | — | 2C2 | 2C2 | 2C1 | — | — | — | — |
| 1952 | — | — | — | B-Slt | B-Slt | B,BX,C Evap feed/1C2 | B-Slt | B-Slt | B-Slt | 2C2 | 2C2 | 2C1/2C2 | — | — | 224/MW2 | 224/DW/MW2 |
| 1953 | Sluiced | Sluiced | MW1/Sluiced | B-Slt | B-Slt | B,BX,C Evap feed/TBP | B-Slt | B-Slt | B-Slt | 2C2 | 2C2 | 2C1 | 224/MW2 | 224/MW2 | — | — |
| 1954 | B-Slt | — | B-Slt | — | B-Slt | B,BX,C Evap feed/TBP | B-Slt | — | B-Slt | B-Slt | B-Slt | 2C1 | — | — | — | — |
| 1955 | — | — | — | — | — | — | — | B-Slt | — | DW | — | — | — | — | — | — |
| 1956 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 1957 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 1958 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 1959 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 1960 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 1961 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 1962 | — | — | — | — | — | — | — | — | — | — | DW/2C2 | — | — | IX | — | — |
| 1963 | CWP2 | CWP2 | CWP2 | — | — | LW | CWP2 | CWP2 | CWP2 | DW | — | — | — | — | — | — |
| 1964 | — | — | CWP2 | — | — | — | — | — | | P2 | P2 | — | — | — | — | — |
| 1965 | — | — | — | — | — | — | — | — | BY-Slt | P2 | P2 | — | — | — | — | — |
| 1966 | — | — | — | — | — | — | — | — | — | P2 | P2 | — | — | — | — | — |
| 1967 | — | — | — | — | — | — | — | — | — | P2 | P2/BY-Slt | CWP2 | — | — | — | — |
| 1968 | — | — | — | — | — | LW | — | — | — | IX | | — | — | — | — | — |
| 1969 | IX | IX | IX/OWW/CWP2 | — | — | — | — | IX | IX | IX | IX | IX | — | — | — | — |
| 1970 | — | IX | IX | — | — | — | — | — | — | — | IX | — | — | — | — | — |
| 1971 | IX | IX | IX | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 1972 | IX | IX | IX | — | BY-Slt | — | — | — | — | — | — | — | — | — | — | — |
| 1973 | IX | B-Slt | IX/CWP2/LW/ DW/TBP | — | — | — | — | — | IX | — | — | BY-Slt | — | — | — | — |
| 1974 | — | B-Slt/IX | B-Slt | — | — | B-Slt | — | B-Slt | BY-Slt/224 | — | — | BY-Slt | — | — | — | — |
| 1975 | — | B-Slt | — | — | — | — | — | — | BY-Slt/224 | — | — | BY-Slt | — | — | — | — |
| 1976 | — | B-Slt | B-Slt | — | — | — | — | — | BY-Slt | — | — | — | — | — | — | — |

Colors in table are used to highlight similar waste type groups.

1C1 = Bismuth phosphate first-cycle decontamination waste and coating waste (1944-49)
224 = Lanthanum fluoride process 224 Building waste (1949-1956)
2C1 = Bismuth phosphate first-cycle decontamination waste and coating waste (1950-56)
2C2 = Bismuth phosphate Second cycle decontamination waste (1950-1956)
B-Slt = Saltcake from 242-B Evaporator operation (1951-1954)
BY-Slt = Saltcake from in-tank solidification in 241-BY Tank Farm (1965-1974)
CWP2 = Plutonium Uranium Extraction Plant (PUREX) cladding waste, aluminum clad fuel (1963-1967)
DW = Decontamination waste
IX = Ion exchange waste: may include cesium recovery waste, B-Plant, or strontium recovery waste. Not easily distinguished in references.
LW = Laboratory waste
MW1 = Bismuth phosphate metal waste (1944-1949)
MW2 = Bismuth phosphate metal waste (1950-1956)
OWW = Organic wash waste
P2 = PUREX waste managed as high-level waste (1963-1967)
TBP = Tributyl phosphate, uranium recovery waste (1952-1957)

Source documents:
LA-UR-97-311, *Waste Status and Transaction Record Summary (WSTRS)*, Rev. 4 Vol. I of II
RPP-RPT-49089, *Hanford B-Farm Leak Inventory Assessments Report*
WHC-MR-0132, *A History of the 200 Area Tank Farms*
WHC-SD-WM-TI-302, *Hanford Waste Tank Sluicing History*

1

**Table 1-2. Waste Types Received into 241-BX Tank Farm Single-Shell Tanks.**

| Year | 241-BX-101 | 241-BX-102 | 241-BX-103 | 241-BX-104 | 241-BX-105 | 241-BX-106 | 241-BX-107 | 241-BX-108 | 241-BX-109 | 241-BX-110 | 241-BX-111 | 241-BX-112 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1948 | MW1 | MW1 | MW1 | MW1 | MW1 | MW1 | 1C1 | 1C1 | — | — | — | — |
| 1949 | MW1 | MW1 | MW1 | MW1 | MW1 | MW1 | 1C1 | 1C1 | — | 1C1 | — | — |
| 1950 | MW2 | MW2 | MW2 | MW2 | MW2 | MW2 | 1C2 | 1C2 | 1C2 | 1C2 | 1C2 | — |
| 1951 | MW2 | MW2 | MW2 | MW2 | MW2 | MW2 | — | — | — | — | — | 1C2 |
| 1952 | — | — | — | — | — | — | — | — | — | — | — | — |
| 1953 | Sluiced | MW2 | — | — | — | — | TBP | TBP | TBP | — | — | — |
| 1954 | Sluiced | Sluiced | Sluiced | Sluiced | — | MW2 | — | TBP | TBP | B-Slt | B-Slt | B-Slt |
| 1955 | — | — | — | Sluiced | Sluiced | Sluiced | — | — | — | — | — | — |
| 1956 | PFeCN | PFeCN | PFeCN | PFeCN | PFeCN | PFeCN | — | — | — | — | — | — |
| 1957 | — | — | — | — | — | — | — | — | — | — | — | — |
| 1958-1961 | — | — | — | — | — | — | — | — | — | — | — | — |
| 1962 | CWP2 | CWP2 | CWP2 | CWP2 | — | — | — | — | — | — | — | — |
| 1963 | — | — | — | — | CWP2 | CWP2 | — | — | — | — | — | — |
| 1964 | — | — | — | — | CWP2 | — | — | CWP2 | CWP2 | CWP2 | CWP2 | CWP2 |
| 1965-1967 | — | — | — | — | — | — | — | — | — | — | — | — |
| 1968 | IX/BY-Slt | IX/BY-Slt/CWP2 | CWP2/OWW | IX/BY-Slt | IX/CWP2/BY-Slt | IX/BY-Slt/CWP2/OWW | — | — | — | — | — | — |
| 1969 | IX | IX | OWW | IX | | IX | IX | IX | IX | IX | IX | IX |
| 1970 | IX/OWW/CWP2 | IX/OWW/CWP2 | IX/P2 | IX | — | IX/OWW | — | — | — | — | — | — |
| 1971 | IX/BY-Slt | DE | CWP2/BY-Slt | IX/CWP2/R2 | — | IX/BY-Slt | — | — | — | — | BY-Slt | — |
| 1972 | IX | — | IX | IX | — | IX/OWW/CWP2 | — | — | — | BY-Slt | BY-Slt | — |
| 1973 | — | — | IX/DW/LW/PL/N/BY-Slt | IX | IX | IX/OWW/CWP2 | — | — | — | BY-Slt | BY-Slt | — |
| 1974 | — | — | BY-Slt/CW | IX | BY-Slt | IX/OWW/CWP2 | — | — | — | | BY-Slt | — |
| 1975 | — | — | BY-Slt/CW/IX | IX | BY-Slt | BY-Slt | — | — | — | — | — | — |
| 1976 | — | — | IX | IX | BY-Slt | BY-Slt | — | — | — | — | — | — |
| 1977 | — | — | — | | — | — | — | — | — | — | — | — |
| 1978 | — | — | — | IX/BY-Slt/S,T,R-Slt | BY-Slt/S,T,R-Slt | — | — | — | — | — | — | — |
| 1979 | — | — | — | BY-Slt | S,T,R-Slt | — | — | — | — | — | — | — |
| 1980 | — | — | — | — | S,T,R-Slt | — | — | — | — | — | — | — |

Colors in table are used to highlight each waste type group association or process change to tank inventory.

1C1 = Bismuth phosphate first-cycle decontamination waste and coating waste (1944-49)
2C1 = Bismuth phosphate first-cycle decontamination waste and coating waste (1950-56)
B-Slt = Saltcake from 242-B Evaporator operation (1951-1954)
BY-Slt = Saltcake from in-tank solidification in 241-BY Tank Farm (1965-1974)
CW = Plutonium Uranium Extraction Plant (PUREX) coating (cladding) waste
CWP2 = PUREX cladding waste, aluminum clad fuel (1963-1967)
DE = Diatomaceous earth
DW = Decontamination waste
IX = Ion exchange waste: may include cesium recovery waste, B-Plant, or strontium recovery waste. Not easily distinguished in references.
LW = Laboratory waste
MW1 = Bismuth phosphate metal waste (1944-1949)
MW2 = Bismuth phosphate metal waste (1950-1956)
N = N Reactor phosphate decontamination waste
OWW = Organic wash waste
P2 = PUREX waste managed as high-level waste (1963-1967)
PFeCN = Ferrocyanide scavenging waste, TBP supernate scavenged in 244-CR Vault
PL = PUREX low-level waste
R2 = Reduction-Oxidation (S Plant) waste (1959-1966)
R-Slt = Saltcake from self-concentration in 241-S and 241-SX Tank Farms (1952 1966)
S-Slt = Saltcake from the 242-S Evaporator (1977-1980)
TBP = Tributyl phosphate, uranium recovery waste (1952-1957)
T-Slt = Saltcake from the 242-T Evaporator (1965-1976)

Source documents:
LA-UR-97-311, *Waste Status and Transaction Record Summary (WSTRS)*, Rev. 4 Vol. I of II
RPP-RPT-47562, *Hanford 241-BX Farm Leak Inventory Assessment Report*
WHC-MR-0132, *A History of the 200 Area Tank Farms*
WHC-SD-WM-TI-302, *Hanford Waste Tank Sluicing History*

1

**Table 1-3. Waste Types Received into 241-BY Tank Farm Series Single-Shell Tanks.**

| Year | 241-BY-101 | 241-BY-102 | 241-BY-103 | 241-BY-104 | 241-BY-105 | 241-BY-106 | 241-BY-107 | 241-BY-108 | 241-BY-109 | 241-BY-110 | 241-BY-111 | 241-BY-112 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1950 | MW2 | MW2 | MW2 | — | — | — | 1C2 | — | — | — | — | — |
| 1951 | MW2 | MW2 | MW2 | MW2 | MW2 | — | 1C2 | 1C2 | — | — | MW2 | MW2 |
| 1952 | — | — | MW2 | — | MW2 | — | TBP | 1C2 | — | 1C2 | MW2/TBP | MW2 |
| 1953 | — | — | — | — | — | 1C2 | TBP | TBP | TBP | — | — | — |
| 1954 | Sluiced | Sluiced | Sluiced | Sluiced | Sluiced/ PFeCN | Sluiced | TBP/PFeCN | TBP/PFeCN | — | PFeCN | — | — |
| 1955 | PFeCN | PFeCN | PFeCN | PFeCN | PFeCN | PFeCN | PFeCN | PFeCN | — | PFeCN | Sluiced | MW2/ Sluiced |
| 1956 | — | — | — | PFeCN | PFeCN | PFeCN | PFeCN | PFeCN | PFeCN | PFeCN | — | PFeCN |
| 1957 | — | PFeCN | P1 | PFeCN | PFeCN | PFeCN | PFeCN/CWP2 | PFeCN | — | PFeCN/ CWP2 | CWP2/OWW | PFeCN/CWP2 |
| 1958 | — | — | P1 | — | — | — | CWP2 | — | — | CWP2 | — | — |
| 1959 | — | — | — | — | — | — | CWP2 | CWP2 | — | — | — | — |
| 1960 | — | — | — | — | — | — | — | — | — | — | — | — |
| 1961 | CWP2 | — | — | CWP2 | CWP2 | CWP2 | — | — | — | — | — | — |
| 1962 | — | — | — | CWP2 | — | — | — | — | CWP2 | — | — | — |
| 1963 | — | — | — | — | — | — | — | — | — | — | — | — |
| 1964 | — | CWP2 | — | — | — | — | — | — | — | — | — | — |
| 1965 | BY-Slt | CWP2 | CWP2 | — | — | — | — | — | CWP2 | — | — | CWP2 |
| 1966 | BY-Slt | BY-Slt | CWP2 | — | CWP2/ Cement | CWP2 | — | — | CWP2 | — | CWP2 | CWP2 |
| 1967 | — | BY-Slt | BY-Slt | CWP2 | — | CWP2 | — | — | CWP2 | — | CWP2 | BY-Slt |
| 1968 | — | BY-Slt | BY-Slt/OWW | CWP2/ IX | BY-Slt | — | — | BY-Slt | CWP2/OWW | — | BY-Slt | BY-Slt |
| 1969 | BY-Slt | BY-Slt | BY-Slt | — | BY-Slt | BY-Slt | — | BY-Slt | BY-Slt | — | BY-Slt | BY-Slt |
| 1970 | — | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt |
| 1971 | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt |
| 1972 | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt |
| 1973 | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt | BY-Slt | — | BY-Slt | BY-Slt | BY-Slt | BY-Slt |
| 1974 | BY-Slt | BY-Slt | — | BY-Slt | BY-Slt | BY-Slt | BY-Slt | — | BY-Slt | BY-Slt | BY-Slt | BY-Slt |
| 1975 | BY-Slt | — | — | — | — | BY-Slt | BY-Slt | — | BY-Slt | BY-Slt | BY-Slt | BY-Slt |
| 1976 | BY-Slt | — | — | — | — | — | — | — | BY-Slt | BY-Slt | BY-Slt | BY-Slt |

Colors in table are used to highlight each waste type group association or process change to tank inventory.

BY-Slt = Saltcake from in-tank solidification in 241-BY Tank Farm (1965-1974)
CWP2 = Plutonium Uranium Extraction Plant (PUREX) cladding waste (1963-1967)
MW2 = Bismuth phosphate metal waste (1950-1956)
OWW = Organic wash waste
P1 = PUREX waste managed as high-level waste (1956-1962)
PFeCN = Ferrocyanide scavenging waste (1955-1958)
TBP = Tributyl phosphate, uranium recovery waste (1952-1957)

Source documents:
LA-UR-97-311, *Waste Status and Transaction Record Summary (WSTRS)*, Rev. 4 Vol. I of II
RPP-RPT-43704, *Hanford BY-Farm Leak Inventory Assessment Report*
WHC-SD-WM-TI-302, *Hanford Waste Tank Sluicing History*
WHC-MR-0132, *A History of the 200 Area Tank Farms*

1

The B Farm 100-series SSTs have a dished bottom with a 4-ft radius knuckle and a 17-ft operating depth (WHC-SD-WM-ER-310, *Supporting Document for the Historical Tank Content Estimate for B-Tank Farm*). The tanks are set on a reinforced concrete foundation. The 100-series tanks are divided into four sets of three tanks each that allowed waste to cascade from the first tank to the next tank in the series (e.g., tanks 241-B-101, 241-B-102, and 241-B-103), by gravity feed. The 200-series tanks do not have cascade lines. The tanks have four process spare inlet nozzles located ~16.5 ft from the tank knuckle bottom, ~0.6 ft above the cascade line and 1.4 ft below the top of the steel liner (RPP-RPT-49089, *Hanford B-Farm Leak Inventory Assessment Report*). The BX Farm SSTs have four process spare inlet nozzles located ~16.3 ft from the tank knuckle bottom (RPP-RPT-47562, *Hanford BX-Farm Leak Inventory Assessment Report*). The tanks in BY Farm are a modified B Farm design, with additional tank risers, a dished bottom and maximum operational depth of 23 ft (WHC-SD-WM-ER-312, *Supporting Document for the Historical Tank Content Estimate for BY Tank Farm*). The tanks are divided into 4 sets of 3 tanks each that allowed waste to cascade from the first tank to the next tank in the series (e.g., tanks 241-BY-101, 241-BY-102, and 241-BY-103), by gravity feed. The tanks have four process spare inlet nozzles located ~24.1 ft from the tank knuckle bottom, above the top of the steel tank liner (RPP-RPT-43704).

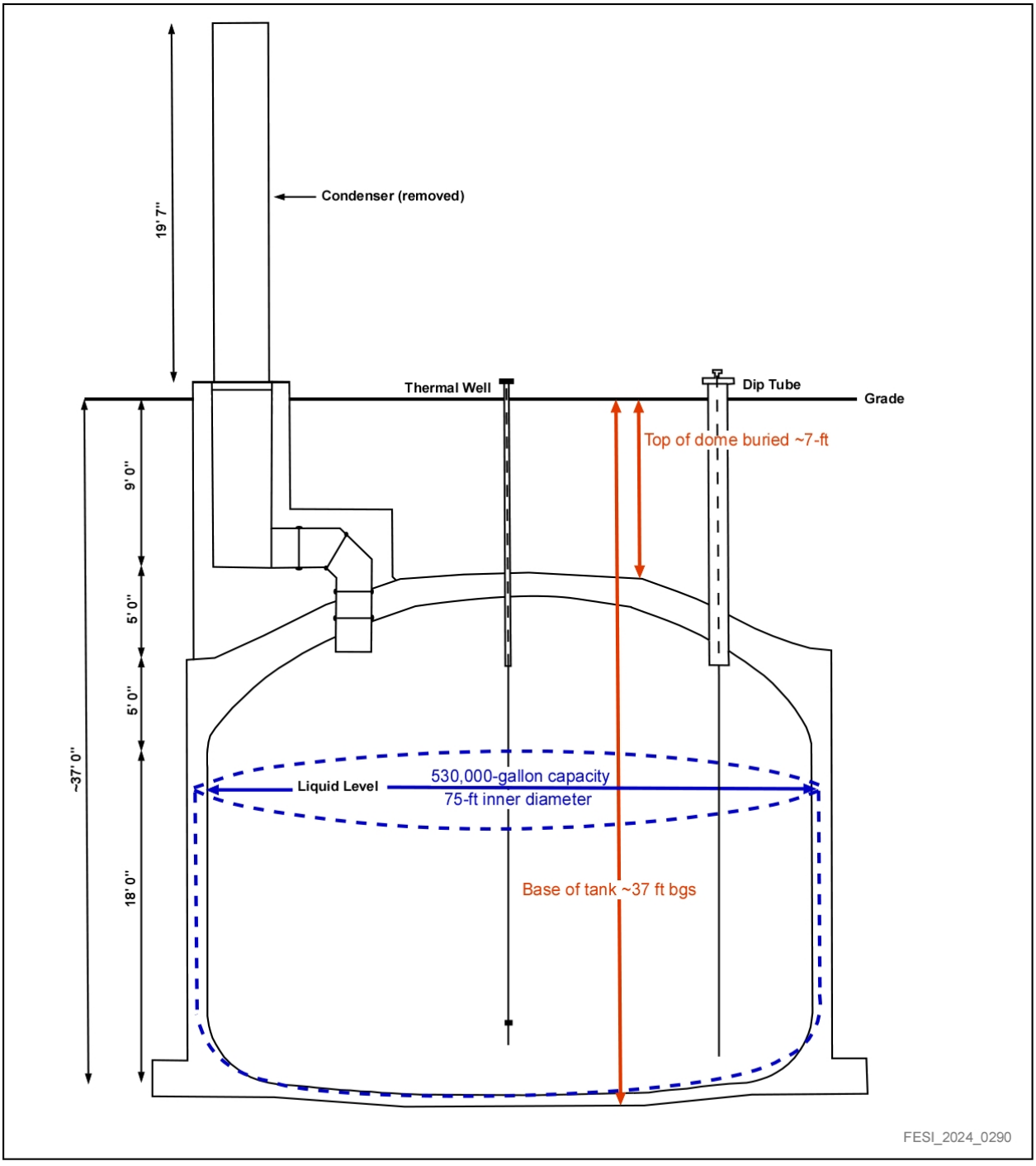
Figures 1-3, 1-4 and 1-5 show schematics of the 100-Series 241-B and 241-BX tanks, the 200-Series 241-B tanks, and 100-series 241-BY tanks, respectively.

### 1.2.3 Ancillary Equipment

Ancillary equipment in and near WMA B-BX-BY are summarized in this section. More detailed descriptions and discussion of the ancillary equipment are provided in numerous references, including:

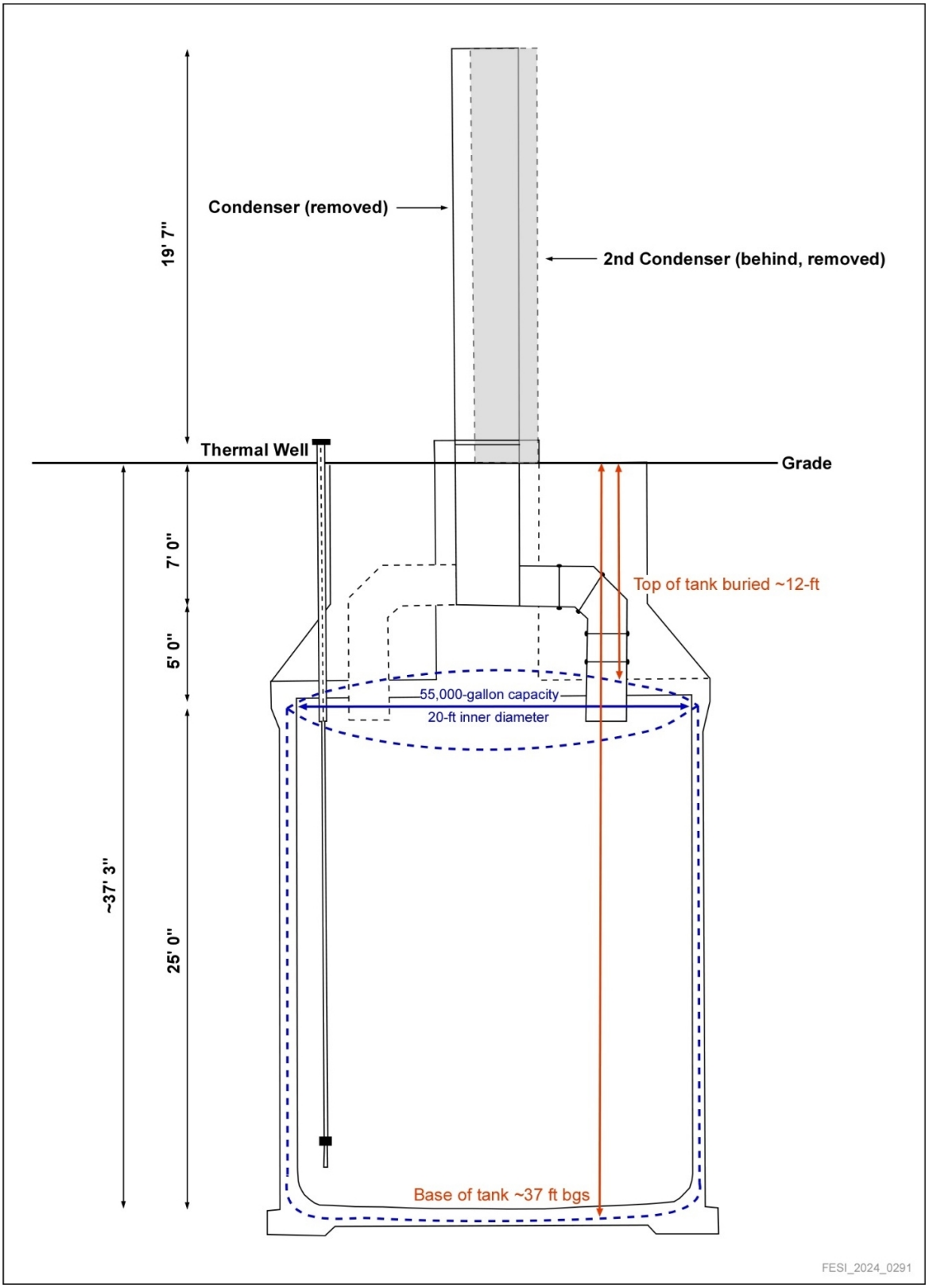
- BHI-00179, *B Plant Aggregate Area Management Study Technical Baseline Report*,
- RPP-10098, *Field Investigation Report for Waste Management Area B-BX-BY*,
- RPP-15043, *Single-Shell Tank System Description*,
- RPP-10466, *Status of Facilities and Waste Transfer Lines Within Single Shell Tank Farms*,
- RPP-RPT-58156, *Basis for Miscellaneous Underground Storage Tanks and Special Surveillance Facilities Waste Volumes Published in HNF-EP-0182 Revision 320 "Waste Tank Summary Report for Month Ending August 31, 2014"*,
- RPP-RPT-58858, *Tier 1 Closure Plan Single-Shell Tank System*,
- WHC-SD-EN-ES-040, *Engineering Study of 50 Miscellaneous Inactive Underground Radioactive Waste Tanks Located at the Hanford Site, Washington*, and
- DOE/RL-88-30, *Hanford Site Waste Management Units Report.*

**Figure 1-3. 100-Series 241-B Farm and 241-BX Farm Tank Schematics.**



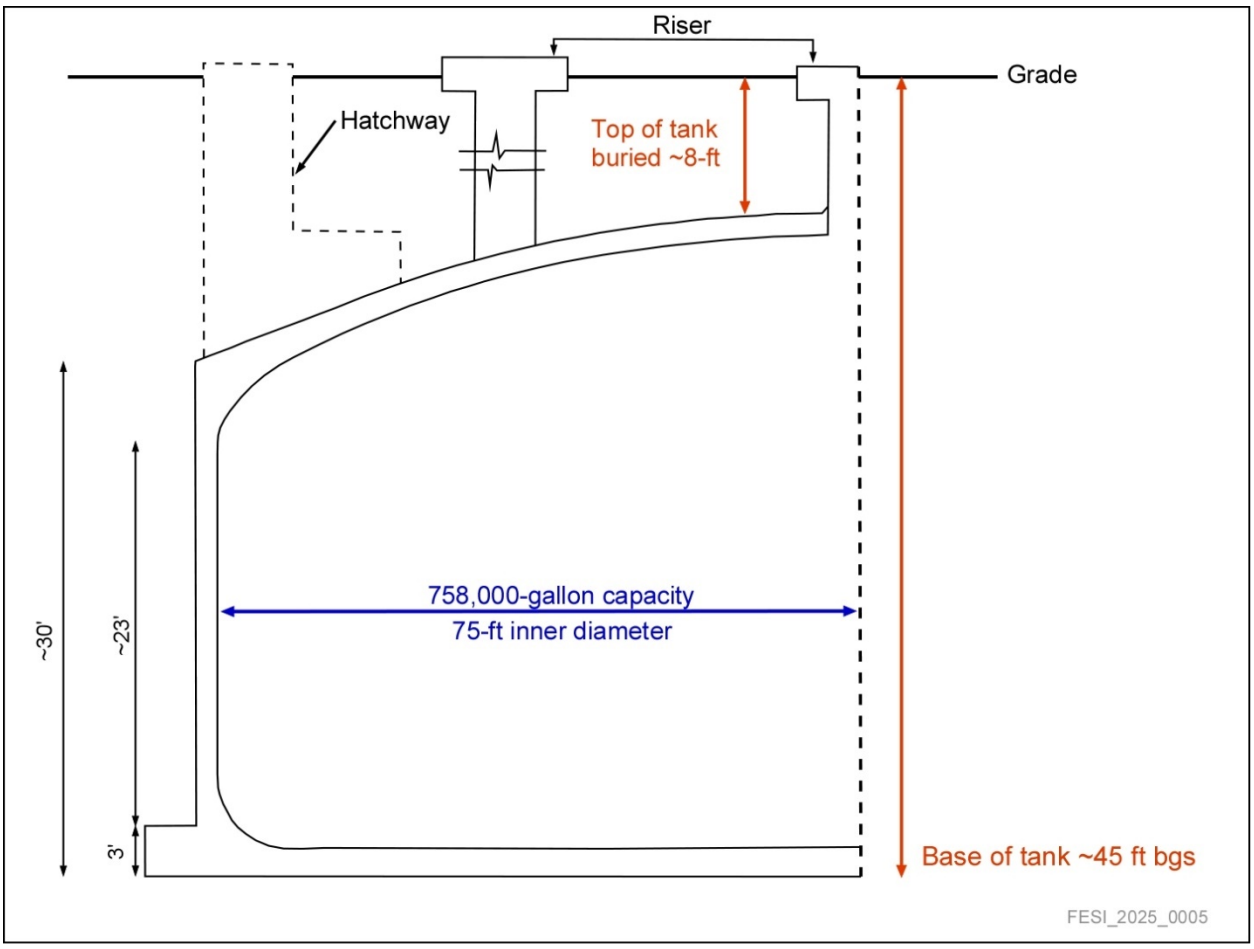

Adapted from W-72743, "Hanford Engineer Works–B'l'd. #241 75'-0" Dia. Storage Tanks T-U-B & C Arrangement.".

**Figure 1-4. 200-Series 241-B Farm Tank Schematics.**




Adapted from W-72742, "Hanford Engineer Works 20'-0" Dia. Storage Tanks Arrangement Bldg# 241-T, 241-U, 241-B, 241-C."

**Figure 1-5. 100-Series 241-BY Farm Tank Schematics.**




Adapted from H-2-1312, "75-Foot Tank Sections".

### 1.2.4 Catch Tanks

**1.2.4.1 241-B-301 Catch Tank.** The 241-B-301-B catch tank is a nominal 36,000-gal capacity, vertical, flat-bottom, cylindrical tank, 16 ft 6 in. long by 20 ft in diameter, located on the west side of B Farm. The tank is constructed of reinforced concrete and is buried approximately 10 ft below grade. It was in operation from 1945 to 1984 and collected waste spilled from the 241-B-252 Diversion Box during transfers and is located adjacent to and below the 241-B-252 Diversion Box. The tank was isolated in 1985 (WHC-SD-EN-ES-040). The stabilization evaluation shows no solids and a liquid level of 2.75 in., equating to 539 gal.

**1.2.4.2 241-B-302B Catch Tank.** The 241-B-301-B catch tank is a nominal 17,700-gal capacity, carbon steel cylindrical tank, 35 ft 9.5 in. long by 9 ft in diameter, located north of the 241-B-154 Diversion Box. The tank is buried approximately 10 ft below grade. It was in operation from 1945 to 1978 and provided secondary containment for the 241-B-154 Diversion Box until it was isolated in 1985. The stabilization evaluation shows a liquid level of 35 in. with 9 in. of solids, equating to 4,288 gal of liquid and 681 gal of sludge.

**1.2.4.3 241-B-361 Catch Tank.** The 241-B-361 catch tank is a nominal 36,000-gal capacity, carbon steel tank, 20 ft in diameter and 16.5 ft high from the tank floor to the beginning of the tank dome and 19 ft high from the floor to the top of the dome, located south of B Farm and south of the 241-B-151 Diversion Box. The tank is buried approximately 6 ft below grade. It was in operation from 1945 to 1978 and provided secondary containment for the 241-B-154 Diversion Box until it was isolated in 1985. The stabilization evaluation shows a liquid level of 35 in. with 9 in. of solids, equating to 4,288 gal of liquid and 681 gal of sludge.

**1.2.4.4 241-BX-302A Catch Tank.** The 241-BX-302A catch tank is a nominal 17,700-gal capacity cylindrical tank, 36 ft long by 9 ft in diameter, located southeast of tank 241-BX-101 in BX Farm. It was in operation from 1948 to 1985 and received drainage from diversion boxes 241-BR-152, 241-BX-153, 241-BYR-152 and 241-BXR-152. The tank was isolated in 1985. The stabilization evaluation shows a solids level of 10.25 in. with no liquids, equating to 828 gal of sludge (RPP-RPT-58156).

**1.2.4.5 241-BX-302B Catch Tank.** The 241-BX-302B catch tank is a nominal 11,400-gal capacity, horizontal cylindrical tank, 18 ft long by 10 ft in diameter, located on the south side of the 221-B building. It was in operation from 1948 to 1985 and received drainage from the 241-BX-154 Diversion Box. The tank was isolated in 1985 with a solids level of 17 in. and liquid level of 18 in., equating to 922 gal of sludge and 81 gal of liquid.

**1.2.4.6 241-BX-302C Catch Tank.** The 241-BX-302C catch tank is a nominal 11,400-gal capacity, horizontal cylindrical tank, 18 ft long by 10 ft in diameter, located on the south side of the 221-B building. It was in operation from 1948 to 1985 and received drainage from the 241-BX-155 Diversion Box. The tank was isolated in 1985 with a solids level of 13 in. and liquid level of 16 in., equating to 619 gal of sludge and 224 gal of liquid.

### 1.2.5 244-BXR Vault

The 244-BXR vault is an underground concrete structure with about 1 ft of the vault cover above grade. It operated from 1948 to 1985 and was originally used for uranium recovery processing conducted in the 221-U Plant. The vault received neutralized uranium MW generated by the bismouth phosphate process and was used for subsequent blending, pH adjustments and conditioning of the waste. The vault is located inside the southern portion of BY Farm and connects with 241-BXR-151 and 241-BYR-154 Diversion Boxes and BX Farm tanks. The vault includes four tank cells (BXR-001, BXR-002, BXR-003 and BXR-011), each with a tank and 45-gal sump. Each cell is separated by a 2-ft thick concrete wall.

244-BXR-001 is a nominal 50,000-gal tank. It is a vertical carbon steel tank 20 ft tall and 20 ft in diameter. During operations it received a maximum of 13,720 gal/day of metal waste slurry for BX Farm and BY Farm tanks. A 1984 sample showed a pH of 9.91, 19,100 µCi/L total Beta and 10,100 µCi/L $^{137}$Cs. When the tank was interim stabilized in 1985 it contained no liquids and 37 in. of solids equating to 4,136 gal with 15 gal of liquid measured in the sump (RPP-RPT-58156).

244-BXR-002 is a nominal 15,000-gal tank. It is a vertical stainless steel tank, 12 ft tall, and 14 ft in diameter. The tank contains cooling coils capable of transferring 1,202,000 BTU/hr out of the tank. The tank was used to mix a slurry stream with nitric acid. It received 14,230 gal/day from tank 244-BXR-001 and 7,800 gal/day nitric acid. The solutions were then pumped to tank 244-BXR-011. The sump may contain ferrocyanide from the 241-BXR-151 Diversion Box. A 1984 sample from the tank showed a pH of 9.55, 1,530 µCi/L total Beta and 519 µCi/L $^{137}$Cs. When the tank was interim stabilized in 1985 it contained 19 in. of solids and a liquid level of 23 in., equating to 792 gal of solids and 340 gal of liquid with 37 gal of liquids and 41 gal of solids measured in and above the sump (RPP-RPT-58156).

244-BXR-003 is also a nominal 15,000 gal tank. It was configured and used the same as tank 244-BXR-002; the tanks were used as a pair for blending operations. A 1984 sample showed a pH of 10.10, 89,900 µCi/L total Beta and 6,030 µCi/L $^{137}$Cs. When the tank was interim stabilized in 1985 it contained 15.25 in. of solids and a liquid level of 19 in., equating to 515 gal of solids and 277 gal of liquid in the tank and 413 gal of liquids and 6,725 gal of solids measured in and above the sump (RPP-RPT-58156).

244-BXR-011 is a nominal 50,000-gal tank. It is a vertical stainless steel tank, 20 ft tall and 20 ft in diameter. The tank received approximately 27,200 gal/day of acid solution from tanks 244-BXR-002 and 244-BXR-003. The solutions were pumped from tank 244-BXR-011 to the 241-ER-151 diversion station then to U Plant for uranium recovery. A 1978 sample showed water soluble waste with 0.54 µCi/g $^{89/90}$Sr and 11.1 µCi/g $^{137}$Cs and acid fusion results of 85.5 µCi/g $^{89/90}$Sr and 23 µCi/g $^{137}$Cs. When the tank was interim stabilized in 1985 it contained 36 in. of solids and a liquid level of 36.5 in., equating to 3,942 gal of solids and 97 gal of liquid in the tank with 7,616 gal of solids measured in and above the sump (RPP-RPT-58156).

The vault has been been isolated and weather covered and tanks were interim stabilized in 1985. As of February 1, 2025, the 244-BXR vault contains an estimated 25 kgal of waste (HNF-EP-0182, *Waste Tank Summary Report for Month Ending January 31, 2025*).

### 1.2.6 244-BX Double Contained Receiver Tank

244-BX is a carbon steel underground double-contained receiver tank set within a reinforced-concrete steel-lined vault. It is located on the north of the B Plant and ~ 73 ft east of tank 241-BX-101 in BX Farm and interconnects with B Farm, BX Farm, and BY Farm tanks. The tank has a nominal capacity of 31 kgal and, as of February 1, 2025 contained 11.1 kgal of waste (HNF-EP-0182).

### 1.2.7 241-BY-ITS Tanks

The 241-BY In-Tank Solidification Unit #1, ITS-1, was located in BY Farm between tanks 241-BY-101 and 241-BY-102. The ITS-1 unit was used to concentrate non-boiling waste in underground storage tanks using evaporation. This technique was achieved by sparging hot air into the waste solution in the tanks and condensing the off-gas (RPP-RPT-32085, *241-BY-ITS1 Liquid Level Assessment Report*, p. 3). In-Tank Solidification Unit #1 had three miscellaneous underground storage tanks associated with it: 241-BY-ITS1-TK1 (Tank 1 – Scrub Solution

Circulation Tank) used to scrub the off-gas from the process and recirculate to the system, 241-BY-ITS1-TK2 (Tank 2 – Ion Exchange Feed Tank) which received condensate from the condensate hold tank/separator, and 241-BY-ITS1-IX (Ion Exchange Column) which received and treated filtered waste from the Ion Exchange Feed Tank (Tank 2).

The Scrub Solution Circulation Tank (Tank 1) was below grade near tank 241-BY-101. This tank was located within a 7-ft 6-in. by 10-ft concrete pit containing a small sump (H-2-33479, *ITS No. 1 Circulating Scrubbing System Prototype*). The tank was a 7-ft by 3-ft 3-in. by 4-ft high oval shape (H-2-50260, *Continuous Concentrator Cooler Assembly – Sections – Details and Cell Orientation*). The tank was inspected on December 10, 2006. The inspection indicated that there were no significant solids, although there was a thin layer of sediment on the bottom of the tank. The tank contained 347 gal of liquid waste. The sump and pit were dry (RPP-RPT-32085, p. 2).

The Ion Exchange Feed Tank **(**Tank 2) had a diameter of 5 ft and is 4 ft 6 in. tall (H-2-33476, *Feed Tank 2 Modifications*). The tank was above grade, resting on a concrete slab in close proximity to the Ion Exchange Column. A video inspection of Tank 2 performed on December 4, 2006 showed that the tank contained some solids located in a drift by the pump suction line, but no liquids, and no waste volume was reported (RPP-RPT-32085, p. 2).

The Ion Exchange Column (Tank 3) had a radius of 9 in. and was 9 ft tall. The column received filtered waste from Tank 2. The waste gravity-flowed through the column with the waste stream routed to either the BY Cribs or Tank 2 for rework (RPP-18251, *241-BY-ITS1 Assessment Plan*). A video inspection performed on December 12, 2006 showed that there were 78 gal of resin in the column and no liquids (RPP-RPT-32085, p. 2).

The 241-BY In-Tank Solidification Unit #2, ITS-2, was a second-generation stabilization system placed between tanks 241-BY-111 and 241-BY-112. In addition to the SSTs, two tanks associated with ITS 2 were a vapor condenser (Tank 1) and heater flush tank (Tank 2). No data is available for waste residuals in Tank 1. In 2006 an estimated 780 gal of liquid waste remained in Tank 2 (HNF-EP-0182).

### 1.2.8 Diversion Boxes

Diversion boxes are below-grade, reinforced-concrete structures that provide a flexible method of connecting waste transfer lines via jumper connections to direct liquid waste from a given point to any other given point. Diversion boxes did not directly receive and store waste, but some waste may have leaked into the diversion boxes. The top of the diversion box is a concrete cover block that usually extends above grade. Cover blocks vary in thickness from box to box. Some diversion boxes are lined with steel. Transfer lines are connected in the diversion box by installing a jumper between the connecting nozzles. Jumpers either can be fixed or flexible. Spills within the diversion boxes drain to catch tanks.

Six diversion boxes are associated with B Farm. These include 241-B-151, 241-B-152, 241-B-153, 241-B-154, 241-B-252 and 242-B-151. Inner surface dimensions are given to estimate potential waste adhering to side-wall and bottom surface areas of the concrete boxes.

The 241-B-151, 241-B-152, and 241-B-153 Diversion Boxes are located about 35 to 120 ft south of B Farm. These units transferred waste solutions from processing and decontamination operations to B Farm and BX Farm. The units are interconnected by the 241-B-154 Diversion Box, located . Radionuclide inventories are not available; however, records indicate that the concrete structures are potentially contaminated with high levels of alpha, beta, and gamma emitters. The boxes were in service from 1945 until June 1984 and are now isolated and weather covered. The units are 16 to 30 ft long, 6 ft wide and 10 to 30 ft high.

The 241-B-154 diversion box is south of B Farm. It interconnects Diversion Boxes 241-B-151 and 241-B-152 with the 221-B Building. It was constructed in 1944 to 1945 and was active from 1945 to June 1984. It is 32 ft long, 6 ft wide and 11 ft high.

The 241-B-252 Diversion Box is connected to the 241-BX-154 and 241-B-152 Diversion Boxes and B Farm and BY Farm and is adjacent to the B-301 catch tank.

The 242-B-151 Diversion Box is connected to the 241-BX-154 and 241-B-152 Diversion Boxes and B Farm and BY Farm and is adjacent to the B-301 catch tank.

Ten diversion boxes are associated with BX Farm. These include 241-BR-152, 241-BX-153, 241-BX-155, 241-BXR-151, 241-BXR-152, 241-BXR-153, 241-BXR-154, 241-BYR-152, 241-BYR-153 and 241-BYR-154. The 241-BR-152 Diversion Box is located 25 ft south of BX Farm. It consists of three sections about 22.5 to 33.5 ft long, 6 to 17 ft wide and 8 ft high. The box was used to transfer waste solutions in BX Farm from 1948 until June 1984. The box has been isolated and weather covered.

The 241-BX-153 Diversion Box is located on the south boundary of BX Farm. The box is about 36 ft long, 6 ft wide and 20 ft high unit transferred waste solutions of processing and decontamination operations from 1948 until June 1983 and drains to the 241-BX-302A catch tank. The box has been isolated and weather covered.

The 241-BX-155 Diversion Box is located outside the southwest boundary of BX Farm. The box is about 36 ft long, 6 ft wide and 20 ft high unit transferred waste solutions of processing and decontamination operations from 1948 until June 1983 and drains to the 241-BX-302A catch tank. The box has been isolated and weather covered.

The 241-BXR-151 Diversion Box is located at the southern boundary in BX Farm. The site was in service from 1948 until June 1984. Diversion Box 241-BXR-151 consists of two sections about 44 and 46 ft long, 9 and 17 ft wide and 13 and 6.5 ft high.

Diversion Boxes 241-BXR-152 and 241-BXR-153 are located at the southern boundary in BX Farm. The site was in service from 1948 until June 1984. The boxes consist of three sections about 24.5 to 35 ft long, 9 to 12 ft wide, and 8 ft high. The 241-BXR-153 Diversion Box interconnected the 241-B-152 and 241-B-155 Diversion Boxes and BX Farm and BY Farm.

Diversion Boxes 241-BYR-152, 241-BYR-153, and 241-BYR-154 are located at the southern boundary in BX Farm and are associated with BY Farm. The sites were in service from 1950 until June 1984. The boxes consist of three sections about 20 to 33 ft long, 5 to 12 ft wide, and 8 ft high, and have been isolated and weather covered.

No diversion boxes are inside the BY Farm fence.

### 1.2.9 Pipelines

An extensive network of transfer lines connects the various components of the tank farms in WMA B-BX-BY. Figure 1-6 shows a diagram of a typical transfer system. The lines were generally sloped to allow self drainage. Typically, low points in a pipeline drained to a tank. The pipelines were contaminated through use (direct contact with tank waste), but the lines were flushed and hydro-tested before use and, except for plugged lines, estimates indicate that they do not contain significant volumes of waste. Underground transfer lines in B Farm are out of service. A list of pipelines in B Farm and facilities connected to each line is presented in RPP-RPT-58858.

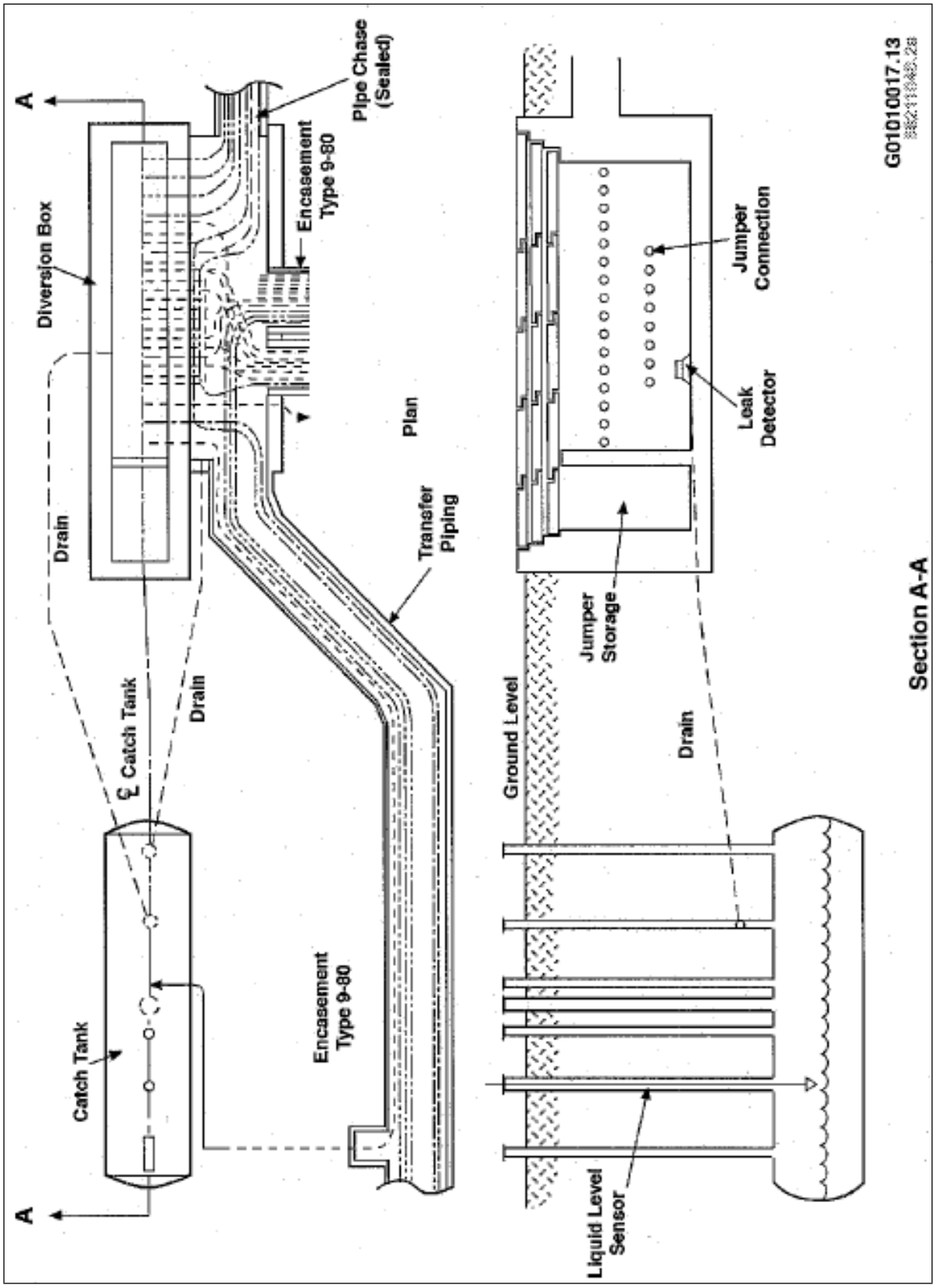
The estimated number of pipelines, length of pipelines in a tank farm (including one-half the distance of to pipeline connections outside the farm), average diameter of the pipelines and pipeline volumes are presented in (RPP-15043, Figure D-3).

The 241-B Tank Farm contains 143 pipelines with an average 3-in. diameter and total length of 6.7 miles ± 3.0 miles and a pipe volume of 17.6 ± 4.6 kgal.

The 241-BX Tank Farm contains 95 pipelines with an average 3-in. diameter and total length of 7.7 miles ± 2.4 miles and a pipe volume of 15.0 ± 4.6 kgal.

The 241-BY Tank Farm contains 102 pipelines with an average 3-in. diameter and total length of 10.2 miles ± 2.3 miles and a pipe volume of 19.8 ± 4.4 kgal.

**Figure 1-6. Typical Pipeline System in the Tank Farms.**



# 2. PURPOSE AND SCOPE

The purpose of this report is to provide updated radiological and nonradiological inventory estimates for waste residuals in tanks and ancillary equipment in WMA B-BX-BY at the time of closure. This report provides the basis for the sets of inventory estimates shown in Table ES-1.

This report includes post-retrieval inventory estimates based on BBI data obtained as of February 1, 2025. Section 4.1 describes the BBI process and current inventory estimates for SSTs in WMA B-BX-BY (see Figure 2-1). Additional detail for the BBI inventory process is provided in RPP-7625, *Guidelines for Updating Best-Basis Inventory*. Section 4.2 describes the approach used to estimate residual waste inventories in SSTs. The bases for inventory estimates for catch tanks, pipelines, and other ancillary equipment in WMA B-BX-BY are described in Section 5.0, and Section 6.0 discusses uncertainty for tank and ancillary equipment inventory estimates. Current BBI inventories and estimated residual waste inventory estimates for WMA B-BX-BY SSTs and ancillary equipment are included in Appendix A.

This report is limited to inventory estimates for waste contained in SSTs and ancillary equipment in WMA B-BX-BY. Other reports will address soil inventories including leak estimates and unplanned releases, PA modeling, conceptual models, and modeling parameters for waste release and waste transport pathways (including recharge rates, and solubility or $K_D$ factors for residuals and contaminants in soils).

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# 3. ASSUMPTIONS AND DATA QUALITY OBJECTIVES

## 3.1 ASSUMPTIONS

Key enabling assumptions for updated inventory estimates include the following.

a. Pre-retrieval tank inventories presented are BBI inventories for 241-U SSTs as of February 1, 2025.

b. Radionuclides are decayed to January 1, 2022, the BBI decay date.

c. It was assumed that the volume of waste remaining after retrieval from SSTs in WMA B-BX-BY would be 10.2 kL (360 $ft^3$) and 0.85 kL (30 $ft^3$) for 200-series SSTs. These are the waste residual goals for SSTs specified in the *Hanford Federal Facility Agreement and Consent Order* (HFFACO) (Ecology et al. 1989).

d. Because only limited data is available for waste in catch tanks and vaults and no data is available for waste in pipelines and diversion boxes, waste concentrations in ancillary equipment are assumed to be represented by the weighted average BBI residual concentrations for waste in applicable tank farms.

e. It is assumed that waste in catch tanks will be retrieved prior to closure (no direction has been given at this time and no limits established). Retrieval of 90% of the waste was assumed.

f. It is assumed that pipelines are 5% full of waste (see Section 5.3).

g. The post-retrieval waste composition is conservatively assumed to be the same as the pre-retrieval BBI concentration. The composition of soluble constituents is expected to be lower after retrieval.

Additional assumptions and the bases for assumptions are found in corresponding sections.

Applying these assumptions, the reported inventory is adequate for preliminary PA calculations with the expectation that additional calculations will be performed prior to WMA closure using post-retrieval samples collected from each retrieved source term.

## 3.2 CONSTITUENTS OF INTEREST AND DATA QUALITY OBJECTIVES

The WMA B-BX-BY residual constituents of interest at closure are specified in RPP-23403, *Single-Shell Tank Component Closure Data Quality Objectives*. A discussion of constituents of interest and DQOs is included in Appendix B. However, inventory estimates in this report are limited to BBI constituents for which analytical inventory data were obtained to address applicable DQOs or for which process information was available. Only some of the constituents

of interest are included in the BBI and sample data is only available for some of the contituents (see Section 4.0). After retrieval is completed, tank residual waste will be sampled and analyzed for all of the constituents of interest in accordance with RPP-23403.

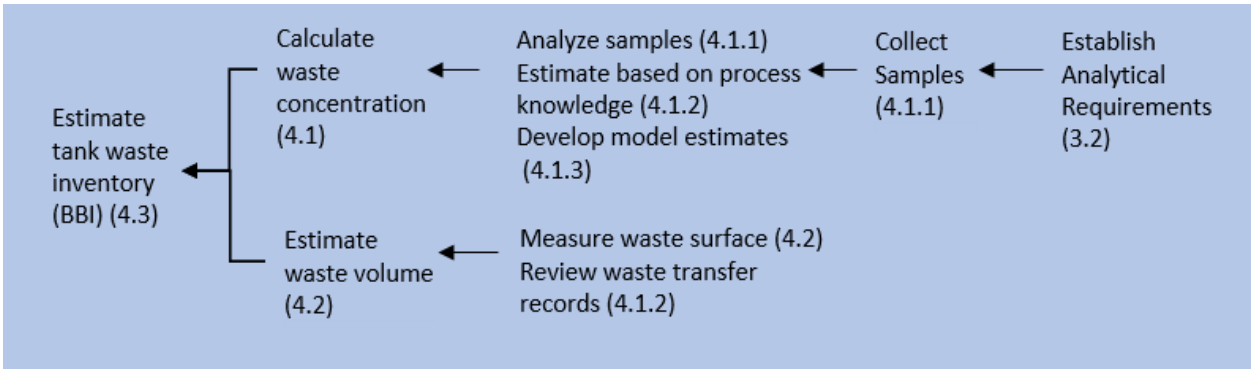
# 4. CURRENT TANK INVENTORY ESTIMATES

The BBI process is the official inventory database for the Hanford Site tanks. This section describes the BBI process used to estimate WMA B-BX-BY SST waste inventories.

The BBI process, illustrated in Figure 4-1, uses the best available information to estimate tank compositions and inventories for double-shell tanks (DSTs) and SSTs at Hanford. Some of the BBI inventories for SSTs in WMA B-BX-BY are based on historical sampling analyses. However, analytical data is not available for many of the BBI radionuclides and some chemical constituents; these inventory estimates are based on process information. The BBI process, described in RPP-7625, involves the following steps:

1. Review available waste volume and composition information for a tank
2. Estimate waste volumes and concentrations for each waste type within a tank
3. Combine volume and concentration estimates to calculate inventories and uncertainties
4. Document basis for inventory estimates, and
5. Issue inventory estimates and BBI documentation.

**Figure 4-1. Best-Basis Inventory Flow Process.**




The BBI includes inventory estimates for 25 chemicals and 46 radionuclides for all SSTs and DSTs (Table 4-1). Inventories for additional or "supplemental" constituents are also provided for tanks for which analytical data is available (Table 4-2). Because sample data is not available for many constituents, the standard constituents in BBI are limited to those constituents included in historical waste process models. The standard analytes account for ~99 weight percent (wt%) of the chemical inventory (not including percent water, free hydroxide, bound hydroxide or oxygen associated with metallic oxides) and the radionuclides account for over 99% of the activity (Ci), in terms of short and long-term risk (WHC-SD-WM-TI-731, *Predominant Radionuclides in Hanford Site Waste Tanks*).

The BBI is maintained under configuration control and updated on a quarterly basis, or as needed to incorporate new data and waste transfer information. Updated BBI tank waste volume estimates are documented in monthly tank waste summary reports (HNF-EP-0182). Farm SSTs as of February 1, 2025. Chapter 6 discusses uncertainty in the BBI estimates. Appendix A shows estimated volumes and inventories, by tank, for waste in WMA B-BX-BY.

**Table 4-1. Standard Best-Basis Inventory Constituents.**

| Constituents | | Radionuclides | | | |
|---|---|---|---|---|---|
| Al | Ni | $^{3}H$ | $^{113m}Cd$ | $^{227}Ac$ | $^{238}U$ |
| Bi | $NO_2$ | $^{14}C$ | $^{125}Sb$ | $^{228}Ra$ | $^{239}Pu$ |
| Ca | $NO_3$ | $^{59}Ni$ | $^{126}Sn$ | $^{229Th}$ | $^{240}Pu$ |
| Cl | Oxalate | $^{60}Co$ | $^{129}I$ | $^{231}Pa$ | $^{241}Am$ |
| $CO_3$ | Pb | $^{63}Ni$ | $^{134}Cs$ | $^{232}Th$ | $^{241}Pu$ |
| Cr | $PO_4$ | $^{79}Se$ | $^{137}Cs$ | $^{232}U$ | $^{242}Cm$ |
| F | Si | $^{90}Sr$ | $^{137m}Ba$ | $^{233}U$ | $^{242}Pu$ |
| Fe | $SO_4$ | $^{90}Y$ | $^{151}Sm$ | $^{234}U$ | $^{243}Am$ |
| Hg | Sr | $^{93}Zr$ | $^{152}Eu$ | $^{235}U$ | $^{243}Cm$ |
| K | Total organic carbon | $^{93m}Nb$ | $^{154}Eu$ | $^{236}U$ | $^{244}Cm$ |
| La | U-TOTAL | $^{99}Tc$ | $^{155}Eu$ | $^{237}Np$ | |
| Mn | Zr | $^{106}Ru$ | $^{226}Ra$ | $^{238}Pu$ | |
| Na | | | | | |

**Table 4-2. Supplemental Best-Basis Inventory Constituents in 241-B, 241-BX, and 241-BY Tank Farms.[1]**

| Supplemental Constituents (23) | | |
|---|---|---|
| Ag | Cu | Te |
| Aroclors (total polychlorinated biphenyl) | Free OH | Th |
| As | Li | Ti |
| B | Mg | Tl |
| Ba | Mo | Total alpha |
| Be | Nd | V |
| Cd | Rh | Y |
| Ce | Ru | Zn |
| CN | Sb | $^{239/240}Pu$[2] |
| Co | Se | |

[1]Analyses available for one or more of the 241-B, 241-BX or 241-BY Farm tanks.
[2]Combined $^{239}Pu$ and $^{240}Pu$ analysis.

## 4.1 TANK WASTE COMPOSITION ESTIMATES

Best-basis inventory waste composition estimates are based on:

1. First, sample data, if sample data is available

2. Next, process knowledge (i.e., historical sample data pre-1989, sample data from other tanks that received similar waste types, and isotope calculations)

3. Then, model data based on the information described in Section 4.1.3.

An array of concentration values from a single information source (e.g., a sample event or model estimate) is referred to as a vector. Expert judgment is used to determine the BBI waste composition estimates. The value and justification for each estimate are documented in BBI summary reports.

### 4.1.1 Sample Data

Not all of the B Farm, BX Farm, and BY Farm tanks have been sampled and sample data representative of current tank contents is not available for all tank and BBI constituents. Based on sampling event data in the Tank Waste Information Network System (TWINS) database, since 1990, core samples have not been obtained for tanks 241-B-102, 241-B-103, 241-B-105, 241-B-112, 241-BX-101, 241-BX-102, 241-BX-105, 241-BX-106, 241-BX-108, and 241-BY-103. Only supernatant or surface samples were obtained for tanks 241-B-102, 241-B-103, 241-B-112, 241-BX-101, 241-BX-105, 241-BX-106, 241-BX-108, and 241-BY-103, and no samples have been taken from tanks 241-B-105 or 241-BX-102. Sampling and analysis of B Farm, BX Farm, and BY Farm tanks were driven by needs specified in DQOs (Table 3-7). The most recent core samples for these tanks were obtained in September 1998.

Supernatant liquid grab samples are generally assumed to be homogeneous and are taken from one or more risers at multiple depths. Average and standard deviations for the sample sets are derived from grab sample data. Core samples and/or auger samples are taken from two or more risers (ceiling access ports) from opposite sides of the tank in an attempt to account for heterogeneity. For core samples, 19-in. sample segments are obtained. Averages are calculated by first averaging primary and duplicate samples in a segment, then averaging segments representative of a waste type, and finally averaging across multiple risers.

Sample measurements that represent tank contents are the preferred source of waste concentration information for the BBI. However, no analytical data was obtained for some of the “standard” radionuclides. Consequently, a complete inventory of tank waste in WMA B-BX-BY cannot be determined based on samples only; process knowledge (Section 4.1.2) or model-based estimates (Section 4.1.3) are needed to complete standard inventory estimates.

### 4.1.2 Process Knowledge

Process knowledge concentration estimates are derived from:

- historical tank sample data (pre-1989 data),
- sample data from other tanks, and
- isotope calculations.

Historical sample data (pre-1989 data) generally have a lower level of quality assurance/quality control and are therefore considered process knowledge information rather than a sample-based estimate.

Sample-based template values were developed from a review of sample data for tanks with similar process histories and with samples representive of a given waste type. The Hanford Site has had many different fuel reprocessing systems that generated many waste streams (WHC-MR-0132, *A History of the 200 Area Tank Farms*). Table 4-3 lists the waste types identified in the BBI as remaining in B Farm, BX Farm, and BY Farm tanks. The decision to include tank data in a template was based on tank transfer records indicating the expected waste type and depth in a tank and a comparison with expected analytical concentrations for a given waste type, and is documented in each update of the BBI for that tank. Sample-based templates were developed for selected constituents for 1C, 2C, 224, CWP2, PUREX cladding waste, aluminum clad fuel (1963-1967) (CWR1), B-Slt, and saltcake from in-tank solidification in BY Farm (1965-1974) (BY-Slt). Sample templates could not be developed for B, BL (see Table 4-3), supernate with cesium removed by ion exchange (CSR) or MW because representative samples for these waste types could not be obtained. Waste type template concentrations for B, BL, CSR, and MW are entirely based on Hanford Defined Waste (HDW) Model estimates. Diatomaceous earth and Portland cement were added to stabilize waste and mitigate tank leaks.

Sample templates are described in RPP-8847, *Best-Basis Inventory Template Compositions of Common Tank Waste Layers*. Waste type uncertainties are presented in Chapter 6.

In the absence of specific sample data, some isotope values were estimated from measured values. For example, plutonium, americium and curium isotopes were estimated based on HDW model ratios from total alpha values for similar waste types; uranium isotopes were estimated based on HDW model ratios from total uranium measurements for similar waste types; and $^{137m}$Ba and $^{90}$Y were decay calculations from measured values for $^{137}$Cs and $^{90}$Sr, respectively.

### 4.1.3 Hanford Defined Waste Model-Based Inventories

The HDW model composition estimates are only used in the BBI when sample data or other process knowledge information for a given waste type or constituent is not available. Sample data or sample-based templates are available for most of the standard BBI chemicals. However, sample data or sample-based templates are not available for many of the standard BBI radionuclides (RPP-19822). As a result, some of the chemical and radionuclide inventories are based on HDW model concentration estimates.

**Table 4-3. Waste Types in 241-B, 241-BX, and 241-BY Farm Tanks. (2 sheets)**

| Waste Type | Description | Tanks |
|---|---|---|
| 1C | Bismuth phosphate ($BiPO_4$) First cycle decontamination waste and coating waste 1944-1956). | 241-B-104, 241-B-105, 241-B-106, 241-B-107<br>241-BX-107, 241-BX-108, 241-BX-110, 241-BX-111, 241-BX-112 |
| 2C | $BiPO_4$ Second cycle decontamination waste (1944-1956). | 241-B-104, 241-B-105, 241-B-110, 241-B-111, 241-B-112 |
| 224 | Lanthanum fluoride process 224 Building waste (1944-1956). | 241-B-201, 241-B-202, 241-B-203, 241-B-204 |
| B | B Plant waste managed as high-activity waste – Rare earth (RE) fission products, recovered current acid waste (CAW), solvent wash waste, and any solution containing high activity (including cask station receipts, cell drainage containing product spills) (1963-1972). | 241-B-101, 241-B-110, 241-B-111 |
| BL | B Plant waste managed as low-activity waste – 1AW solvent extraction waste stream (includes complexants added for solvent extraction), the 1CP/organic wash waste during PAS processing, and insoluble solids remaining after treatment of solids centrifuged from CAW feed (i.e., acid leached and water washed PUREX P1/P2 waste). Cell drainage and Waste Encapsulation Storage Facility transfers with low radionuclide content (1967-1976). | 241-B-101<br>241-BX-101 |
| CSR | Supernates from which the cesium has been removed by ion-exchange at the 241-C-801 cask station (1962-1967) and B Plant Waste Fractionization (1967-1976). | 241-B-110, 241-B-111<br>241-BX-103 |
| CWP2 | Reduction-Oxidation (S Plant) (REDOX) cladding waste, aluminum clad fuel (1961-1966). | 241-B-107, 241-B-108, 241-B-109<br>241-BX-101, 241-BX-102, 241-BX-103, 241-BX-104, 241-BX-105, 241-BX-106<br>241-BY-103, 241-BY-109 |
| CWR1 | REDOX cladding waste, aluminum clad fuel (1950-1962). | 241-BX-104 |
| DE | Diatomaceous Earth. | 241-BX-102 |
| MW | $BiPO_4$ Metal Waste (1944–1956). | 241-B-101, 241-B-103<br>241-BX-104, 241-BX-105<br>241-BY-112 |
| PFeCN | Ferrocyanide sludge from TBP in-plant scavenged supernate and co-disposed TBP sludge (1954-1958). | 241-BX-102, 241-BX-103, 241-BX-104, 241-BX-106<br>241-BY-101, 241-BY-104, 241-BY-105, 241-BY-106, 241-BY-107, 241-BY-108, 241-BY-110 |
| Cement | Portland Cement. | 241-BY-105 |

**Table 4-3. Waste Types in 241-B, 241-BX, and 241-BY Farm Tanks. (2 sheets)**

| Waste Type | Description | Tanks |
|---|---|---|
| TBP | Tributyl phosphate process waste, same as U Plant uranium recovery waste (UR) (1952-1957). | 241-B-106<br>241-BX-101, 241-BX-105, 241-BX-108, 241-BX-109 |
| B-Slt | Saltcake from 242-B Evaporator operation (1951-1954). | 241-B-101, 241-B-102, 241-B-103, 241-B-104, 241-B-105, 241-B-106, 241-B-107, 241-B-108, 241-B-109 |
| BY-Slt | Saltcake from in-tank solidification in 241-BY Tank Farm (1965-1974). | 241-B-112, 241-BX-105, 241-BX-106, 241-BX-110, 241-BX-111<br>241-BY-101, 241-BY-102, 241-BY-103, 241-BY-104, 241-BY-105, 241-BY-106, 241-BY-107, 241-BY-108, 241-BY-109, 241-BY-110, 241-BY-111,241-BY- 112 |

1AW =
1CP =
P1 = Plutonium Uranium Extraction Plant (PUREX) waste managed as high-level waste (1956-1962)
P2 = PUREX waste managed as high-level waste (1963-1967)
PAS = PUREX acidified sludge

The HDW model uses a spreadsheet format to combine tank waste process information with Hanford Site irradiated fuel and separation plant process records from the Oak Ridge Isotope Generation 2 (ORIGEN2) model (RPP-13489, *Activity of Fuel Batches Processed Through Hanford Separations Plants, 1944 Through 1989*) to produce total chemical and radionuclide compositions by waste type. These estimates comprise 46 radionuclides (the standard radioisotopes in the BBI), 33 nonradioactive species (24 of the 25 standard chemicals from the BBI plus citrate, N-[hydroxyethyl]-ethylenediaminetriacetic acid, ethylenediaminetetraacetic acid, glycolate, acetate, dibutyl phosphate, butanol, ammonia, and ferrocyanide), and 4 properties (density, water wt%, total organic carbon wt% and sludge void fraction [total organic carbon is a standard constituent in BBI]).

The HDW model results will only be used for preliminary PA calculations; additional calculations will be performed prior to WMA closure using post-retrieval samples collected from each retrieved source term.

## 4.2 BEST-BASIS VOLUME ESTIMATES

Information such as surveillance data (e.g., waste surface level measurements, sludge level measurements, liquid observation well measurements), in-tank photographs, core sample extrusion observations, core sample analysis and waste transfer history were evaluated to estimate waste volumes used in the BBI. New volume estimates are documented in tank waste summary reports (HNF-EP-0182). Table 4-4 shows estimated waste phase volumes for each 241-B, BX, and BY Farm tank as of February 1, 2025.

**Table 4-4. Best-Basis Volume Estimates for 241-B, 241-BX and 241-BY Farm Tanks.**

| Tank | Waste Phase (kgal) | | |
|---|---|---|---|
| | Saltcake* | Sludge | Supernate |
| 241-B-101 | 75 | 33 | 0 |
| 241-B-102 | 30 | 0 | 1 |
| 241-B-103 | 36 | 1 | 1 |
| 241-B-104 | 55 | 309 | 5 |
| 241-B-105 | 216 | 28 | 0 |
| 241-B-106 | 0 | 109 | 8 |
| 241-B-107 | 73 | 84 | 1 |
| 241-B-108 | 60 | 25 | 1 |
| 241-B-109 | 80 | 50 | 0 |
| 241-B-110 | 0 | 237 | 7 |
| 241-B-111 | 0 | 216 | 1 |
| 241-B-112 | 17 | 14 | 4 |
| 241-B-201 | 0 | 28 | 2 |
| 241-B-202 | 0 | 27 | 2 |
| 241-B-203 | 0 | 49 | 1 |
| 241-B-204 | 0 | 48 | 2 |
| Total 241-B Farm | 641 | 1,257 | 36 |
| 241-BX-101 | 0 | 43 | 12 |
| 241-BX-102 | 0 | 89 | 0 |
| 241-BX-103 | 0 | 62 | 13 |
| 241-BX-104 | 0 | 93 | 5 |
| 241-BX-105 | 22 | 42 | 4 |
| 241-BX-106 | 21 | 10 | 6 |
| 241-BX-107 | 0 | 337 | 6 |
| 241-BX-108 | 0 | 25 | 0 |
| 241-BX-109 | 0 | 185 | 4 |
| 241-BX-110 | 140 | 65 | 9 |
| 241-BX-111 | 79 | 30 | 3 |
| 241-BX-112 | 0 | 156 | 1 |
| Total 241-BX Farm | 262 | 1,137 | 63 |
| 241-BY-101 | 311 | 37 | 0 |
| 241-BY-102 | 279 | 0 | 0 |

**Table 4-4. Best-Basis Volume Estimates for 241-B, 241-BX and 241-BY Farm Tanks.**

| Tank | Waste Phase (kgal) | | |
|---|---|---|---|
| | Saltcake* | Sludge | Supernate |
| 241-BY-103 | 383 | 9 | 1 |
| 241-BY-104 | 314 | 43 | 0 |
| 241-BY-105 | 393 | 48 | 0 |
| 241-BY-106 | 356 | 30 | 0 |
| 241-BY-107 | 243 | 16 | 0 |
| 241-BY-108 | 194 | 44 | 0 |
| 241-BY-109 | 267 | 23 | 0 |
| 241-BY-110 | 292 | 44 | 0 |
| 241-BY-111 | 345 | 0 | 0 |
| 241-BY-112 | 211 | 2 | 0 |
| Total 241-BY Farm | 3,587 | 296 | 1 |
| Total 241-B, 241-BX, 241-BY Farms | 4,491 | 2,690 | 101 |

*Does not include drained void space or retained gas volume.

## 4.3 BEST-BASIS INVENTORIES

Best-basis inventories are determined for each tank by multiplying the concentration of each constituent in a given layer (based on a waste type) by the volume of that layer, and summing over the layers in a tank. BBI inventories and concentrations as of February 1, 2025 for each waste phase or waste type in each tank in U Farm are provided in Appendix A. Table ES-2 shows total BBI waste volume, chemical mass and radionuclide activity for WMA B-BX-BY.

## 4.4 RESIDUAL TANK WASTE INVENTORY ESTIMATES

Residual waste is defined in Appendix H of the HFFACO (Ecology et al. 1989) Action Plan as

> "Tank waste remaining in the tank after all waste retrieval actions have been completed. Some materials may be excluded from residual waste volume calculations, subject to approval in the closure plan."

The HFFACO Action Plan Appendix H requires that tanks be retrieved to less than 360 $ft^3$ for 100-series SSTs and 30 $ft^3$ for 200-series SSTs or the limit of technology, whichever is lower.

Given the uncertainty in the volume of waste that can be retrieved, the current BBI estimate (no retrieval) should be considered an upper bound for WMA B-BX-BY residual inventories.

# 5. WASTE INVENTORIES IN ANCILLARY FACILITIES

Ancillary equipment in B Farm, BX Farm, and BY Farm are described in Section 1.2.3 and in RPP-10466. Ancillary equipment includes catch tanks, pits, diversion boxes and pipelines within the SST system. Little waste composition data is available for ancillary equipment. Therefore, for catch tanks in U Farm the weighted average BBI tank residual waste composition estimates and 10% of the current waste volume were used to estimate residual waste compositions. Weighted average BBI estimates multiplied by current waste volume were used to estimate upper bound residual waste inventories. Weighted average BBI SST concentrations for a farm and current waste volume estimates (no retrieval is planned) are used to estimate inventories for waste in Valve Pits, Diversion Boxes and Pipelines.

Table ES-2 summarizes residual waste volume and inventory estimates for ancillary facilities associated with the B Farm, BX Farm, and BY Farm systems. Some of the facilities are outside the tank farm fencelines and should be further evaluated as to whether they should be included in residual inventories for WMA B-BX-BY. The bases for these estimates are provided in the following sections:

- Catch Tanks and Vaults (Section 5.1)
- Pits (Section 5.2)
- Diversion Boxes (Section 5.3)
- Pipelines (Section 5.4).

Appendix A shows ancillary equipment residual inventory calculation results.

## 5.1 CATCH TANKS

Waste will likely be retrieved from catch tanks and inactive miscellaneous underground storage tanks as determined during the closure process. However, no decision or direction has been given to date regarding removal of waste from ancillary equipment. Therefore, it was assumed (consistent with DOE/EIS-0391) that 90% of the current waste volume in catch tanks will be retrieved. Current waste volume estimates and weighted average BBI tank concentrations for a farm provide an upper bound estimate for catch tanks. Table 5-1 shows current waste volume estimates for catch tanks and vaults in B Farm, BX Farm, and BY Farm.

## 5.2 DIVERSION BOXES

The estimate for current content of the Diversion Boxes will vary during retrieval of tanks. It was assumed that at closure all of the waste will be flushed from diversion boxes except waste adhered to concrete surfaces. This estimate was determined by multiplying the wetted surface area (sides and bottom) of the pits and diversion boxes by a waste thickness of 0.040 cm (0.0156 in.) times a grout formation factor (void space) of 0.30 (RPP-15043). The estimate is consistent with RPP-RPT-58156, which indicates that the diversion boxes contain <100 gal of waste.

**Table 5-1. Catch Tank and Vault Waste Volume Estimates.**

| Structure | Capacity (kgal) | Waste (kgal) |
|---|---|---|
| **241-B-301** | 36.4 | 0.54 |
| **241-B-302B** | 17.7 | 5 |
| **241-BX-302A** | 17.7 | 0.83 |
| **241-BX-302B** | 10.8 | 1 |
| **241-BX-302C** | 10.8 | 0.84 |
| **244-BXR Vault** | | |
| **BXR-001 tank and sump** | 50 | 4.2 |
| **BXR-002 tank and sump** | 15 | 1.2 |
| **BXR-003 tank and sump** | 15 | 8 |
| **BXR-011 tank and sump** | 50 | 11.6 |
| **244-BX Double-Contained Receiver Tank** | 31 | 11.1 |
| **241-BY-ITS Tanks** | | |
| **ITS-1 scrub solutions tank** | 0.6 | 0.35 |
| **ITS-2 heater flush tank** | 2.7 | 0.78 |

Source documents:
HNF-EP-0182, *Waste Tank Summary Report for Month Ending January 31, 2025*
RPP-RPT-58156, *Basis for Miscellaneous Underground Storage Tanks and Special Surveillance Facilities Waste Volumes Published in HNF-EP-0182 Revision 320 "Waste Tank Summary Report for Month Ending August 31, 2014"*

Table 5-2 shows inner surface areas and estimated waste volumes for diversion boxes in WMA B-BX-BY.

## 5.3 PIPELINES

The 241-B Tank Farm contains 143 pipelines with an average 3-in. diameter and total length of 6.7 miles ± 3.0 miles and a pipe volume of 17.6 ± 4.6 kgal. The 241-BX Tank Farm contains 95 pipelines with an average 3-in. diameter and total length of 7.7 miles ± 2.4 miles and a pipe volume of 15.0 ± 4.6 kgal. The 241-BY Tank Farm contains 102 pipelines with an average 3-in. diameter and total length of 10.2 miles ± 2.3 miles and a pipe volume of 19.8 ± 4.4 kgal (RPP-15043, Figure D-3; note that the line lengths include half the length of lines extending outside the farm fence).

**Table 5-2. Diversion Box and Pits Waste Volume Estimates. (2 sheets)**

| Structure | Approximate Dimensions (L by W by H, ft) | Surface Area ($ft^2$) | Calculated Waste Volume (gal) | Reference |
|---|---|---|---|---|
| **241-B-151 Diversion Box** | 16 × 6 × 10 | 535 | 1.6 | H-2-2338, Sht 13, W-72461 |
| **241-B-152 Diversion Box** | 24 × 6 × 9.9 | 741 | 2.2 | H-2-2338, Sht 14, W-72461 |
| **241-B-153 Diversion Box** | 30 × 6 × 29.6 | 2,309 | 6.7 | H-2-2338, Sht 15, W-72461 |
| **241-B-154 Diversion Box** | 32 × 6 × 10.8 | 1,010 | 2.9 | H-2-2338, Sht 16, W-72461 |
| **241-B-252 Diversion Box** | 32 × 6 × 8.7 | 852 | 2.5 | H-2-2338, Sht 17, W-72461 |
| **242-B-151 Diversion Box** | 10 × 6 × 8.5 | 333 | 1.0 | H-2-2338, Sht 49, H-2-2029 |
| **241-BX-153 Diversion Box** | 36 × 6 × 19.9 | 1,884 | 5.5 | H-2-2338, Sht 18, W-72461 |
| **241-BR-152 Diversion Box-1** | 22.5 × 16.8 × 7.8 | 992 | 8.4 | H-2-2338, Sht 37, H-2-42565 |
| **241-BR-152 Diversion Box-2** | 33.5 × 9 × 7.8 | 964 | | |
| **241-BR-152 Diversion Box-3** | 33.5 × 8.4 ×x 7.8 | 934 | | |
| **241-BXR-151 Diversion Box-1** | 44 × 9 × 13 | 1,774 | 9.8 | H-2-2338, Sht 38, H-2-42242 |
| **241-BXR-151 Diversion Box-2** | 46 × 16.7 × 6.5 | 1,584 | | |
| **241-BXR-152 Diversion Box-1** | 24.5 × 12 × 7.8 | 863 | 8.4 | H-2-2338, Sht 39, H-2-42563, H-2-42566 |
| **241-BXR-152 Diversion Box-2** | 33 × 9 × 7.8 | 952 | | |
| **241-BXR-152 Diversion Box-3** | 35 × 10.3 × 7.8 | 1,068 | | |
| **241-BXR-153 Diversion Box-1** | 24.5 × 12 × 7.8 | 863 | 7.9 | H-2-2338, Sht 40, H-2-42142, H-2-42143 |
| **241-BXR-153 Diversion Box-2** | 33 × 9 × 7.8 | 952 | | |
| **241-BXR-153 Diversion Box-3** | 35 × 7 × 7.8 | 900 | | |
| **241-BYR-152 Diversion Box-1** | 20 × 12 × 7.8 | 739 | 7.8 | H-2-2338, Sht 41, H-2-42561, H-2-42562 |
| **241-BYR-152 Diversion Box-2** | 33 × 9 × 7.8 | 952 | | |
| **241-BYR-152 Diversion Box-3** | 36 × 8.3 × 7.8 | 991 | | |
| **241-BYR-153 Diversion Box-1** | 20 × 12 × 7.8 | 739 | 7.6 | H-2-2338, Sht 42, H-2-42140, H-2-42141 |
| **241-BYR-153 Diversion Box-2** | 33 × 9 × 7.8 | 952 | | |
| **241-BYR-153 Diversion Box-3** | 36 × 7 × 7.8 | 922 | | |
| **241-BYR-154 Diversion Box-1** | 20 × 12 × 7.8 | 739 | 5.9 | H-2-2338, Sht 43, H-2-42559, H-2-42560 |
| **241-BYR-154 Diversion Box-2** | 28.5 × 9 × 7.8 | 841 | | |
| **241-BYR-154 Diversion Box-3** | 17 × 5 × 7.8 | 428 | | |

References:
H-2-2029, *First Cycle Evaporation Div. Box 242-B-151 Arrangement and Piping*
H-2-2338, *Diversion Box 241-B-151 Nozzle Information*, Sheet 13

**Table 5-2. Diversion Box and Pits Waste Volume Estimates. (2 sheets)**

| Structure | Approximate Dimensions (L by W by H, ft) | Surface Area ($ft^2$) | Calculated Waste Volume (gal) | Reference |
|---|---|---|---|---|

H-2-2338, *Diversion Box 241-B-152 Nozzle Information*, Sheet 14
H-2-2338, *Diversion Box 241-B-153 Nozzle Information*, Sheet 15
H-2-2338, *Diversion Box 241-B-154 Nozzle Information*, Sheet 16
H-2-2338, *Diversion Box 241-B-252 Nozzle Information*, Sheet 17
H-2-2338, *Diversion Box 241-BX-153 Nozzle Information*, Sheet 18
H-2-2338, *Diversion Box 241-BR-152 Nozzle Information*, Sheet 37
H-2-2338, *Diversion Box 241-BXR-151 Nozzle Information*, Sheet 38
H-2-2338, *Diversion Box 241-BXR-152 Nozzle Information*, Sheet 39
H-2-2338, *Diversion Box 241-BXR-153 Nozzle Information*, Sheet 40
H-2-2338, *Diversion Box 241-BYR-152 Nozzle Information*, Sheet 41
H-2-2338, *Diversion Box 241-BYR-153 Nozzle Information*, Sheet 42
H-2-2338, *Diversion Box 241-BYR-154 Nozzle Information*, Sheet 43
H-2-2338, *Diversion Box 242-B-151 Nozzle Information*, Sheet 49
H-2-42140, *Structural – Concrete – Plan & Sections – Cascade Diversion Box 241-BYR-153*
H-2-42141, *Structural – Concrete – Sections & Details – Cascade Diversion Box 241-BYR-153*
H-2-42142, *Structural – Concrete – Plans & Sections Cascade Diversion Box 241-BXR-153*
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H-2-42242, *Structural – Concrete – Plan & Sections – Master Diversion Box – 241-BXR-151*
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W-72461, *Hanford Engineer Works Bldg. #241-T.U.B. Diversion Boxes Concrete Plans & Details*

The lines were generally sloped to allow self drainage (RPP-15043). The volume of waste in the pipelines is unknown; however, the pipelines were flushed after being used in an attempt to remove residual waste. No discernible residual waste was observed in pipelines studied in 241-SY Tank Farm and about 4% of the pipe volume contained waste in 15- to 18-in. vitrified clay pipes between the 231-Z building and Z Ditches (RPP-PLAN-47559, *Single-Shell Tank Waste Management Area C Pipeline Feasibility Evaluation*).

If the pipelines are ~5% full, as assumed for 241-C Tank Farm and WMA A-AX, there would be ~ 660 gal of waste in B Farm pipelines, 750 gal in BX Farm pipelines and 990 gal in BX Farm pipelines with a total of 2,400 gal of waste in pipelines in WMA B-BX-BY. Cascade lines and plugged lines may contain more waste, but make up only a small fraction of the pipeline volume and would not change the rounded volume estimate. Other than a cascade line in BX Farm, none of the piplines in WMA B-BX-BY are suspected of being plugged (RPP-25113, *Residual Waste Inventories in the Plugged and Abandoned Pipelines at the Hanford Site)*.

Appendix A shows pipeline inventory estimates by constituent by farm.

# 6. INVENTORY UNCERTAINTY

This section summarizes the uncertainty of tank and ancillary equipment residual inventory estimates. Tank BBI volume, composition and inventory uncertainties described in RPP-7625 are discussed in Section 6.1. Section 6.2 discusses residual tank inventory uncertainties and Section 6.3 discusses uncertainty in ancillary equipment inventory estimates.

## 6.1 BEST-BASIS INVENTORY UNCERTAINTY

This section addresses how uncertainty is captured in the BBI. Inventory uncertainties were divided into three phases: sludge, saltcake, and supernate. Saltcake is subdivided into saltcake solids (solids plus undrainable interstitial liquid) and saltcake liquids (drainable interstitial liquids). For each phase, the equation for the inventory of a constituent is

$$I = C \times D \times V$$

where

I = Inventory
C = Concentration
D = Density
V = Volume.

The term “density” is used to denote “Bulk Density” or “Specific Gravity” depending on the waste phase, solid or liquid. In this equation, C denotes constituent concentration (constituent mass or activity per unit mass of waste), D the density of the waste (unit mass of waste per unit volume of waste), and V the volume of the waste in the phase.

The uncertainty in the inventory is calculated in terms of standard deviations (SDs). The relative standard deviation (RSD) reported in the BBI is the SD divided by the mean; i.e., it is the SD expressed as a fraction of the mean. If it is assumed that the three variables C, D, and V are independent of each other, then the $RSD^2$ of the product is, approximately,

$$RSD^2(I) \cong RSD^2(C) + RSD^2(D) + RSD^2(V)$$

Therefore, the uncertainty of the inventory is a function of the uncertainty (RSD) of each of its components: concentration (C), density (D), and volume (V). For liquids, the RSD associated with density (specific gravity) is omitted from the equation because the concentrations are reported on a volumetric basis (µg/mL or µCi/mL) and the density is not used in calculating the inventory.

### 6.1.1 Concentration Uncertainty

**6.1.1.1 Sample Uncertainty.** Sample-based (S) concentration RSDs were less than 0.4 for all constituents. Sample uncertainty estimates are determined for each constituent and sample analyzed considering precision and accuracy of samples. Differences between sample results

from two or more locations provide a measure of spacial variability and representativeness of the tank samples. The BBI calculates mean concentrations and RSDs for the constituents in each waste phase based on tank sample data and sample analytical reports. These values are included in the Calculation Detail Reports in TWINS. Radionuclides and chemical constituents with low concentrations tend to have higher RSDs than those with high concentrations. An RSD value of 1 was assigned for "less than" values used.

**6.1.1.2 Sample-Based Template Uncertainty.** Sample-based template values were used for tanks where analytical sample data were not available or where detection-level sample values were lower than sample-based template values. Template RSDs ranged from as high as 1.74 for $^{90}Sr$ to 0.10; most reported values were < 1. Waste type templates and uncertainties are described in RPP-8847 and uncertainties are included in calculation detail reports in TWINS.

An RSD value of 1.00 was assumed if more than 50% of concentrations used in a sample-based template calculation for a given constituent are below detection limits or when concentration data were limited to a single detected value that was determined to be reasonable based on comparison to other detection limits and/or the HDW model.

**6.1.1.3 Model-Based Template Uncertainty.** The uncertainty in model-based template concentration estimates for B Farm, BX Farm and BY Farm tank waste is unknown, but may be much higher than for sample-based templates.

### 6.1.2 Density Uncertainty

The density or specific gravity of the waste is also estimated from tank sample data. If analytical density/specific gravity measurements were not available, sample template densities were used. Because data was limited, pooled RSDs of the density for SST and DST liquids and solids were determined and applied to all tanks. The technique for estimating the RSDs for density is reported in RPP-6924, *Statistical Methods for Estimating the Uncertainty in the Best Basis Inventories*. The density RSDs are given in Table 6-1.

**Table 6-1. Relative Standard Deviations for Bulk Density and Specific Gravity by Type of Tank and Waste Phase.**

| Tank and Phase | Method | Relative Standard Deviation (%) |
|---|---|---|
| Single-shell tank, liquid | Specific gravity | 5.9% |
| Single-shell tank, solid | Bulk density | 7.6% |

Pooled density RSDs are generally used to calculate the RSD for the inventories. Sample-based RSDs are used when sample data is available.

### 6.1.3 Volume Uncertainty

Enraf®[1] and zip cord measurements were used in the BBI to estimate the total volume of waste in B Farm, BX Farm and BY Farm.

The Enraf® gauge tracks level changes in tank waste by using a load cell to monitor the weight of a displacer. Enraf® measurements are reported to be within 0.01 in. for a liquid surface (RPP-6570, *Volume Uncertainty Estimates for Hanford Tank Wastes*). However, none of the Enraf®s in the B Farm, BX Farm and BY Farm tanks contact a liquid surface. Consequently, the uncertainty in solid surface level measurements is based on variability in Enraf®, zip cord and other surface level and core profile measurements across a tank surface.

A zip cord measurement is taken with a tape lowered into the tank, and the distance to the waste level is measured. Zip cord measurements are usually taken prior to initiating tank activity, such as sampling in a riser.

BBI waste volume uncertainties for unretrieved tanks are default values based on the average variability in surface level measurements for a given set of tanks, each with multiple Enraf® and zip cord measurements from different locations within the tank (RPP-7625). Tables 6-2 and 6-3 show the tanks included in variability estimates and the range of the surface level readings for these tanks. The B Farm, BX Farm and BY Farm tanks have both saltcake and sludge surfaces. For a sludge surface, the average standard deviation of the surface level readings is 4.3 in. or ~12,000 gal for a 75-ft diameter tank. Similarly for tanks with saltcake surfaces the average standard deviation of the surface level readings is 23 in. or ~63,000 gal. The volume RSD for each top sludge or saltcake waste phase is the standard deviation (4.3 in.) divided by the depth of the top waste phase in the tank. Note that the RSD for volume based on the surface level increases as the volume of waste decreases. This results in some unrealistically high volume RSDs.

The RSD for a bottom layer of sludge or saltcake is estimated as one half of a core segment length or 9 in. divided by the depth of the waste phase.

### 6.1.4 Inventory Uncertainty

The statistical techniques used to combine the inventory estimates for the waste phases and used to combine the RSDs are given in detail in RPP-6924. RPP-6924 also gives the derivation of the equation for $RSD^2(I)$ being the sum of squares of the individual RSDs and gives equations that are similar to confidence intervals for constituent inventories. The sample-based and template-based inventory RSD results are presented in the calculation detail report in TWINS.

[1] Honeywell Enraf® is a registered trademark of Honeywell International Inc., Corporation Delaware, 101 Columbia Road Morristown, New Jersey.

**Table 6-2. Range of Sludge Surface Level Measurements.**

| Tank | Range cm (in.) | Reference |
|---|---|---|
| 241-C-104 | 2.82 (1.11) | RPP-RPT-43031, *2009 Auto-TCR for Tank 241-C-104* |
| 241-C-107 | 0.00 | RPP-RPT-43034, *2009 Auto-TCR for Tank 241-C-107* |
| 241-T-105 | 21.6 (8.50) | WS-97-00119/W, *241-T-105 Riser Prep/Inspect* |
| 241-T-106 | 5.1 (2.0) | WS-96-00052/W, *241-T-106 Riser Prep/Inspect for LDUA* |
| 241-T-202 | 43.2 (17.0) | WS-96-00280/W, *241-T-202 Riser Prep/Inspect* |
| 241-T-203 | 38.1 (15.0) | WS-96-00281/W, *241-T-203 Riser Prep/Inspect* |
| 241-T-204 | 45.7 (18.0) | WS-96-00282/W, *241-T-204 Riser Prep/Inspect* |
| 241-U-112 | 19.1 (7.50) | WS-96-00274/W, *241-U-112 Riser Prep for Vapor Sample* |
| Average range | 21.9 (8.64) | |
| Standard deviation (Range/2) | 11.0 (4.32) | |

**Table 6-3. Range of Saltcake Surface Level Measurements.**

| Tank | Range cm (in.) | Reference |
|---|---|---|
| 241-BY-102 | 17 (6.7) | RPP-RPT-42996, *2009 Auto-TCR for Tank 241-BY-102* |
| 241-BY-111 | 99 (39) | ES-96-00606/W, *241-BY-111 Riser Prep/Inspect* |
| 241-S-106 | 13 (5.2) | RPP-RPT-43049, *2009 Auto-TCR for Tank 241-S-106* |
| 241-TX-107 | 90 (35.5) | WS-95-00232/W, *241-TX-107 Riser Prep (Auger)* |
| 241-TX-118 | 69 (27) | WS-96-00324/W, *241-TX-118 Riser Prep/Inspect for RMCST Sample* |
| 241-TY-102 | 62 (24.5) | WS-97-00055/W, *241-TY-102 Riser Prep/Inspect* |
| Average | 58 (23) | |
| Standard Deviation (Range/2) | 29 (11.5) | |

## 6.2 RESIDUAL TANK WASTE UNCERTAINTY

### 6.2.1 Residual Volume Uncertainty

The residual waste volume for SSTs in WMA B-BX-BY after retrieval is unknown; as a base case it was assumed that waste will be retrieved to the waste residual goal of 360 $ft^3$. In 241-C Tank Farm, 6 of 12 of the 550,000-gal SSTs were retrieved to less than 360 $ft^3$. None of the 241-AX Farm tanks retrieved met the goal.

Given the uncertainty in the volume of waste that can be retrieved, the current BBI tank volume estimate (no retrieval) was used as an upper bound for B Farm, BX Farm and BY Farm tank residual volumes.

### 6.2.2 Residual Concentration Uncertainty

As a base case, residual waste concentrations for the B Farm, BX Farm and BY Farm tanks were assumed to be the same as current, pre-retrieval waste concentrations. This may provide a conservatively high concentration estimate for mobile constituents. RPP-RPT-42323, *Post-Closure Hanford C-Farm Tank and Ancillary Equipment Residual Waste Inventory Estimates* shows that the $^{99}$Tc BBI inventory decreased from an estimated 351 Ci (mostly model based estimates) before retrieval to 2.3 Ci (residual sample analyses) after retrieval and the total waste volume decreased from 1,758 kgal to 63 kgal. Based on $^{99}$Tc BBI estimates before retrieval, a total of 99.4% of the $^{99}$Tc was removed from the tanks after retrieving 96.4% of the waste, indicating a slight decrease in the $^{99}$Tc concentration.

Based on 241-AX Tank Farm retrieval constituent concentrations (RPP-RPT-60885, *Model Package Report System Model for the WMA A-AX Performance Assessment*), RPP-RPT-64941, *Calculation of Inventory Uncertainty Factors for S, SX and U Tank Farms* recommends using a mean RSD of 1 (2 times the mean) with a standard deviation of 0.25 for upper bound analyses for waste concentrations after retrieval in 241-S, 241-SX and 241-U Farm SSTs; the same RSD values are recommended for waste concentrations after retrieval in B Farm, BX Farm and BY Farm SSTs. An RSD of 1 will also be applied as a bounding case for ancillary equipment concentrations.

## 6.3 ANCILLARY EQUIPMENT RESIDUAL WASTE UNCERTAINTY

### 6.3.1 Volume Uncertainty

As a base case, retrieval of 90% of the remaining waste is assumed for catch tanks. This is an arbitrary value because no decision has been made to date regarding retrieval of the catch tanks and vaults. As an upper bound estimate for the volume of waste in catch tanks and vaults, no retrieval is assumed.

As a base case, it is assumed that most of the waste has been removed from diversion boxes and pits and that remaining waste is adsorbed to the surface of pits and diversion boxes. While this assumption is uncertain, the volume of waste remaining in pits and diversion boxes should be negligible compared to residuals in tanks and pipelines.

The estimated volume of waste in pipelines is also uncertain. An effort was made to provide a conservative estimate. The estimated lengths of pipelines in B Farm, BX Farm and BY Farm are from RPP-15043 and are conservatively high. For pipelines extending from inside the farm to beyond the farm fence, the estimate includes half the distance of the pipeline from inside the farm to the end of the line outside the farm. Some pipelines are mostly outside the farms. Limited pipeline evaluations conducted in other farms and outside tank farms indicate that the

lines were flushed. None of the pipelines in WMA B-BX-BY except one cascade line in BX Farm were identified as plugged in the past (see Section 5.3). As a base case it is assumed that residual waste may be contained in as much as 5% of the pipeline volume.

### 6.3.2 Concentration Uncertainty

Because little composition data is available for waste in ancillary equipment, it was assumed that the weighted average waste composition in the B Farm, BX Farm and BY Farm SSTs is representative of waste in ancillary equipment in the corresponding farm. Pipelines, diversion boxes and valve pits were flushed with little waste remaining; therefore, mobile constituent concentrations in pipelines, diversion boxes and valve pits are expected to be lower than the residual concentration estimates used for this report. Current BBI values and uncertainties by tank and by constituent are provided in BBI calculation detail reports in the TWINS data base and in the B-BX-BY-Farm Resid Inv2.xls spreadsheet attached with this report in the configuration data base.

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WS-96-00282/W, 1997, *241-T-204 Riser Prep/Inspect*, Westinghouse Hanford Company, Richland, Washington.

WS-96-00324/W, 1997, *241-TX-118 Riser Prep/Inspect for RMCST Sample*, Westinghouse Hanford Company, Richland, Washington.

WS-97-00055/W, 1997, *241-TY-102 Riser Prep/Inspect*, Westinghouse Hanford Company, Richland, Washington.

WS-97-00119/W, 1997, *241-T-105 Riser Prep/Inspect*, Westinghouse Hanford Company, Richland, Washington.

# APPENDIX A

## 241-B, BX, AND BY FARM SST AND ANCILLARY EQUIPMENT RESIDUAL INVENTORY ESTIMATES

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A.3 241-BY Farm Single-Shell Tank and Ancillary Equipment .....A-9

# A.1 241-B Farm Single-Shell Tank and Ancillary Equipment

| Base Case Tank Residual Inventories | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Analyte | units | B-101 | B-102 | B-103 | B-104 | B-105 | B-106 | B-107 | B-108 | B-109 | B-110 | B-111 | B-112 | B-201 | B-202 | B-203 | B-204 | B SUM |
| Base Case Vol | kL | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 0.849 | 0.849 | 0.849 | 0.849 | 126 |
| Base Case Vol | kgal | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 0.224 | 0.224 | 0.224 | 0.224 | 33.217 |
| BBI Vol | kgal | 108.1 | 31.2 | 38.6 | 368.8 | 243.9 | 117.3 | 157.5 | 85.9 | 130.0 | 244.1 | 216.6 | 34.6 | 29.6 | 29.3 | 50.2 | 49.4 | 1935.0 |
| BBI Vol | kL | 409 | 118 | 146 | 1396 | 923 | 444 | 596 | 325 | 492 | 924 | 820 | 131 | 112 | 111 | 190 | 187 | 7324 |
| Al | kg | 3.81E+02 | 3.25E+02 | 2.80E+02 | 2.86E+01 | 3.70E+02 | 5.92E+01 | 4.34E+02 | 9.54E+02 | 9.03E+02 | 1.84E+01 | 1.21E+01 | 1.98E+02 | 1.10E+00 | 1.66E+00 | 5.10E-02 | 5.68E-02 | 3.97E+03 |
| Bi | kg | 3.71E+01 | 5.30E+01 | 4.57E+01 | 1.76E+02 | 9.03E+01 | 6.89E+01 | 1.55E+02 | 3.00E+01 | 6.24E+01 | 2.48E+02 | 2.49E+02 | 1.21E+02 | 9.40E+01 | 3.31E+01 | 4.07E+01 | 4.77E+01 | 1.55E+03 |
| Ca | kg | 4.26E+01 | 2.37E+01 | 2.18E+01 | 5.13E+00 | 2.77E+01 | 2.55E+01 | 8.09E+00 | 2.19E+01 | 1.19E+01 | 1.09E+01 | 8.88E+00 | 9.49E+00 | 6.16E+00 | 6.16E+00 | 2.19E-01 | 2.63E-01 | 2.30E+02 |
| Cl | kg | 9.25E+00 | 1.66E+01 | 1.43E+01 | 3.46E+01 | 1.41E+01 | 1.94E+01 | 1.73E+01 | 1.72E+01 | 1.58E+01 | 1.73E+01 | 1.33E+01 | 2.21E+01 | 1.73E+00 | 8.42E-01 | 8.45E-01 | 6.50E-01 | 2.15E+02 |
| TIC as CO3 | kg | 3.34E+02 | 1.33E+02 | 1.53E+02 | 2.07E+02 | 2.47E+02 | 2.14E+01 | 1.55E+02 | 2.32E+02 | 1.24E+02 | 6.39E+01 | 2.41E+02 | 3.90E+02 | 1.63E+01 | 9.49E+00 | 3.59E+00 | 6.68E+00 | 2.34E+03 |
| Cr | kg | 1.06E+01 | 1.49E+01 | 1.28E+01 | 8.11E+00 | 1.75E+01 | 4.52E+00 | 4.31E+00 | 3.95E+00 | 3.32E+01 | 1.14E+01 | 1.43E+01 | 2.29E+01 | 3.55E+00 | 2.63E+00 | 3.05E+00 | 3.22E+00 | 1.71E+02 |
| F | kg | 2.67E+00 | 2.78E+02 | 2.39E+02 | 5.50E+01 | 3.13E+02 | 4.57E+01 | 3.47E+02 | 4.99E+02 | 4.99E+02 | 2.56E+01 | 2.01E+01 | 5.83E+01 | 6.23E+00 | 6.06E+00 | 7.65E+00 | 6.54E+00 | 2.41E+03 |
| Fe | kg | 7.93E+01 | 6.93E+01 | 6.16E+01 | 1.63E+02 | 9.97E+01 | 1.98E+02 | 2.27E+02 | 1.56E+01 | 1.02E+02 | 2.44E+02 | 2.11E+02 | 9.49E+01 | 1.16E+01 | 1.16E+01 | 3.25E+00 | 3.64E+00 | 1.60E+03 |
| Hg | kg | 5.98E-01 | 4.97E-02 | 4.28E-02 | 6.03E-02 | 5.71E-02 | 5.14E-01 | 3.25E-02 | 3.95E-02 | 4.60E-02 | 1.48E-02 | 1.20E-01 | 2.35E-02 | 6.07E-04 | 3.05E-04 | 0.00E+00 | 0.00E+00 | 1.60E+00 |
| K | kg | 6.11E+00 | 6.43E+00 | 5.54E+00 | 1.09E+01 | 4.11E+00 | 3.40E+00 | 4.46E+00 | 9.06E+00 | 2.71E+00 | 4.45E+00 | 8.33E+00 | 2.55E+01 | 3.36E+00 | 7.28E+00 | 5.14E+00 | 5.86E+00 | 1.13E+02 |
| La | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.60E-01 | 1.79E-02 | 2.73E-01 | 7.66E-02 | 4.36E-01 | 5.53E-01 | 4.28E-01 | 8.85E-02 | 1.02E-01 | 1.34E+01 | 1.16E+01 | 1.02E+01 | 1.02E+01 | 4.76E+01 |
| Mn | kg | 1.98E+00 | 2.82E+00 | 2.44E+00 | 2.11E+00 | 3.28E+00 | 2.02E+00 | 1.47E+00 | 2.78E+00 | 8.62E+00 | 9.04E-01 | 1.02E+00 | 7.24E-01 | 2.36E+01 | 1.22E+01 | 1.39E+01 | 1.46E+01 | 9.44E+01 |
| Na | kg | 2.94E+03 | 2.96E+03 | 2.58E+03 | 1.86E+03 | 3.04E+03 | 1.42E+03 | 2.48E+03 | 3.26E+03 | 3.71E+03 | 1.35E+03 | 1.14E+03 | 1.79E+03 | 3.58E+01 | 3.81E+01 | 2.93E+01 | 2.66E+01 | 2.87E+04 |
| Ni | kg | 6.68E+00 | 6.64E+00 | 5.73E+00 | 8.84E-01 | 7.33E+00 | 6.96E-01 | 5.78E-01 | 1.49E+01 | 1.27E+01 | 2.84E-01 | 2.45E-01 | 1.55E+00 | 4.58E-01 | 2.01E-01 | 1.80E-01 | 2.30E-01 | 5.94E+01 |
| NO2 | kg | 6.13E+02 | 3.85E+02 | 3.32E+02 | 4.25E+01 | 3.09E+02 | 9.62E+01 | 5.76E+01 | 2.32E+02 | 1.08E+02 | 1.51E+02 | 5.82E+02 | 3.68E+02 | 8.95E-01 | 1.06E+00 | 7.38E-01 | 6.18E-01 | 3.28E+03 |
| NO3 | kg | 2.14E+03 | 2.43E+03 | 2.09E+03 | 4.56E+03 | 2.05E+03 | 2.39E+03 | 2.60E+03 | 1.33E+03 | 2.06E+03 | 2.54E+03 | 1.06E+03 | 1.90E+03 | 5.38E+01 | 5.97E+01 | 6.26E+01 | 5.00E+01 | 2.74E+04 |
| Oxalate | kg | 5.58E+01 | 1.43E+02 | 1.54E+01 | 1.20E+01 | 3.43E+01 | 1.80E+00 | 1.59E+01 | 2.72E+01 | 6.71E+01 | 2.91E+00 | 7.48E+00 | 6.65E+01 | 5.85E+00 | 7.01E+00 | 1.96E+00 | 1.64E+00 | 4.65E+02 |
| Pb | kg | 6.63E+00 | 0.00E+00 | 0.00E+00 | 1.58E+01 | 1.14E+00 | 4.36E+00 | 7.37E+00 | 9.88E+00 | 1.86E+01 | 7.13E+00 | 2.03E+01 | 6.42E+00 | 2.98E-01 | 6.39E-01 | 3.01E-01 | 2.80E-01 | 9.91E+01 |
| PO4 | kg | 8.67E+01 | 6.28E+02 | 5.68E+02 | 3.64E+02 | 7.51E+02 | 9.48E+02 | 1.17E+03 | 1.46E+03 | 1.82E+03 | 6.65E+02 | 6.03E+02 | 2.57E+02 | 1.48E+01 | 1.09E+01 | 6.57E+00 | 7.00E+00 | 9.36E+03 |
| Si | kg | 4.09E+02 | 2.68E+01 | 2.31E+01 | 8.76E+01 | 4.10E+01 | 7.09E+00 | 8.38E+01 | 1.73E+01 | 9.10E+01 | 1.26E+02 | 1.33E+02 | 5.28E+01 | 6.17E+00 | 4.08E-01 | 8.94E-01 | 1.03E+00 | 1.11E+03 |
| SO4 | kg | 6.11E+02 | 1.10E+03 | 9.71E+02 | 3.37E+02 | 1.17E+03 | 2.14E+02 | 1.29E+03 | 1.42E+03 | 1.29E+03 | 1.58E+02 | 1.49E+02 | 1.79E+02 | 3.61E-01 | 1.55E+00 | 2.71E-01 | 2.88E-01 | 8.88E+03 |
| Sr | kg | 6.98E-01 | 8.53E-01 | 7.33E-01 | 4.39E+00 | 1.35E+00 | 5.05E+00 | 1.78E+00 | 9.47E-01 | 1.09E+00 | 2.84E+00 | 2.81E+00 | 1.98E+00 | 9.10E-01 | 4.78E-01 | 4.87E-01 | 3.77E-01 | 2.68E+01 |
| TOC | kg | 1.18E+02 | 7.54E+01 | 8.17E+00 | 2.10E+01 | 1.93E+01 | 5.95E+00 | 1.25E+01 | 1.75E+01 | 2.30E+01 | 6.84E+00 | 1.42E+01 | 2.89E+01 | 2.40E+00 | 2.87E+00 | 5.37E-01 | 4.51E-01 | 3.57E+02 |
| UTOTAL | kg | 1.73E+02 | 9.59E+00 | 1.39E+02 | 3.10E+01 | 1.35E+01 | 1.51E+02 | 3.15E+01 | 1.56E+01 | 1.92E+02 | 2.80E+00 | 2.54E+00 | 9.18E+00 | 1.58E-01 | 3.14E-01 | 1.28E-02 | 5.54E-03 | 7.72E+02 |
| Zr | kg | 4.76E-02 | 6.57E-02 | 5.66E-02 | 1.07E+00 | 1.59E-01 | 6.75E-01 | 1.97E+00 | 4.23E-01 | 7.58E-01 | 8.41E-02 | 1.85E-01 | 1.31E-01 | 1.87E-02 | 8.80E-04 | 2.59E-03 | 2.43E-03 | 5.64E+00 |
| SUM | kg | 8.06E+03 | 8.69E+03 | 7.58E+03 | 8.03E+03 | 8.63E+03 | 5.70E+03 | 9.11E+03 | 9.59E+03 | 1.11E+04 | 5.65E+03 | 4.49E+03 | 5.60E+03 | 3.03E+02 | 2.26E+02 | 1.92E+02 | 1.88E+02 | 9.32E+04 |

| BBI Radionuclide values | | | Decayed to 1/1/2022 | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Analyte | units | B-101 | B-102 | B-103 | B-104 | B-105 | B-106 | B-107 | B-108 | B-109 | B-110 | B-111 | B-112 | B-201 | B-202 | B-203 | B-204 | SUM B |
| 106Ru | Ci | 1.11E-10 | 2.80E-18 | 2.41E-18 | 2.17E-18 | 1.79E-18 | 7.76E-19 | 3.59E-16 | 2.40E-15 | 2.30E-15 | 1.61E-11 | 1.22E-10 | 2.09E-13 | 2.03E-22 | 1.05E-20 | 1.14E-20 | 1.09E-20 | 2.50E-10 |
| 113mCd | Ci | 3.66E-03 | 8.12E-04 | 7.05E-04 | 2.69E-04 | 4.80E-04 | 3.15E-04 | 1.20E-03 | 4.39E-03 | 4.04E-03 | 3.40E-03 | 2.78E-03 | 4.65E-02 | 5.60E-08 | 1.02E-07 | 1.11E-07 | 1.05E-07 | 6.86E-02 |
| 125Sb | Ci | 4.79E-03 | 3.21E-07 | 2.78E-07 | 9.93E-08 | 1.89E-07 | 1.28E-07 | 3.23E-07 | 7.90E-07 | 6.86E-07 | 8.50E-04 | 6.39E-03 | 2.54E-04 | 1.05E-11 | 5.10E-11 | 5.54E-11 | 5.27E-11 | 1.23E-02 |
| 126Sn | Ci | 6.78E-04 | 2.76E-04 | 2.42E-04 | 7.38E-05 | 1.61E-04 | 1.08E-04 | 1.88E-04 | 1.99E-04 | 1.27E-04 | 6.78E-04 | 4.46E-04 | 7.94E-03 | 2.63E-08 | 3.63E-08 | 3.96E-08 | 3.75E-08 | 1.11E-02 |
| 129I | Ci | 2.43E-05 | 2.82E-05 | 2.45E-05 | 6.92E-06 | 1.65E-05 | 1.15E-05 | 1.58E-04 | 9.50E-04 | 9.12E-04 | 3.21E-05 | 5.59E-06 | 7.74E-04 | 6.01E-12 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.94E-03 |
| 134Cs | Ci | 3.17E-08 | 4.34E-10 | 3.74E-10 | 6.51E-11 | 2.47E-10 | 1.88E-10 | 1.16E-09 | 6.59E-09 | 6.24E-09 | 3.87E-06 | 4.25E-08 | 4.66E-07 | 9.63E-08 | 4.16E-16 | 4.52E-16 | 4.29E-16 | 4.52E-06 |
| 137Cs | Ci | 3.24E+01 | 3.65E+01 | 3.21E+01 | 7.16E+01 | 2.83E+01 | 1.42E+02 | 1.19E+02 | 1.44E+02 | 1.73E+01 | 9.94E+01 | 1.05E+03 | 3.52E+02 | 9.10E-02 | 4.89E-02 | 4.31E-03 | 1.71E-02 | 2.13E+03 |
| 137mBa | Ci | 3.04E+01 | 3.45E+01 | 3.03E+01 | 6.75E+01 | 2.66E+01 | 1.34E+02 | 1.13E+02 | 1.36E+02 | 1.63E+01 | 9.38E+01 | 9.95E+02 | 3.32E+02 | 8.57E-02 | 4.61E-02 | 4.06E-03 | 1.62E-02 | 2.01E+03 |
| 14C | Ci | 1.85E-03 | 1.75E-03 | 1.55E-03 | 1.72E-03 | 1.16E-03 | 1.20E-03 | 3.92E-03 | 6.90E-03 | 6.22E-03 | 1.75E-02 | 2.08E-02 | 2.57E-02 | 1.49E-07 | 1.91E-07 | 2.08E-07 | 1.24E-06 | 9.02E-02 |
| 151Sm | Ci | 6.13E+02 | 2.65E+00 | 2.32E+00 | 1.09E+00 | 1.59E+00 | 9.85E-01 | 2.16E+00 | 1.89E+00 | 1.20E+00 | 1.09E+02 | 8.16E+02 | 4.49E+01 | 4.00E-03 | 5.02E-03 | 5.14E-03 | 4.77E-03 | 1.60E+03 |
| 152Eu | Ci | 1.57E-01 | 3.60E-05 | 3.12E-05 | 1.52E-05 | 2.16E-05 | 1.44E-05 | 3.15E-05 | 3.39E-05 | 2.40E-05 | 1.80E-01 | 2.10E-01 | 3.52E-03 | 1.99E-08 | 9.64E-08 | 1.05E-07 | 9.95E-08 | 5.50E-01 |
| 154Eu | Ci | 6.08E+00 | 1.49E-03 | 1.28E-03 | 6.16E-04 | 8.89E-04 | 5.83E-04 | 1.28E-03 | 1.39E-03 | 9.92E-04 | 1.75E-01 | 2.18E-01 | 1.44E-01 | 3.22E-04 | 3.80E-06 | 4.14E-06 | 3.92E-06 | 6.63E+00 |
| 155Eu | Ci | 5.66E-01 | 2.20E-04 | 1.91E-04 | 8.69E-05 | 1.31E-04 | 8.43E-05 | 1.83E-04 | 2.04E-04 | 1.45E-04 | 2.88E-02 | 3.94E-02 | 1.74E-02 | 5.90E-05 | 5.30E-07 | 5.77E-07 | 5.50E-07 | 6.53E-01 |
| 226Ra | Ci | 3.54E-07 | 3.27E-07 | 3.75E-07 | 8.84E-08 | 1.91E-07 | 1.25E-07 | 2.22E-07 | 2.34E-07 | 1.48E-07 | 1.41E-08 | 1.07E-08 | 2.18E-07 | 4.88E-11 | 3.10E-11 | 3.38E-11 | 3.20E-11 | 2.31E-06 |
| 227Ac | Ci | 1.47E-06 | 1.62E-06 | 1.56E-06 | 2.24E-06 | 1.02E-06 | 9.30E-07 | 1.97E-05 | 1.04E-04 | 1.06E-04 | 7.58E-07 | 5.61E-07 | 2.32E-04 | 2.26E-08 | 1.56E-08 | 1.70E-08 | 1.61E-08 | 4.72E-04 |
| 228Ra | Ci | 1.88E-12 | 2.27E-12 | 1.97E-12 | 1.77E-12 | 1.45E-12 | 7.39E-13 | 6.50E-04 | 4.27E-03 | 4.21E-03 | 4.67E-09 | 7.51E-10 | 2.68E-06 | 1.37E-14 | 1.55E-14 | 1.70E-14 | 1.61E-14 | 9.12E-03 |
| 229Th | Ci | 2.41E-10 | 2.70E-10 | 2.33E-10 | 2.10E-10 | 1.72E-10 | 8.75E-11 | 1.42E-04 | 9.35E-04 | 9.22E-04 | 1.73E-09 | 3.36E-10 | 7.02E-07 | 1.63E-12 | 1.83E-12 | 1.99E-12 | 1.89E-12 | 2.00E-03 |
| 231Pa | Ci | 3.66E-06 | 4.60E-06 | 3.95E-06 | 4.22E-06 | 2.99E-06 | 1.30E-06 | 7.61E-06 | 1.28E-05 | 1.12E-05 | 1.45E-06 | 1.07E-06 | 6.68E-04 | 4.41E-08 | 3.05E-08 | 3.33E-08 | 3.15E-08 | 7.23E-04 |
| 232Th | Ci | 1.88E-12 | 2.27E-12 | 1.97E-12 | 1.77E-12 | 1.45E-12 | 7.39E-13 | 6.50E-04 | 4.27E-03 | 4.21E-03 | 4.67E-09 | 7.51E-10 | 2.68E-06 | 1.37E-14 | 1.55E-14 | 1.70E-14 | 1.61E-14 | 9.12E-03 |
| 232U | Ci | 2.94E-06 | 3.42E-08 | 3.34E-07 | 9.93E-08 | 4.72E-08 | 5.03E-07 | 2.19E-05 | 2.88E-04 | 5.84E-03 | 7.71E-08 | 4.61E-08 | 1.88E-04 | 3.68E-10 | 1.27E-09 | 5.19E-11 | 2.23E-11 | 6.34E-03 |
| 233U | Ci | 2.69E-06 | 3.36E-09 | 3.61E-08 | 1.00E-08 | 4.66E-09 | 5.03E-08 | 1.62E-03 | 2.14E-02 | 4.33E-01 | 4.98E-06 | 8.14E-07 | 1.40E-02 | 4.00E-11 | 1.22E-10 | 5.01E-12 | 2.16E-12 | 4.70E-01 |
| 234U | Ci | 5.96E-02 | 3.14E-03 | 4.56E-02 | 1.02E-02 | 4.42E-03 | 4.96E-02 | 1.03E-02 | 5.46E-03 | 6.98E-02 | 9.23E-04 | 8.64E-04 | 3.18E-03 | 5.23E-05 | 1.37E-04 | 4.18E-06 | 5.31E-06 | 2.63E-01 |
| 235U | Ci | 2.64E-03 | 1.40E-04 | 2.05E-03 | 4.53E-04 | 1.97E-04 | 2.21E-03 | 4.60E-04 | 2.27E-04 | 2.78E-03 | 4.13E-05 | 3.84E-05 | 1.35E-04 | 2.32E-06 | 4.68E-06 | 1.85E-07 | 8.31E-08 | 1.14E-02 |
| 236U | Ci | 9.99E-04 | 3.68E-05 | 3.98E-04 | 1.11E-04 | 5.10E-05 | 5.65E-04 | 1.21E-04 | 1.02E-04 | 1.59E-03 | 1.04E-05 | 1.39E-05 | 4.72E-05 | 5.42E-07 | 1.48E-06 | 5.68E-08 | 4.72E-08 | 4.05E-03 |
| 237Np | Ci | 2.29E-04 | 1.74E-04 | 1.52E-04 | 4.16E-05 | 1.01E-04 | 6.84E-05 | 1.07E-04 | 1.25E-04 | 7.94E-05 | 1.62E-03 | 9.44E-04 | 2.25E-03 | 1.62E-07 | 2.14E-07 | 8.18E-07 | 2.21E-07 | 5.89E-03 |
| 238Pu | Ci | 6.21E-01 | 3.06E-03 | 1.49E-02 | 4.18E-03 | 3.69E-03 | 2.09E-03 | 4.67E-03 | 6.65E-04 | 4.21E-03 | 3.66E-02 | 3.13E-02 | 8.02E-04 | 5.52E-03 | 1.71E-03 | 1.73E-03 | 1.46E-03 | 7.37E-01 |
| 238U | Ci | 5.78E-02 | 3.20E-03 | 4.64E-02 | 1.04E-02 | 4.50E-03 | 5.05E-02 | 1.05E-02 | 5.21E-03 | 6.42E-02 | 9.37E-04 | 8.47E-04 | 3.06E-03 | 5.28E-05 | 1.05E-04 | 4.27E-06 | 1.84E-06 | 2.58E-01 |
| 239Pu | Ci | 8.40E+00 | 4.73E-01 | 2.31E+00 | 7.02E-01 | 5.77E-01 | 3.44E-01 | 6.62E-01 | 6.81E-02 | 4.83E-01 | 1.32E+00 | 1.12E+00 | 1.05E-01 | 7.58E-01 | 1.24E-01 | 2.30E-01 | 1.95E-01 | 1.79E+01 |
| 240Pu | Ci | 2.57E+00 | 5.36E-02 | 2.62E-01 | 7.52E-02 | 6.48E-02 | 3.72E-02 | 7.78E-02 | 9.66E-03 | 6.42E-02 | 1.63E-01 | 1.42E-01 | 1.20E-02 | 4.38E-02 | 2.10E-02 | 2.89E-02 | 2.45E-02 | 3.65E+00 |
| 241Am | Ci | 3.51E+01 | 9.07E-03 | 2.02E-02 | 4.16E-02 | 4.78E-02 | 1.33E-01 | 7.66E-02 | 4.77E-03 | 1.62E-02 | 9.62E-01 | 1.08E+00 | 1.15E-03 | 2.81E-02 | 6.44E-02 | 3.41E-02 | 3.74E-02 | 3.77E+01 |
| 241Pu | Ci | 1.52E+01 | 3.93E-02 | 1.92E-01 | 5.25E-02 | 4.73E-02 | 2.64E-02 | 7.35E-02 | 1.43E-02 | 8.18E-02 | 3.64E-01 | 3.19E-01 | 1.28E-02 | 3.95E-03 | 3.25E-02 | 2.32E-02 | 1.97E-02 | 1.65E+01 |
| 242Cm | Ci | 6.68E-02 | 1.82E-06 | 3.80E-06 | 6.40E-06 | 7.93E-06 | 2.85E-05 | 1.14E-05 | 4.30E-07 | 9.80E-07 | 2.20E-04 | 1.12E-03 | 1.73E-06 | 2.00E-06 | 1.55E-05 | 8.18E-06 | 9.04E-06 | 6.82E-02 |
| 242Pu | Ci | 3.71E-04 | 7.78E-07 | 3.80E-06 | 1.02E-06 | 9.35E-07 | 5.14E-07 | 1.44E-06 | 2.79E-07 | 1.60E-06 | 2.79E-06 | 7.50E-06 | 2.64E-07 | 2.62E-06 | 4.12E-06 | 4.65E-07 | 3.94E-07 | 4.00E-04 |
| 243Am | Ci | 3.36E-02 | 1.17E-06 | 2.44E-06 | 4.10E-06 | 5.10E-06 | 1.83E-05 | 7.29E-06 | 2.82E-07 | 6.51E-07 | 1.38E-04 | 2.41E-04 | 2.51E-07 | 1.26E-06 | 9.95E-06 | 5.23E-06 | 5.77E-06 | 3.41E-02 |
| 243Cm | Ci | 4.69E-03 | 1.44E-08 | 3.01E-08 | 5.08E-08 | 6.32E-08 | 2.27E-07 | 9.48E-08 | 5.90E-09 | 1.67E-08 | 4.14E-04 | 1.84E-05 | 4.01E-08 | 7.96E-09 | 1.26E-07 | 6.62E-08 | 7.31E-08 | 5.12E-03 |
| 244Cm | Ci | 8.47E-02 | 2.51E-07 | 5.22E-07 | 8.84E-07 | 1.09E-06 | 3.93E-06 | 1.68E-06 | 1.20E-07 | 3.52E-07 | 7.33E-03 | 3.27E-04 | 7.35E-07 | 1.38E-07 | 2.17E-06 | 1.14E-06 | 1.27E-06 | 9.24E-02 |
| 3H | Ci | 9.52E-03 | 9.24E-03 | 8.24E-03 | 2.07E-03 | 5.36E-03 | 4.32E-03 | 7.10E-03 | 2.81E-01 | 1.20E-02 | 6.77E-03 | 7.36E-03 | 6.72E-02 | 5.52E-03 | 1.42E-09 | 1.55E-09 | 1.46E-09 | 4.26E-01 |
| 59Ni | Ci | 1.34E-02 | 2.85E-03 | 2.46E-03 | 4.81E-04 | 2.99E-03 | 1.66E-04 | 7.97E-03 | 4.39E-02 | 4.29E-02 | 2.07E-03 | 1.40E-02 | 1.21E-01 | 3.92E-08 | 5.00E-08 | 5.45E-08 | 5.13E-08 | 2.55E-01 |
| 60Co | Ci | 8.72E-02 | 1.28E-04 | 1.11E-04 | 6.51E-05 | 7.86E-05 | 4.78E-05 | 7.20E-04 | 7.06E-03 | 3.85E-03 | 3.66E-03 | 2.04E-04 | 2.75E-02 | 4.76E-05 | 1.11E-08 | 1.21E-08 | 1.14E-08 | 1.31E-01 |
| 63Ni | Ci | 1.13E+00 | 2.54E-01 | 2.19E-01 | 4.54E-02 | 2.67E-01 | 1.44E-02 | 6.79E-01 | 3.70E+00 | 3.58E+00 | 1.73E-01 | 1.18E+00 | 1.01E+01 | 2.90E-06 | 3.81E-06 | 4.15E-06 | 3.79E-06 | 2.14E+01 |
| 79Se | Ci | 3.39E-04 | 1.52E-04 | 1.33E-04 | 4.02E-05 | 8.86E-05 | 5.90E-05 | 1.03E-04 | 1.09E-04 | 6.90E-05 | 3.36E-04 | 9.97E-04 | 3.95E-03 | 1.50E-08 | 1.94E-08 | 2.12E-08 | 2.01E-08 | 6.37E-03 |
| 90Sr | Ci | 3.29E+03 | 8.51E+00 | 1.99E+01 | 2.10E+01 | 1.46E+01 | 4.82E+02 | 3.44E+01 | 1.88E+01 | 4.91E+00 | 6.77E+02 | 1.60E+03 | 3.57E+01 | 1.12E+00 | 1.88E+00 | 4.41E-02 | 1.71E-03 | 6.21E+03 |
| 90Y | Ci | 3.29E+03 | 8.51E+00 | 1.99E+01 | 2.10E+01 | 1.46E+01 | 4.82E+02 | 3.44E+01 | 1.88E+01 | 4.91E+00 | 6.77E+02 | 1.60E+03 | 3.57E+01 | 1.12E+00 | 1.88E+00 | 4.41E-02 | 1.71E-03 | 6.21E+03 |
| 93mNb | Ci | 8.20E-03 | 3.79E-03 | 3.26E-03 | 1.14E-02 | 2.96E-03 | 4.84E-03 | 1.81E-02 | 2.66E-03 | 2.63E-03 | 8.93E-03 | 5.71E-03 | 7.86E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.51E-01 |
| 93Zr | Ci | 1.07E-02 | 6.27E-03 | 5.40E-03 | 1.19E-02 | 4.87E-03 | 5.07E-03 | 1.90E-02 | 4.39E-03 | 2.76E-03 | 9.66E-03 | 6.28E-03 | 1.04E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.91E-01 |
| 99Tc | Ci | 4.64E-02 | 2.04E-02 | 1.80E-02 | 1.58E-01 | 3.32E-02 | 8.15E-02 | 2.45E-01 | 1.49E-02 | 9.53E-03 | 2.66E-01 | 1.48E+00 | 5.59E-01 | 1.36E-08 | 5.05E-03 | 1.91E-08 | 3.53E-07 | 2.94E+00 |
| SUM | sum | 7.33E+03 | 9.16E+01 | 1.08E+02 | 1.83E+02 | 8.67E+01 | 1.24E+03 | 3.05E+02 | 3.23E+02 | 4.95E+01 | 1.66E+03 | 6.08E+03 | 8.12E+02 | 3.27E+00 | 4.11E+00 | 4.20E-01 | 3.19E-01 | 1.83E+04 |

| Ancillary Equipment Residual Inventory Estimates: Assuming BBI average tank farm waste concentrations | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Assumes 90% retrieval for catch tanks and vaults, see Section 5.1. | | | | | | | | |
| Assumes pipelines are 5% full, See Section 5.3. | | | | | | | | |
| **B-Farm** | **Weighted** | | **Inventory (kg)** | | | | | |
| **Chemicals** | **Avg. Tank** | **Units** | **B-301** | **B-302B** | **Total Tanks** | **Div Box/Pits** | **Pipelines** | **Total B-Anc.** |
| | **Conc. (kg/kL)** | Vol in kL | 2.04E-01 | 1.89E+00 | 2.10E+00 | 6.38E-02 | 2.87E+00 | 5.03E+00 |
| | | Vol in kgal | 5.40E-02 | 5.00E-01 | 5.54E-01 | 1.69E-02 | 7.57E-01 | 1.33E+00 |
| Al | 2.29E+01 | kg | 4.69E+00 | 4.34E+01 | 4.81E+01 | 1.46E+00 | 6.58E+01 | 1.15E+02 |
| Bi+3 | 1.79E+01 | kg | 3.67E+00 | 3.40E+01 | 3.76E+01 | 1.15E+00 | 5.14E+01 | 9.02E+01 |
| Ca+2 | 1.63E+00 | kg | 3.33E-01 | 3.08E+00 | 3.41E+00 | 1.04E-01 | 4.66E+00 | 8.18E+00 |
| Cl- | 1.85E+00 | kg | 3.78E-01 | 3.50E+00 | 3.88E+00 | 1.18E-01 | 5.30E+00 | 9.30E+00 |
| TIC as CO3 | 1.74E+01 | kg | 3.55E+00 | 3.28E+01 | 3.64E+01 | 1.11E+00 | 4.97E+01 | 8.72E+01 |
| Cr | 1.41E+00 | kg | 2.88E-01 | 2.67E+00 | 2.96E+00 | 8.99E-02 | 4.04E+00 | 7.09E+00 |
| F- | 1.56E+01 | kg | 3.19E+00 | 2.95E+01 | 3.27E+01 | 9.96E-01 | 4.47E+01 | 7.85E+01 |
| Fe+3 | 1.48E+01 | kg | 3.03E+00 | 2.80E+01 | 3.10E+01 | 9.45E-01 | 4.24E+01 | 7.44E+01 |
| Hg+2 | 1.06E-02 | kg | 2.17E-03 | 2.01E-02 | 2.23E-02 | 6.78E-04 | 3.05E-02 | 5.34E-02 |
| K+ | 1.14E+00 | kg | 2.32E-01 | 2.15E+00 | 2.38E+00 | 7.25E-02 | 3.26E+00 | 5.71E+00 |
| La+3 | 1.09E+00 | kg | 2.22E-01 | 2.05E+00 | 2.28E+00 | 6.93E-02 | 3.11E+00 | 5.46E+00 |
| Mn | 1.72E+00 | kg | 3.52E-01 | 3.26E+00 | 3.61E+00 | 1.10E-01 | 4.93E+00 | 8.65E+00 |
| Na+ | 2.00E+02 | kg | 4.10E+01 | 3.79E+02 | 4.20E+02 | 1.28E+01 | 5.74E+02 | 1.01E+03 |
| Ni+2 | 3.56E-01 | kg | 7.28E-02 | 6.74E-01 | 7.47E-01 | 2.27E-02 | 1.02E+00 | 1.79E+00 |
| NO2- | 2.10E+01 | kg | 4.29E+00 | 3.97E+01 | 4.40E+01 | 1.34E+00 | 6.01E+01 | 1.05E+02 |
| NO3- | 2.37E+02 | kg | 4.83E+01 | 4.48E+02 | 4.96E+02 | 1.51E+01 | 6.78E+02 | 1.19E+03 |
| Oxalate | 2.48E+00 | kg | 5.07E-01 | 4.70E+00 | 5.21E+00 | 1.58E-01 | 7.11E+00 | 1.25E+01 |
| Pb+2 | 9.53E-01 | kg | 1.95E-01 | 1.80E+00 | 2.00E+00 | 6.08E-02 | 2.73E+00 | 4.79E+00 |
| PO4-3 | 6.82E+01 | kg | 1.39E+01 | 1.29E+02 | 1.43E+02 | 4.35E+00 | 1.95E+02 | 3.43E+02 |
| Si+4 | 9.14E+00 | kg | 1.87E+00 | 1.73E+01 | 1.92E+01 | 5.84E-01 | 2.62E+01 | 4.60E+01 |
| SO4-2 | 5.79E+01 | kg | 1.18E+01 | 1.10E+02 | 1.21E+02 | 3.70E+00 | 1.66E+02 | 2.91E+02 |
| Sr+2 | 2.81E-01 | kg | 5.75E-02 | 5.33E-01 | 5.90E-01 | 1.80E-02 | 8.07E-01 | 1.41E+00 |
| TOC | 2.19E+00 | kg | 4.48E-01 | 4.15E+00 | 4.60E+00 | 1.40E-01 | 6.29E+00 | 1.10E+01 |
| U(TOTAL) | 4.55E+00 | kg | 9.31E-01 | 8.62E+00 | 9.55E+00 | 2.91E-01 | 1.31E+01 | 2.29E+01 |
| Zr+4 | 5.27E-02 | kg | 1.08E-02 | 9.98E-02 | 1.11E-01 | 3.37E-03 | 1.51E-01 | 2.65E-01 |
| Sum | | kg | 1.43E+02 | 1.33E+03 | 1.47E+03 | 4.48E+01 | 2.01E+03 | 3.53E+03 |

| | Weighted | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| B-Farm | Avg. Tank | | B-Farm Inventory (Ci) | | | | | | |
| Radionuclides | Conc. (Ci/kL) | | B-301B | B-302B | | Total Tanks | Div Box/Pits | Pipelines | Total B-Anc. |
| 106Ru | 2.15E-12 | Ci | 4.40E-13 | 4.07E-12 | | 4.51E-12 | 1.37E-13 | 6.17E-12 | 1.08E-11 |
| 113mCd | 2.45E-04 | Ci | 5.01E-05 | 4.64E-04 | | 5.14E-04 | 1.56E-05 | 7.03E-04 | 1.23E-03 |
| 125Sb | 1.07E-04 | Ci | 2.19E-05 | 2.03E-04 | | 2.25E-04 | 6.85E-06 | 3.08E-04 | 5.40E-04 |
| 126Sn | 3.91E-05 | Ci | 7.99E-06 | 7.39E-05 | | 8.19E-05 | 2.49E-06 | 1.12E-04 | 1.96E-04 |
| 129I | 1.38E-05 | Ci | 2.83E-06 | 2.62E-05 | | 2.90E-05 | 8.84E-07 | 3.97E-05 | 6.96E-05 |
| 134Cs | 5.12E-08 | Ci | 1.05E-08 | 9.69E-08 | | 1.07E-07 | 3.27E-09 | 1.47E-07 | 2.57E-07 |
| 137Cs | 1.79E+01 | Ci | 3.67E+00 | 3.40E+01 | | 3.76E+01 | 1.14E+00 | 5.14E+01 | 9.02E+01 |
| 137mBa | 1.69E+01 | Ci | 3.46E+00 | 3.21E+01 | | 3.55E+01 | 1.08E+00 | 4.85E+01 | 8.51E+01 |
| 14C | 6.62E-04 | Ci | 1.35E-04 | 1.25E-03 | | 1.39E-03 | 4.22E-05 | 1.90E-03 | 3.33E-03 |
| 151Sm | 1.38E+01 | Ci | 2.83E+00 | 2.62E+01 | | 2.90E+01 | 8.83E-01 | 3.96E+01 | 6.95E+01 |
| 152Eu | 5.40E-03 | Ci | 1.10E-03 | 1.02E-02 | | 1.13E-02 | 3.45E-04 | 1.55E-02 | 2.71E-02 |
| 154Eu | 3.82E-02 | Ci | 7.81E-03 | 7.23E-02 | | 8.01E-02 | 2.44E-03 | 1.09E-01 | 1.92E-01 |
| 155Eu | 3.93E-03 | Ci | 8.03E-04 | 7.43E-03 | | 8.24E-03 | 2.51E-04 | 1.13E-02 | 1.97E-02 |
| 226Ra | 1.24E-08 | Ci | 2.53E-09 | 2.35E-08 | | 2.60E-08 | 7.91E-10 | 3.55E-08 | 6.23E-08 |
| 227Ac | 1.81E-06 | Ci | 3.70E-07 | 3.42E-06 | | 3.79E-06 | 1.15E-07 | 5.18E-06 | 9.09E-06 |
| 228Ra | 5.15E-05 | Ci | 1.05E-05 | 9.74E-05 | | 1.08E-04 | 3.29E-06 | 1.48E-04 | 2.59E-04 |
| 229Th | 1.13E-05 | Ci | 2.31E-06 | 2.13E-05 | | 2.37E-05 | 7.20E-07 | 3.23E-05 | 5.67E-05 |
| 231Pa | 1.55E-06 | Ci | 3.18E-07 | 2.94E-06 | | 3.26E-06 | 9.91E-08 | 4.45E-06 | 7.81E-06 |
| 232Th | 5.15E-05 | Ci | 1.05E-05 | 9.74E-05 | | 1.08E-04 | 3.29E-06 | 1.48E-04 | 2.59E-04 |
| 232U | 4.03E-05 | Ci | 8.23E-06 | 7.62E-05 | | 8.45E-05 | 2.57E-06 | 1.15E-04 | 2.03E-04 |
| 233U | 2.98E-03 | Ci | 6.10E-04 | 5.65E-03 | | 6.26E-03 | 1.90E-04 | 8.55E-03 | 1.50E-02 |
| 234U | 1.56E-03 | Ci | 3.18E-04 | 2.95E-03 | | 3.26E-03 | 9.93E-05 | 4.46E-03 | 7.82E-03 |
| 235U | 6.70E-05 | Ci | 1.37E-05 | 1.27E-04 | | 1.41E-04 | 4.28E-06 | 1.92E-04 | 3.37E-04 |
| 236U | 2.47E-05 | Ci | 5.04E-06 | 4.67E-05 | | 5.17E-05 | 1.57E-06 | 7.07E-05 | 1.24E-04 |
| 237Np | 4.06E-05 | Ci | 8.30E-06 | 7.68E-05 | | 8.51E-05 | 2.59E-06 | 1.16E-04 | 2.04E-04 |
| 238Pu | 4.66E-03 | Ci | 9.53E-04 | 8.83E-03 | | 9.78E-03 | 2.98E-04 | 1.34E-02 | 2.34E-02 |
| 238U | 1.52E-03 | Ci | 3.11E-04 | 2.88E-03 | | 3.19E-03 | 9.71E-05 | 4.36E-03 | 7.65E-03 |
| 239Pu | 1.40E-01 | Ci | 2.86E-02 | 2.65E-01 | | 2.93E-01 | 8.93E-03 | 4.01E-01 | 7.03E-01 |
| 240Pu | 2.46E-02 | Ci | 5.02E-03 | 4.65E-02 | | 5.15E-02 | 1.57E-03 | 7.04E-02 | 1.23E-01 |
| 241Am | 2.23E-01 | Ci | 4.56E-02 | 4.22E-01 | | 4.68E-01 | 1.42E-02 | 6.39E-01 | 1.12E+00 |
| 241Pu | 9.64E-02 | Ci | 1.97E-02 | 1.82E-01 | | 2.02E-01 | 6.15E-03 | 2.76E-01 | 4.84E-01 |
| 242Cm | 3.82E-04 | Ci | 7.81E-05 | 7.23E-04 | | 8.02E-04 | 2.44E-05 | 1.10E-03 | 1.92E-03 |
| 242Pu | 2.36E-06 | Ci | 4.83E-07 | 4.47E-06 | | 4.96E-06 | 1.51E-07 | 6.78E-06 | 1.19E-05 |
| 243Am | 1.90E-04 | Ci | 3.87E-05 | 3.59E-04 | | 3.97E-04 | 1.21E-05 | 5.43E-04 | 9.53E-04 |
| 243Cm | 3.10E-05 | Ci | 6.34E-06 | 5.87E-05 | | 6.50E-05 | 1.98E-06 | 8.89E-05 | 1.56E-04 |
| 244Cm | 5.59E-04 | Ci | 1.14E-04 | 1.06E-03 | | 1.17E-03 | 3.57E-05 | 1.60E-03 | 2.81E-03 |
| 3H | 1.95E-03 | Ci | 4.00E-04 | 3.70E-03 | | 4.10E-03 | 1.25E-04 | 5.60E-03 | 9.83E-03 |
| 59Ni | 1.06E-03 | Ci | 2.17E-04 | 2.01E-03 | | 2.22E-03 | 6.76E-05 | 3.04E-03 | 5.33E-03 |
| 60Co | 6.39E-04 | Ci | 1.31E-04 | 1.21E-03 | | 1.34E-03 | 4.08E-05 | 1.83E-03 | 3.21E-03 |
| 63Ni | 8.93E-02 | Ci | 1.82E-02 | 1.69E-01 | | 1.87E-01 | 5.70E-03 | 2.56E-01 | 4.49E-01 |
| 79Se | 2.83E-05 | Ci | 5.79E-06 | 5.36E-05 | | 5.94E-05 | 1.81E-06 | 8.12E-05 | 1.42E-04 |
| 90Sr | 4.80E+01 | Ci | 9.81E+00 | 9.09E+01 | | 1.01E+02 | 3.06E+00 | 1.38E+02 | 2.41E+02 |
| 90Y | 4.80E+01 | Ci | 9.81E+00 | 9.09E+01 | | 1.01E+02 | 3.06E+00 | 1.38E+02 | 2.41E+02 |
| 93mNb | 8.20E-04 | Ci | 1.68E-04 | 1.55E-03 | | 1.72E-03 | 5.24E-05 | 2.35E-03 | 4.12E-03 |
| 93Zr | 9.52E-04 | Ci | 1.95E-04 | 1.80E-03 | | 2.00E-03 | 6.08E-05 | 2.73E-03 | 4.79E-03 |
| 99Tc | 2.69E-02 | Ci | 5.49E-03 | 5.08E-02 | | 5.63E-02 | 1.71E-03 | 7.70E-02 | 1.35E-01 |
| Sum | | Ci | 2.97E+01 | 2.75E+02 | | 3.05E+02 | 9.28E+00 | 4.17E+02 | 7.31E+02 |

## A.2 241-BX Farm Single-Shell Tank and Ancillary Equipment

| Base Case Tank Residual Inventories | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Analyte | units | BX-101 | BX-102 | BX-103 | BX-104 | BX-105 | BX-106 | BX-107 | BX-108 | BX-109 | BX-110 | BX-111 | BX-112 | SUM BX |
| Base Case Vol | kL | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 122 |
| Base Case Vol | kgal | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 32.319 |
| BBI Vol | kgal | 55.0 | 88.8 | 75.0 | 98.3 | 69.2 | 36.7 | 343.2 | 24.8 | 188.9 | 213.7 | 111.8 | 156.9 | 1462.4 |
| BBI Vol | kL | 208 | 336 | 284 | 372 | 262 | 139 | 1299 | 94 | 715 | 809 | 423 | 594 | 5535 |
| Al | kg | 1.92E+03 | 8.34E+02 | 1.47E+03 | 2.18E+03 | 4.90E+02 | 6.84E+02 | 2.06E+02 | 2.17E+02 | 3.02E+01 | 3.21E+02 | 2.65E+02 | 1.64E+02 | 8.78E+03 |
| Bi | kg | 4.19E+00 | 7.10E+00 | 2.58E+00 | 9.13E+00 | 1.09E+01 | 4.83E+00 | 3.48E+02 | 1.93E+02 | 7.51E+00 | 9.60E+01 | 7.06E+01 | 2.30E+02 | 9.84E+02 |
| Ca | kg | 3.43E+01 | 7.43E+01 | 2.39E+01 | 2.88E+01 | 9.03E+01 | 4.11E+01 | 1.50E+01 | 5.06E+01 | 4.12E+01 | 1.19E+01 | 5.06E+00 | 9.80E+00 | 4.26E+02 |
| Cl | kg | 1.64E+01 | 1.11E+01 | 8.00E+00 | 1.71E+01 | 1.55E+01 | 3.89E+01 | 1.64E+01 | 3.19E+01 | 2.01E+01 | 2.70E+01 | 2.02E+01 | 1.47E+01 | 2.37E+02 |
| TIC as CO3 | kg | 7.45E+02 | 1.66E+02 | 4.42E+02 | 3.73E+02 | 2.19E+02 | 6.09E+02 | 1.68E+01 | 9.84E+01 | 1.98E+01 | 9.43E+01 | 1.26E+02 | 1.44E+02 | 3.05E+03 |
| Cr | kg | 9.26E+01 | 7.52E+00 | 5.20E+00 | 7.70E+01 | 1.23E+02 | 2.71E+01 | 1.38E+01 | 1.06E+01 | 2.17E+00 | 7.31E+01 | 2.60E+01 | 1.87E+01 | 4.77E+02 |
| F | kg | 2.44E+00 | 2.09E+01 | 4.31E+01 | 1.32E+01 | 3.41E+01 | 8.65E+01 | 1.33E+02 | 1.19E+02 | 4.03E+00 | 1.00E+02 | 7.54E+01 | 1.82E+02 | 8.14E+02 |
| Fe | kg | 1.80E+02 | 2.03E+02 | 1.27E+02 | 8.11E+01 | 8.68E+01 | 1.06E+02 | 1.59E+02 | 4.32E+02 | 3.24E+02 | 6.11E+01 | 5.98E+01 | 1.09E+02 | 1.93E+03 |
| Hg | kg | 1.60E+00 | 2.69E-01 | 9.76E-02 | 2.14E-01 | 2.21E-01 | 1.80E-01 | 8.16E-03 | 1.01E+00 | 1.02E+00 | 6.07E-03 | 6.41E-03 | 4.05E-03 | 4.64E+00 |
| K | kg | 5.64E+00 | 1.03E+01 | 7.04E+00 | 1.92E+01 | 2.46E+01 | 2.88E+01 | 3.79E+00 | 6.18E+00 | 1.80E+00 | 2.60E+01 | 2.36E+01 | 6.02E+00 | 1.63E+02 |
| La | kg | 6.57E-01 | 4.82E-01 | 7.11E-01 | 2.16E+00 | 4.36E-01 | 2.68E-01 | 2.17E-02 | 5.45E-01 | 5.35E-01 | 9.75E-03 | 6.92E-03 | 1.82E-02 | 5.85E+00 |
| Mn | kg | 1.41E+02 | 4.37E+00 | 5.31E+00 | 1.89E+01 | 2.10E+01 | 2.88E+00 | 9.34E-01 | 3.93E+00 | 2.12E+00 | 1.24E+00 | 6.77E-01 | 4.12E+00 | 2.07E+02 |
| Na | kg | 1.06E+03 | 8.65E+02 | 7.39E+02 | 1.12E+03 | 1.79E+03 | 2.63E+03 | 1.47E+03 | 2.66E+03 | 1.61E+03 | 3.26E+03 | 3.11E+03 | 1.11E+03 | 2.14E+04 |
| Ni | kg | 3.95E+00 | 4.25E+01 | 2.72E+01 | 2.71E+00 | 2.24E+00 | 2.87E+01 | 1.77E-01 | 1.52E+00 | 1.12E+00 | 2.41E+00 | 3.01E-01 | 3.52E-02 | 1.13E+02 |
| NO2 | kg | 3.23E+02 | 2.13E+02 | 1.46E+02 | 3.89E+02 | 2.27E+02 | 6.07E+02 | 1.17E+02 | 2.95E+02 | 2.74E+02 | 2.29E+02 | 3.08E+02 | 3.67E+02 | 3.50E+03 |
| NO3 | kg | 5.29E+02 | 7.92E+02 | 4.92E+02 | 7.92E+02 | 6.46E+02 | 2.60E+03 | 1.97E+03 | 4.02E+03 | 2.97E+03 | 5.30E+03 | 4.77E+03 | 1.01E+03 | 2.59E+04 |
| Oxalate | kg | 2.63E+01 | 2.79E+01 | 1.03E+02 | 6.49E+01 | 3.93E+01 | 1.12E+02 | 3.96E+00 | 5.66E+00 | 3.02E+00 | 4.80E+01 | 2.58E+01 | 3.54E+00 | 4.63E+02 |
| Pb | kg | 2.25E+01 | 2.00E+01 | 3.45E+01 | 1.29E+01 | 8.13E+00 | 1.14E+01 | 9.02E-01 | 9.91E+00 | 1.01E+01 | 2.63E+00 | 2.07E+00 | 2.08E+00 | 1.37E+02 |
| PO4 | kg | 4.39E+01 | 2.69E+02 | 3.31E+02 | 1.04E+02 | 9.07E+02 | 2.79E+02 | 1.02E+03 | 2.01E+03 | 9.78E+02 | 7.77E+02 | 4.92E+02 | 8.08E+02 | 8.01E+03 |
| Si | kg | 8.48E+02 | 1.27E+03 | 1.76E+01 | 3.54E+01 | 5.91E+02 | 2.24E+01 | 9.81E+01 | 7.14E+01 | 1.09E+01 | 3.49E+01 | 3.01E+01 | 1.20E+02 | 3.15E+03 |
| SO4 | kg | 2.10E+01 | 5.64E+01 | 9.55E+01 | 2.82E+01 | 1.74E+02 | 2.44E+02 | 1.98E+02 | 3.99E+02 | 2.87E+02 | 1.58E+02 | 8.22E+01 | 9.34E+01 | 1.84E+03 |
| Sr | kg | 4.62E+00 | 5.34E+01 | 1.97E+01 | 1.16E+00 | 8.05E-01 | 3.58E+01 | 2.40E+00 | 1.06E+01 | 9.00E+00 | 2.52E+00 | 1.09E+00 | 1.61E+00 | 1.43E+02 |
| TOC | kg | 2.47E+02 | 4.91E+01 | 1.18E+02 | 7.15E+01 | 3.73E+01 | 1.11E+02 | 8.63E+00 | 1.63E+01 | 1.07E+01 | 2.53E+01 | 1.51E+01 | 7.71E+00 | 7.18E+02 |
| UTOTAL | kg | 5.29E+02 | 1.41E+02 | 7.50E+01 | 9.78E+02 | 2.09E+02 | 9.31E+01 | 3.02E+01 | 2.03E+02 | 2.25E+02 | 1.92E+01 | 1.10E+01 | 1.38E+01 | 2.53E+03 |
| Zr | kg | 3.82E-01 | 1.57E-01 | 5.74E-01 | 1.36E+01 | 4.71E+00 | 2.24E-01 | 1.95E+00 | 1.44E+00 | 1.30E-01 | 8.57E-01 | 5.59E-01 | 7.28E-01 | 2.54E+01 |
| SUM | kg | 6.81E+03 | 5.14E+03 | 4.34E+03 | 6.43E+03 | 5.75E+03 | 8.40E+03 | 5.83E+03 | 1.09E+04 | 6.84E+03 | 1.07E+04 | 9.52E+03 | 4.43E+03 | 8.50E+04 |

| BBI Radionuclide values | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Analyte | units | BX-101 | BX-102 | BX-103 | BX-104 | BX-105 | BX-106 | BX-107 | BX-108 | BX-109 | BX-110 | BX-111 | BX-112 | SUM BX |
| 106Ru | Ci | 4.64E-11 | 3.06E-15 | 1.69E-14 | 1.07E-15 | 1.18E-13 | 2.85E-13 | 3.75E-18 | 2.70E-18 | 8.04E-21 | 3.64E-13 | 4.48E-13 | 2.69E-18 | 4.76E-11 |
| 113mCd | Ci | 6.42E-03 | 5.01E-03 | 1.07E-02 | 3.70E-03 | 2.74E-02 | 8.21E-02 | 3.74E-04 | 7.21E-04 | 4.58E-04 | 6.49E-02 | 7.35E-02 | 2.64E-04 | 2.76E-01 |
| 125Sb | Ci | 4.86E-05 | 7.77E-07 | 1.86E-05 | 5.67E-07 | 1.41E-04 | 3.47E-04 | 1.31E-07 | 2.86E-07 | 1.95E-07 | 4.41E-04 | 5.40E-04 | 9.32E-08 | 1.54E-03 |
| 126Sn | Ci | 5.73E-04 | 5.19E-05 | 1.10E-03 | 1.20E-04 | 4.36E-03 | 1.39E-02 | 8.16E-05 | 2.32E-04 | 1.77E-04 | 1.11E-02 | 1.26E-02 | 5.75E-05 | 4.43E-02 |
| 129I | Ci | 7.74E-04 | 1.20E-03 | 1.37E-03 | 7.92E-04 | 3.93E-04 | 1.57E-03 | 8.00E-06 | 2.46E-05 | 1.91E-05 | 1.07E-03 | 1.21E-03 | 5.73E-06 | 8.45E-03 |
| 134Cs | Ci | 5.34E-09 | 1.54E-08 | 1.72E-08 | 8.80E-09 | 2.55E-07 | 8.14E-07 | 2.19E-11 | 3.64E-10 | 3.54E-10 | 6.48E-07 | 7.35E-07 | 1.57E-11 | 2.50E-06 |
| 137Cs | Ci | 8.43E+02 | 7.52E+02 | 2.80E+02 | 6.74E+02 | 4.67E+02 | 1.04E+03 | 1.28E+02 | 2.26E+02 | 1.08E+02 | 5.52E+02 | 6.02E+02 | 3.55E+02 | 6.03E+03 |
| 137mBa | Ci | 7.94E+02 | 7.10E+02 | 2.64E+02 | 6.38E+02 | 4.40E+02 | 9.83E+02 | 1.21E+02 | 2.13E+02 | 1.02E+02 | 5.22E+02 | 5.69E+02 | 3.35E+02 | 5.69E+03 |
| 14C | Ci | 5.64E-03 | 7.49E-03 | 1.02E-02 | 5.86E-03 | 9.77E-03 | 4.62E-02 | 3.96E-03 | 3.21E-03 | 9.47E-04 | 3.70E-02 | 4.15E-02 | 2.44E-03 | 1.74E-01 |
| 151Sm | Ci | 1.26E+01 | 4.00E-01 | 2.88E+00 | 9.67E-01 | 2.53E+01 | 6.18E+01 | 1.37E+00 | 2.32E+00 | 1.35E+00 | 7.80E+01 | 9.52E+01 | 9.68E-01 | 2.83E+02 |
| 152Eu | Ci | 1.50E-03 | 1.62E-05 | 2.12E-04 | 1.35E-05 | 1.96E-03 | 4.83E-03 | 2.02E-05 | 3.41E-05 | 1.98E-05 | 6.09E-03 | 7.45E-03 | 1.44E-05 | 2.22E-02 |
| 154Eu | Ci | 1.74E+00 | 6.67E-04 | 8.51E-03 | 5.75E-04 | 8.02E-02 | 1.97E-01 | 8.00E-04 | 1.38E-03 | 8.10E-04 | 2.48E-01 | 3.04E-01 | 5.70E-04 | 2.59E+00 |
| 155Eu | Ci | 3.99E-01 | 9.50E-05 | 1.01E-03 | 8.91E-05 | 9.73E-03 | 2.40E-02 | 1.07E-04 | 1.95E-04 | 1.20E-04 | 3.01E-02 | 3.69E-02 | 7.55E-05 | 5.02E-01 |
| 226Ra | Ci | 1.26E-07 | 5.86E-08 | 4.38E-08 | 1.77E-06 | 2.72E-07 | 3.91E-07 | 9.81E-08 | 2.70E-07 | 2.02E-07 | 3.53E-07 | 3.90E-07 | 6.83E-08 | 4.05E-06 |
| 227Ac | Ci | 8.67E-05 | 5.64E-05 | 1.51E-04 | 5.01E-05 | 2.39E-04 | 5.96E-04 | 3.23E-06 | 1.46E-06 | 5.10E-07 | 3.60E-04 | 4.24E-04 | 2.25E-06 | 1.97E-03 |
| 228Ra | Ci | 3.57E-03 | 2.08E-03 | 6.25E-03 | 1.95E-03 | 2.45E-03 | 1.01E-03 | 2.63E-12 | 2.27E-12 | 3.86E-13 | 4.44E-06 | 5.37E-06 | 1.85E-12 | 1.73E-02 |
| 229Th | Ci | 7.79E-04 | 4.55E-04 | 1.36E-03 | 4.25E-04 | 5.37E-04 | 2.21E-04 | 3.12E-10 | 2.70E-10 | 4.55E-11 | 1.16E-06 | 1.41E-06 | 2.20E-10 | 3.78E-03 |
| 231Pa | Ci | 7.94E-06 | 1.24E-05 | 1.39E-05 | 4.33E-06 | 3.66E-04 | 1.17E-03 | 6.32E-06 | 4.54E-06 | 8.51E-09 | 9.30E-04 | 1.05E-03 | 4.39E-06 | 3.57E-03 |
| 232Th | Ci | 3.57E-03 | 2.08E-03 | 6.25E-03 | 1.95E-03 | 2.45E-03 | 1.01E-03 | 2.63E-12 | 2.27E-12 | 3.86E-13 | 4.44E-06 | 5.37E-06 | 1.85E-12 | 1.73E-02 |
| 232U | Ci | 5.59E-03 | 5.43E-04 | 1.06E-03 | 5.37E-03 | 2.57E-03 | 5.22E-04 | 1.03E-07 | 6.77E-07 | 7.49E-07 | 3.26E-04 | 1.93E-05 | 4.72E-08 | 1.60E-02 |
| 233U | Ci | 4.11E-01 | 4.04E-02 | 7.79E-02 | 3.95E-01 | 1.91E-01 | 3.89E-02 | 1.03E-08 | 6.78E-08 | 7.50E-08 | 2.43E-02 | 1.44E-03 | 4.69E-09 | 1.18E+00 |
| 234U | Ci | 1.85E-01 | 4.67E-02 | 2.58E-02 | 3.32E-01 | 7.12E-02 | 3.10E-02 | 9.89E-03 | 6.65E-02 | 7.39E-02 | 6.56E-03 | 3.61E-03 | 4.53E-03 | 8.57E-01 |
| 235U | Ci | 7.79E-03 | 2.06E-03 | 1.09E-03 | 1.44E-02 | 3.08E-03 | 1.36E-03 | 4.42E-04 | 2.97E-03 | 3.29E-03 | 2.81E-04 | 1.61E-04 | 2.03E-04 | 3.71E-02 |
| 236U | Ci | 4.08E-03 | 6.10E-04 | 4.38E-04 | 4.80E-03 | 9.14E-04 | 4.09E-04 | 1.11E-04 | 7.58E-04 | 8.45E-04 | 9.59E-05 | 4.17E-05 | 5.06E-05 | 1.32E-02 |
| 237Np | Ci | 1.65E-04 | 3.43E-05 | 2.66E-04 | 8.14E-05 | 1.26E-03 | 3.58E-03 | 3.44E-05 | 1.42E-04 | 1.18E-04 | 3.47E-03 | 4.07E-03 | 2.42E-05 | 1.32E-02 |
| 238Pu | Ci | 2.26E-01 | 5.58E-03 | 5.17E-01 | 4.69E-02 | 3.04E-02 | 6.06E-02 | 4.54E-03 | 3.74E-03 | 8.93E-04 | 2.09E-03 | 2.33E-03 | 1.17E-02 | 9.12E-01 |
| 238U | Ci | 1.76E-01 | 4.70E-02 | 2.49E-02 | 3.26E-01 | 6.96E-02 | 3.10E-02 | 1.01E-02 | 6.78E-02 | 7.53E-02 | 6.36E-03 | 3.66E-03 | 4.62E-03 | 8.43E-01 |
| 239Pu | Ci | 8.67E+00 | 5.73E-01 | 2.53E+01 | 5.67E+00 | 1.68E+00 | 2.76E+00 | 7.44E-01 | 6.16E-01 | 1.48E-01 | 2.56E-01 | 3.42E-01 | 1.92E+00 | 4.87E+01 |
| 240Pu | Ci | 1.75E+00 | 8.07E-02 | 5.96E+00 | 7.07E-01 | 3.33E-01 | 5.53E-01 | 8.08E-02 | 6.64E-02 | 1.58E-02 | 3.02E-02 | 3.83E-02 | 2.09E-01 | 9.82E+00 |
| 241Am | Ci | 1.84E+00 | 3.94E-01 | 3.73E+00 | 8.47E+00 | 9.49E-01 | 3.54E+00 | 1.84E-01 | 3.76E-01 | 7.96E-02 | 1.98E-01 | 2.48E-01 | 3.17E-01 | 2.03E+01 |
| 241Pu | Ci | 5.24E+00 | 1.24E-01 | 1.56E+01 | 9.43E-01 | 8.25E-01 | 1.52E+00 | 5.72E-02 | 4.72E-02 | 1.13E-02 | 3.41E-02 | 3.30E-02 | 1.48E-01 | 2.46E+01 |
| 242Cm | Ci | 1.66E-02 | 8.10E-05 | 1.47E-04 | 6.58E-04 | 3.28E-04 | 1.05E-03 | 2.98E-05 | 7.33E-05 | 1.78E-05 | 3.81E-05 | 4.29E-05 | 5.05E-05 | 1.91E-02 |
| 242Pu | Ci | 1.16E-04 | 2.40E-06 | 3.02E-04 | 1.87E-05 | 1.65E-05 | 3.23E-05 | 1.12E-06 | 9.19E-07 | 2.18E-07 | 7.14E-07 | 6.70E-07 | 2.92E-06 | 4.94E-04 |
| 243Am | Ci | 3.09E-04 | 5.22E-05 | 9.55E-05 | 4.19E-04 | 2.63E-04 | 1.22E-03 | 1.91E-05 | 4.72E-05 | 1.15E-05 | 2.96E-05 | 2.94E-05 | 3.23E-05 | 2.53E-03 |
| 243Cm | Ci | 1.02E-03 | 6.83E-07 | 4.20E-06 | 4.30E-06 | 6.85E-06 | 2.23E-05 | 2.37E-07 | 5.85E-07 | 1.43E-07 | 4.67E-07 | 4.12E-07 | 4.02E-07 | 1.06E-03 |
| 244Cm | Ci | 1.84E-02 | 1.21E-05 | 9.33E-05 | 7.51E-05 | 1.26E-04 | 4.08E-04 | 4.11E-06 | 1.01E-05 | 2.48E-06 | 8.35E-06 | 7.23E-06 | 6.95E-06 | 1.91E-02 |
| 3H | Ci | 2.30E-01 | 2.27E-01 | 3.95E-01 | 2.47E-01 | 4.28E-02 | 1.20E-01 | 1.61E-03 | 9.02E-03 | 7.53E-03 | 9.43E-02 | 1.07E-01 | 1.77E-03 | 1.48E+00 |
| 59Ni | Ci | 3.62E-02 | 5.83E-02 | 6.17E-02 | 2.74E-02 | 9.10E-02 | 1.82E-01 | 1.95E-04 | 3.85E-04 | 2.48E-04 | 2.08E-01 | 2.53E-01 | 1.37E-04 | 9.18E-01 |
| 60Co | Ci | 1.60E-02 | 7.49E-03 | 1.08E-02 | 1.37E-02 | 1.26E-02 | 3.99E-02 | 1.16E-04 | 1.29E-04 | 4.66E-05 | 4.64E-02 | 5.64E-02 | 8.24E-05 | 2.04E-01 |
| 63Ni | Ci | 3.02E+00 | 4.82E+00 | 5.13E+00 | 2.26E+00 | 7.55E+00 | 1.51E+01 | 2.38E-02 | 3.56E-02 | 1.87E-02 | 1.73E+01 | 2.11E+01 | 1.67E-02 | 7.63E+01 |
| 79Se | Ci | 2.81E-04 | 2.76E-05 | 5.46E-04 | 8.69E-05 | 2.16E-03 | 6.89E-03 | 4.47E-05 | 1.27E-04 | 9.61E-05 | 5.51E-03 | 6.24E-03 | 3.14E-05 | 2.20E-02 |
| 90Sr | Ci | 2.40E+03 | 1.24E+03 | 4.52E+02 | 2.04E+03 | 8.79E+02 | 8.65E+02 | 7.04E+01 | 1.20E+03 | 1.05E+03 | 1.37E+02 | 1.30E+02 | 4.99E+01 | 1.05E+04 |
| 90Y | Ci | 2.40E+03 | 1.24E+03 | 4.52E+02 | 2.04E+03 | 8.79E+02 | 8.65E+02 | 7.04E+01 | 1.20E+03 | 1.05E+03 | 1.37E+02 | 1.30E+02 | 4.99E+01 | 1.05E+04 |
| 93mNb | Ci | 5.44E-03 | 1.77E-04 | 1.31E-02 | 1.07E-04 | 5.21E-02 | 1.67E-01 | 2.44E-02 | 1.11E-02 | 1.10E-05 | 1.22E-01 | 1.38E-01 | 1.68E-02 | 5.50E-01 |
| 93Zr | Ci | 6.08E-03 | 1.93E-04 | 1.43E-02 | 1.80E-04 | 5.64E-02 | 1.81E-01 | 2.55E-02 | 1.83E-02 | 1.15E-05 | 1.55E-01 | 1.71E-01 | 1.75E-02 | 6.46E-01 |
| 99Tc | Ci | 4.80E-01 | 4.52E-03 | 7.82E-02 | 1.22E+00 | 1.15E+00 | 9.75E-01 | 5.33E-01 | 3.31E-01 | 1.50E-02 | 9.46E-01 | 1.00E+00 | 2.57E-01 | 6.99E+00 |
| SUM | sum | 6.47E+03 | 3.94E+03 | 1.51E+03 | 5.41E+03 | 2.70E+03 | 3.84E+03 | 3.93E+02 | 2.85E+03 | 2.32E+03 | 1.45E+03 | 1.55E+03 | 7.94E+02 | 3.32E+04 |

| Ancillary Equipment Residual Inventory Estimates: Assuming BBI average tank farm waste concentrations | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Assumes 90% retrieval for catch tanks and vaults, see Section 5.1. | | | | | | | | | | | |
| Assumes pipelines are 5% full, See Section 5.3. | | | | | | | | | | | |
| **BX-Farm** | **Weighted** | | **Inventory (kg)** | | | vault | DCRT | | | | |
| **Chemicals** | **Avg. Tank** | **Units** | **BX-302A** | **BX-302B** | **BX-302C** | **244-BXR** | **244-BX** | **Total Tank** | **Div Box/P** | **Pipelines** | **Total BX-A** |
| | **Conc. (kg/kL)** | Vol in kL | 3.14E-01 | 3.79E-01 | 3.18E-01 | 9.46E+00 | 4.20E+00 | 1.47E+01 | 2.32E-01 | 2.84E+00 | 1.77E+01 |
| | | Vol in kgal | 8.30E-02 | 1.00E-01 | 8.40E-02 | 2.50E+00 | 1.11E+00 | 3.88E+00 | 6.14E-02 | 7.50E-01 | 4.69E+00 |
| Al | 5.16E+01 | kg | 1.62E+01 | 1.95E+01 | 1.64E+01 | 4.88E+02 | 2.17E+02 | 7.57E+02 | 1.20E+01 | 1.46E+02 | 9.15E+02 |
| Bi+3 | 1.30E+01 | kg | 4.07E+00 | 4.90E+00 | 4.12E+00 | 1.23E+02 | 5.44E+01 | 1.90E+02 | 3.01E+00 | 3.68E+01 | 2.30E+02 |
| Ca+2 | 2.66E+00 | kg | 8.37E-01 | 1.01E+00 | 8.47E-01 | 2.52E+01 | 1.12E+01 | 3.91E+01 | 6.18E-01 | 7.56E+00 | 4.73E+01 |
| Cl- | 1.83E+00 | kg | 5.73E-01 | 6.91E-01 | 5.80E-01 | 1.73E+01 | 7.67E+00 | 2.68E+01 | 4.24E-01 | 5.18E+00 | 3.24E+01 |
| TIC as CO3 | 1.55E+01 | kg | 4.88E+00 | 5.88E+00 | 4.94E+00 | 1.47E+02 | 6.53E+01 | 2.28E+02 | 3.61E+00 | 4.41E+01 | 2.76E+02 |
| Cr | 3.36E+00 | kg | 1.06E+00 | 1.27E+00 | 1.07E+00 | 3.18E+01 | 1.41E+01 | 4.93E+01 | 7.81E-01 | 9.54E+00 | 5.97E+01 |
| F- | 8.03E+00 | kg | 2.52E+00 | 3.04E+00 | 2.55E+00 | 7.60E+01 | 3.37E+01 | 1.18E+02 | 1.86E+00 | 2.28E+01 | 1.42E+02 |
| Fe+3 | 1.47E+01 | kg | 4.60E+00 | 5.55E+00 | 4.66E+00 | 1.39E+02 | 6.16E+01 | 2.15E+02 | 3.40E+00 | 4.16E+01 | 2.60E+02 |
| Hg+2 | 2.59E-02 | kg | 8.13E-03 | 9.79E-03 | 8.22E-03 | 2.45E-01 | 1.09E-01 | 3.80E-01 | 6.01E-03 | 7.34E-02 | 4.59E-01 |
| K+ | 1.16E+00 | kg | 3.65E-01 | 4.40E-01 | 3.70E-01 | 1.10E+01 | 4.88E+00 | 1.71E+01 | 2.70E-01 | 3.30E+00 | 2.06E+01 |
| La+3 | 3.44E-02 | kg | 1.08E-02 | 1.30E-02 | 1.09E-02 | 3.25E-01 | 1.44E-01 | 5.04E-01 | 7.98E-03 | 9.75E-02 | 6.10E-01 |
| Mn | 9.23E-01 | kg | 2.90E-01 | 3.49E-01 | 2.94E-01 | 8.74E+00 | 3.88E+00 | 1.35E+01 | 2.14E-01 | 2.62E+00 | 1.64E+01 |
| Na+ | 1.75E+02 | kg | 5.51E+01 | 6.64E+01 | 5.58E+01 | 1.66E+03 | 7.37E+02 | 2.57E+03 | 4.07E+01 | 4.98E+02 | 3.11E+03 |
| Ni+2 | 5.61E-01 | kg | 1.76E-01 | 2.12E-01 | 1.78E-01 | 5.31E+00 | 2.36E+00 | 8.24E+00 | 1.30E-01 | 1.59E+00 | 9.96E+00 |
| NO2- | 2.44E+01 | kg | 7.67E+00 | 9.25E+00 | 7.77E+00 | 2.31E+02 | 1.03E+02 | 3.58E+02 | 5.67E+00 | 6.93E+01 | 4.33E+02 |
| NO3- | 2.36E+02 | kg | 7.41E+01 | 8.93E+01 | 7.50E+01 | 2.23E+03 | 9.91E+02 | 3.46E+03 | 5.48E+01 | 6.69E+02 | 4.19E+03 |
| Oxalate | 2.72E+00 | kg | 8.56E-01 | 1.03E+00 | 8.66E-01 | 2.58E+01 | 1.14E+01 | 4.00E+01 | 6.33E-01 | 7.73E+00 | 4.83E+01 |
| Pb+2 | 7.68E-01 | kg | 2.41E-01 | 2.91E-01 | 2.44E-01 | 7.26E+00 | 3.22E+00 | 1.13E+01 | 1.78E-01 | 2.18E+00 | 1.36E+01 |
| PO4-3 | 7.16E+01 | kg | 2.25E+01 | 2.71E+01 | 2.28E+01 | 6.77E+02 | 3.01E+02 | 1.05E+03 | 1.66E+01 | 2.03E+02 | 1.27E+03 |
| Si+4 | 1.83E+01 | kg | 5.75E+00 | 6.93E+00 | 5.82E+00 | 1.73E+02 | 7.69E+01 | 2.69E+02 | 4.25E+00 | 5.19E+01 | 3.25E+02 |
| SO4-2 | 1.52E+01 | kg | 4.77E+00 | 5.75E+00 | 4.83E+00 | 1.44E+02 | 6.39E+01 | 2.23E+02 | 3.53E+00 | 4.31E+01 | 2.70E+02 |
| Sr+2 | 7.82E-01 | kg | 2.46E-01 | 2.96E-01 | 2.49E-01 | 7.40E+00 | 3.28E+00 | 1.15E+01 | 1.82E-01 | 2.22E+00 | 1.39E+01 |
| TOC | 3.64E+00 | kg | 1.14E+00 | 1.38E+00 | 1.16E+00 | 3.44E+01 | 1.53E+01 | 5.34E+01 | 8.44E-01 | 1.03E+01 | 6.45E+01 |
| U(TOTAL) | 1.52E+01 | kg | 4.78E+00 | 5.76E+00 | 4.83E+00 | 1.44E+02 | 6.39E+01 | 2.23E+02 | 3.53E+00 | 4.31E+01 | 2.70E+02 |
| Zr+4 | 1.91E-01 | kg | 5.99E-02 | 7.22E-02 | 6.07E-02 | 1.81E+00 | 8.02E-01 | 2.80E+00 | 4.43E-02 | 5.41E-01 | 3.39E+00 |
| Sum | | kg | 2.13E+02 | 2.56E+02 | 2.15E+02 | 6.41E+03 | 2.85E+03 | 9.94E+03 | 1.57E+02 | 1.92E+03 | 1.20E+04 |

| | Weighted | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BX-Farm | Avg. Tank | | BX-Farm Inventory (Ci) | | | | | | | | |
| Radionucl | Avg. Tank | Units | BX-302A | BX-302B | BX-302C | 244-BXR | 244-BX | Total Tank | Div Box/P | Pipelines | Total BX-A |
| 106Ru | 1.81E-13 | Ci | 5.68E-14 | 6.85E-14 | 5.75E-14 | 1.71E-12 | 7.60E-13 | 2.65E-12 | 4.20E-14 | 5.13E-13 | 3.21E-12 |
| 113mCd | 1.96E-03 | Ci | 6.16E-04 | 7.42E-04 | 6.24E-04 | 1.86E-02 | 8.24E-03 | 2.88E-02 | 4.55E-04 | 5.56E-03 | 3.48E-02 |
| 125Sb | 1.22E-05 | Ci | 3.82E-06 | 4.61E-06 | 3.87E-06 | 1.15E-04 | 5.11E-05 | 1.79E-04 | 2.83E-06 | 3.45E-05 | 2.16E-04 |
| 126Sn | 3.22E-04 | Ci | 1.01E-04 | 1.22E-04 | 1.02E-04 | 3.04E-03 | 1.35E-03 | 4.72E-03 | 7.47E-05 | 9.12E-04 | 5.71E-03 |
| 129I | 5.28E-05 | Ci | 1.66E-05 | 2.00E-05 | 1.68E-05 | 5.00E-04 | 2.22E-04 | 7.75E-04 | 1.23E-05 | 1.50E-04 | 9.37E-04 |
| 134Cs | 1.82E-08 | Ci | 5.73E-09 | 6.91E-09 | 5.80E-09 | 1.73E-07 | 7.67E-08 | 2.68E-07 | 4.24E-09 | 5.18E-08 | 3.24E-07 |
| 137Cs | 3.90E+01 | Ci | 1.23E+01 | 1.48E+01 | 1.24E+01 | 3.69E+02 | 1.64E+02 | 5.73E+02 | 9.06E+00 | 1.11E+02 | 6.93E+02 |
| 137mBa | 3.68E+01 | Ci | 1.16E+01 | 1.39E+01 | 1.17E+01 | 3.49E+02 | 1.55E+02 | 5.41E+02 | 8.56E+00 | 1.05E+02 | 6.54E+02 |
| 14C | 1.29E-03 | Ci | 4.05E-04 | 4.89E-04 | 4.10E-04 | 1.22E-02 | 5.42E-03 | 1.89E-02 | 3.00E-04 | 3.66E-03 | 2.29E-02 |
| 151Sm | 2.23E+00 | Ci | 7.02E-01 | 8.46E-01 | 7.10E-01 | 2.11E+01 | 9.39E+00 | 3.28E+01 | 5.19E-01 | 6.34E+00 | 3.96E+01 |
| 152Eu | 1.72E-04 | Ci | 5.40E-05 | 6.50E-05 | 5.46E-05 | 1.63E-03 | 7.22E-04 | 2.52E-03 | 3.99E-05 | 4.87E-04 | 3.05E-03 |
| 154Eu | 1.32E-02 | Ci | 4.15E-03 | 5.00E-03 | 4.20E-03 | 1.25E-01 | 5.55E-02 | 1.94E-01 | 3.07E-03 | 3.75E-02 | 2.34E-01 |
| 155Eu | 2.30E-03 | Ci | 7.21E-04 | 8.69E-04 | 7.30E-04 | 2.17E-02 | 9.65E-03 | 3.37E-02 | 5.33E-04 | 6.51E-03 | 4.07E-02 |
| 226Ra | 2.89E-08 | Ci | 9.09E-09 | 1.09E-08 | 9.20E-09 | 2.74E-07 | 1.22E-07 | 4.25E-07 | 6.72E-09 | 8.21E-08 | 5.13E-07 |
| 227Ac | 1.28E-05 | Ci | 4.01E-06 | 4.84E-06 | 4.06E-06 | 1.21E-04 | 5.37E-05 | 1.87E-04 | 2.97E-06 | 3.63E-05 | 2.27E-04 |
| 228Ra | 8.38E-05 | Ci | 2.63E-05 | 3.17E-05 | 2.66E-05 | 7.93E-04 | 3.52E-04 | 1.23E-03 | 1.95E-05 | 2.38E-04 | 1.49E-03 |
| 229Th | 1.83E-05 | Ci | 5.75E-06 | 6.93E-06 | 5.82E-06 | 1.73E-04 | 7.69E-05 | 2.69E-04 | 4.25E-06 | 5.20E-05 | 3.25E-04 |
| 231Pa | 2.62E-05 | Ci | 8.23E-06 | 9.92E-06 | 8.33E-06 | 2.48E-04 | 1.10E-04 | 3.85E-04 | 6.08E-06 | 7.43E-05 | 4.65E-04 |
| 232Th | 8.38E-05 | Ci | 2.63E-05 | 3.17E-05 | 2.66E-05 | 7.93E-04 | 3.52E-04 | 1.23E-03 | 1.95E-05 | 2.38E-04 | 1.49E-03 |
| 232U | 8.26E-05 | Ci | 2.60E-05 | 3.13E-05 | 2.63E-05 | 7.82E-04 | 3.47E-04 | 1.21E-03 | 1.92E-05 | 2.34E-04 | 1.47E-03 |
| 233U | 6.09E-03 | Ci | 1.91E-03 | 2.31E-03 | 1.94E-03 | 5.77E-02 | 2.56E-02 | 8.94E-02 | 1.42E-03 | 1.73E-02 | 1.08E-01 |
| 234U | 5.13E-03 | Ci | 1.61E-03 | 1.94E-03 | 1.63E-03 | 4.85E-02 | 2.15E-02 | 7.52E-02 | 1.19E-03 | 1.45E-02 | 9.10E-02 |
| 235U | 2.23E-04 | Ci | 7.01E-05 | 8.44E-05 | 7.09E-05 | 2.11E-03 | 9.37E-04 | 3.27E-03 | 5.18E-05 | 6.33E-04 | 3.96E-03 |
| 236U | 7.45E-05 | Ci | 2.34E-05 | 2.82E-05 | 2.37E-05 | 7.05E-04 | 3.13E-04 | 1.09E-03 | 1.73E-05 | 2.11E-04 | 1.32E-03 |
| 237Np | 1.00E-04 | Ci | 3.15E-05 | 3.80E-05 | 3.19E-05 | 9.50E-04 | 4.22E-04 | 1.47E-03 | 2.33E-05 | 2.85E-04 | 1.78E-03 |
| 238Pu | 4.36E-03 | Ci | 1.37E-03 | 1.65E-03 | 1.39E-03 | 4.13E-02 | 1.83E-02 | 6.40E-02 | 1.01E-03 | 1.24E-02 | 7.74E-02 |
| 238U | 5.07E-03 | Ci | 1.59E-03 | 1.92E-03 | 1.61E-03 | 4.80E-02 | 2.13E-02 | 7.44E-02 | 1.18E-03 | 1.44E-02 | 9.00E-02 |
| 239Pu | 2.61E-01 | Ci | 8.21E-02 | 9.89E-02 | 8.31E-02 | 2.47E+00 | 1.10E+00 | 3.83E+00 | 6.07E-02 | 7.41E-01 | 4.64E+00 |
| 240Pu | 4.96E-02 | Ci | 1.56E-02 | 1.88E-02 | 1.58E-02 | 4.69E-01 | 2.08E-01 | 7.28E-01 | 1.15E-02 | 1.41E-01 | 8.80E-01 |
| 241Am | 1.11E-01 | Ci | 3.48E-02 | 4.19E-02 | 3.52E-02 | 1.05E+00 | 4.66E-01 | 1.63E+00 | 2.57E-02 | 3.14E-01 | 1.97E+00 |
| 241Pu | 1.16E-01 | Ci | 3.65E-02 | 4.40E-02 | 3.70E-02 | 1.10E+00 | 4.89E-01 | 1.71E+00 | 2.70E-02 | 3.30E-01 | 2.06E+00 |
| 242Cm | 7.32E-05 | Ci | 2.30E-05 | 2.77E-05 | 2.33E-05 | 6.92E-04 | 3.07E-04 | 1.07E-03 | 1.70E-05 | 2.08E-04 | 1.30E-03 |
| 242Pu | 2.32E-06 | Ci | 7.28E-07 | 8.77E-07 | 7.37E-07 | 2.19E-05 | 9.74E-06 | 3.40E-05 | 5.38E-07 | 6.58E-06 | 4.11E-05 |
| 243Am | 1.06E-05 | Ci | 3.32E-06 | 4.00E-06 | 3.36E-06 | 1.00E-04 | 4.44E-05 | 1.55E-04 | 2.45E-06 | 3.00E-05 | 1.87E-04 |
| 243Cm | 3.92E-06 | Ci | 1.23E-06 | 1.48E-06 | 1.25E-06 | 3.71E-05 | 1.65E-05 | 5.75E-05 | 9.10E-07 | 1.11E-05 | 6.96E-05 |
| 244Cm | 7.08E-05 | Ci | 2.22E-05 | 2.68E-05 | 2.25E-05 | 6.70E-04 | 2.97E-04 | 1.04E-03 | 1.64E-05 | 2.01E-04 | 1.26E-03 |
| 3H | 8.63E-03 | Ci | 2.71E-03 | 3.27E-03 | 2.74E-03 | 8.16E-02 | 3.62E-02 | 1.27E-01 | 2.00E-03 | 2.45E-02 | 1.53E-01 |
| 59Ni | 6.73E-03 | Ci | 2.11E-03 | 2.55E-03 | 2.14E-03 | 6.37E-02 | 2.83E-02 | 9.88E-02 | 1.56E-03 | 1.91E-02 | 1.19E-01 |
| 60Co | 1.50E-03 | Ci | 4.70E-04 | 5.67E-04 | 4.76E-04 | 1.42E-02 | 6.29E-03 | 2.20E-02 | 3.48E-04 | 4.25E-03 | 2.66E-02 |
| 63Ni | 5.60E-01 | Ci | 1.76E-01 | 2.12E-01 | 1.78E-01 | 5.29E+00 | 2.35E+00 | 8.21E+00 | 1.30E-01 | 1.59E+00 | 9.93E+00 |
| 79Se | 1.60E-04 | Ci | 5.03E-05 | 6.06E-05 | 5.09E-05 | 1.51E-03 | 6.72E-04 | 2.35E-03 | 3.72E-05 | 4.54E-04 | 2.84E-03 |
| 90Sr | 5.85E+01 | Ci | 1.84E+01 | 2.22E+01 | 1.86E+01 | 5.54E+02 | 2.46E+02 | 8.59E+02 | 1.36E+01 | 1.66E+02 | 1.04E+03 |
| 90Y | 5.85E+01 | Ci | 1.84E+01 | 2.22E+01 | 1.86E+01 | 5.54E+02 | 2.46E+02 | 8.59E+02 | 1.36E+01 | 1.66E+02 | 1.04E+03 |
| 93mNb | 4.28E-03 | Ci | 1.34E-03 | 1.62E-03 | 1.36E-03 | 4.05E-02 | 1.80E-02 | 6.28E-02 | 9.94E-04 | 1.21E-02 | 7.59E-02 |
| 93Zr | 5.11E-03 | Ci | 1.61E-03 | 1.93E-03 | 1.63E-03 | 4.84E-02 | 2.15E-02 | 7.50E-02 | 1.19E-03 | 1.45E-02 | 9.07E-02 |
| 99Tc | 5.47E-02 | Ci | 1.72E-02 | 2.07E-02 | 1.74E-02 | 5.18E-01 | 2.30E-01 | 8.03E-01 | 1.27E-02 | 1.55E-01 | 9.71E-01 |
| Sum | | Ci | 6.17E+01 | 7.44E+01 | 6.25E+01 | 1.86E+03 | 8.25E+02 | 2.88E+03 | 4.56E+01 | 5.57E+02 | 3.49E+03 |

## A.3 241-BY Farm Single-Shell Tank and Ancillary Equipment

| Base Case Tank Residual Inventories | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Analyte | units | BY-101 | BY-102 | BY-103 | BY-104 | BY-105 | BY-106 | BY-107 | BY-108 | BY-109 | BY-110 | BY-111 | BY-112 | SUM BY |
| Base Case Vol | kL | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 10.194 | 122 |
| Base Case Vol | kgal | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 2.693 | 32.319 |
| BBI Vol | kgal | 348.5 | 279.0 | 393.1 | 357.2 | 440.7 | 385.7 | 258.4 | 237.8 | 289.3 | 336.3 | 344.8 | 212.9 | 3883.8 |
| BBI Vol | kL | 1319 | 1056 | 1488 | 1352 | 1668 | 1460 | 978 | 900 | 1095 | 1273 | 1305 | 806 | 14700 |
| Al | kg | 3.97E+02 | 4.77E+02 | 5.03E+02 | 4.86E+02 | 3.95E+02 | 3.30E+02 | 6.04E+02 | 1.04E+03 | 6.95E+02 | 3.59E+02 | 4.34E+02 | 3.90E+02 | 6.11E+03 |
| Bi | kg | 3.59E+00 | 1.92E-01 | 1.95E-01 | 4.87E+00 | 4.08E+00 | 2.49E+00 | 2.06E+00 | 3.50E+00 | 1.82E-01 | 4.03E+00 | 1.86E-01 | 2.15E-01 | 2.56E+01 |
| Ca | kg | 3.73E+01 | 9.65E+00 | 1.09E+01 | 2.22E+01 | 2.30E+02 | 1.53E+01 | 1.64E+01 | 5.14E+01 | 3.69E+00 | 5.47E+01 | 1.00E+01 | 1.09E+01 | 4.72E+02 |
| Cl | kg | 1.20E+01 | 3.66E+01 | 1.58E+01 | 4.51E+01 | 1.86E+01 | 3.09E+01 | 4.62E+01 | 2.67E+01 | 3.49E+01 | 4.19E+01 | 2.46E+01 | 3.52E+01 | 3.68E+02 |
| TIC as CO3 | kg | 2.74E+02 | 1.90E+03 | 1.11E+03 | 1.36E+03 | 8.43E+02 | 5.56E+02 | 6.63E+02 | 3.91E+02 | 2.18E+02 | 1.97E+03 | 1.55E+03 | 2.67E+03 | 1.35E+04 |
| Cr | kg | 3.21E+01 | 2.69E+01 | 3.79E+01 | 5.77E+01 | 1.05E+01 | 1.39E+01 | 6.48E+00 | 4.80E+00 | 2.75E+01 | 5.43E+01 | 3.85E+01 | 2.91E+02 | 6.01E+02 |
| F | kg | 1.11E+02 | 2.92E+02 | 2.03E+02 | 8.67E+01 | 4.01E+01 | 9.08E+01 | 6.55E+01 | 1.28E+02 | 4.59E+02 | 8.97E+01 | 1.50E+02 | 1.40E+02 | 1.86E+03 |
| Fe | kg | 7.25E+01 | 1.47E+01 | 2.00E+01 | 8.52E+01 | 5.98E+01 | 4.72E+01 | 4.97E+01 | 1.07E+02 | 1.14E+01 | 8.97E+01 | 7.72E+01 | 4.43E+01 | 6.78E+02 |
| Hg | kg | 1.36E-01 | 6.98E-03 | 7.54E-03 | 1.55E-01 | 1.22E-01 | 9.43E-02 | 7.74E-02 | 2.14E-01 | 5.10E-03 | 1.88E-01 | 7.09E-03 | 1.59E-02 | 1.03E+00 |
| K | kg | 5.02E+01 | 4.31E+01 | 4.41E+01 | 5.87E+01 | 1.82E+01 | 4.09E+01 | 7.38E+01 | 2.12E+01 | 4.46E+01 | 4.72E+01 | 4.00E+01 | 5.29E+01 | 5.35E+02 |
| La | kg | 9.82E-02 | 1.39E-06 | 2.82E-02 | 5.45E-01 | 2.88E-02 | 6.72E-02 | 5.47E-02 | 1.60E-01 | 4.78E-02 | 8.17E-02 | 1.35E-06 | 1.56E-06 | 1.11E+00 |
| Mn | kg | 1.82E+00 | 7.31E-01 | 1.01E+00 | 1.60E+00 | 9.78E-01 | 7.82E-01 | 8.79E-01 | 4.93E+00 | 2.49E+00 | 1.55E+00 | 7.50E-01 | 7.87E-01 | 1.83E+01 |
| Na | kg | 4.27E+03 | 4.09E+03 | 3.80E+03 | 3.54E+03 | 3.81E+03 | 3.08E+03 | 4.19E+03 | 2.83E+03 | 2.99E+03 | 3.37E+03 | 4.01E+03 | 5.22E+03 | 4.52E+04 |
| Ni | kg | 2.16E+01 | 3.68E+00 | 4.71E+00 | 2.15E+01 | 1.58E+01 | 4.01E+01 | 9.72E+00 | 3.23E+01 | 1.95E+00 | 3.21E+01 | 3.78E+00 | 3.96E+00 | 1.91E+02 |
| NO2 | kg | 1.51E+02 | 3.43E+02 | 1.81E+02 | 6.85E+02 | 2.52E+02 | 4.80E+02 | 7.49E+02 | 4.60E+02 | 5.55E+02 | 6.13E+02 | 3.06E+02 | 5.92E+02 | 5.37E+03 |
| NO3 | kg | 6.05E+03 | 1.73E+03 | 3.56E+03 | 3.83E+03 | 7.58E+03 | 4.79E+03 | 3.18E+03 | 2.78E+03 | 1.38E+03 | 1.76E+03 | 2.45E+03 | 1.42E+03 | 4.05E+04 |
| Oxalate | kg | 1.21E+02 | 3.15E+02 | 7.26E+02 | 2.45E+02 | 9.17E+01 | 1.37E+02 | 2.11E+02 | 1.17E+02 | 2.18E+02 | 2.27E+02 | 2.94E+02 | 4.50E+02 | 3.15E+03 |
| Pb | kg | 4.44E+00 | 1.68E+00 | 3.23E+00 | 3.23E+00 | 2.37E+00 | 2.65E+00 | 2.38E+00 | 5.80E+00 | 1.48E+00 | 8.49E+00 | 1.67E+00 | 1.73E+00 | 3.91E+01 |
| PO4 | kg | 1.52E+03 | 3.46E+02 | 5.36E+02 | 2.22E+02 | 2.33E+02 | 1.29E+02 | 2.04E+02 | 3.50E+02 | 6.40E+02 | 2.43E+02 | 4.15E+02 | 2.19E+02 | 5.06E+03 |
| Si | kg | 8.04E+01 | 4.78E+01 | 2.47E+01 | 1.03E+01 | 1.31E+02 | 6.67E+00 | 1.92E+01 | 1.07E+01 | 6.04E+01 | 1.07E+01 | 4.12E+02 | 3.63E+01 | 8.50E+02 |
| SO4 | kg | 4.34E+01 | 6.68E+02 | 2.66E+02 | 3.28E+02 | 1.22E+02 | 1.56E+02 | 2.56E+02 | 3.24E+02 | 8.23E+02 | 3.15E+02 | 5.59E+02 | 4.44E+02 | 4.30E+03 |
| Sr | kg | 2.74E+01 | 1.81E+00 | 2.01E+00 | 4.05E+01 | 2.73E+01 | 1.79E+01 | 1.14E+01 | 5.63E+01 | 1.07E+00 | 2.64E+01 | 1.86E+00 | 1.95E+00 | 2.16E+02 |
| TOC | kg | 5.90E+01 | 9.85E+01 | 2.03E+02 | 1.17E+02 | 5.21E+01 | 6.38E+01 | 6.70E+01 | 6.89E+01 | 8.08E+01 | 9.21E+01 | 9.37E+01 | 1.28E+02 | 1.12E+03 |
| UTOTAL | kg | 6.04E+01 | 6.64E+00 | 8.63E+00 | 6.99E+01 | 5.13E+01 | 4.31E+01 | 4.64E+01 | 1.43E+02 | 4.83E+00 | 8.25E+01 | 6.84E+00 | 5.49E+01 | 5.78E+02 |
| Zr | kg | 3.52E-01 | 2.62E-01 | 3.11E-01 | 2.10E-01 | 1.52E-01 | 1.10E-01 | 1.07E-01 | 2.21E-01 | 6.16E-01 | 2.03E-01 | 2.68E-01 | 2.82E-01 | 3.09E+00 |
| SUM | kg | 1.34E+04 | 1.05E+04 | 1.13E+04 | 1.13E+04 | 1.40E+04 | 1.01E+04 | 1.05E+04 | 8.95E+03 | 8.25E+03 | 9.50E+03 | 1.09E+04 | 1.22E+04 | 1.31E+05 |

| BBI Radionuclide values | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Analyte | units | BY-101 | BY-102 | BY-103 | BY-104 | BY-105 | BY-106 | BY-107 | BY-108 | BY-109 | BY-110 | BY-111 | BY-112 | SUM BY |
| 106Ru | Ci | 7.51E-13 | 6.20E-13 | 6.85E-13 | 6.63E-13 | 7.88E-13 | 6.54E-13 | 5.62E-13 | 5.11E-13 | 4.06E-13 | 5.69E-13 | 6.39E-13 | 6.65E-13 | 7.51E-12 |
| 113mCd | Ci | 9.89E-02 | 9.30E-02 | 9.52E-02 | 9.42E-02 | 1.09E-01 | 8.59E-02 | 8.71E-02 | 7.95E-02 | 8.89E-02 | 7.92E-02 | 9.06E-02 | 1.04E-01 | 1.11E+00 |
| 125Sb | Ci | 9.04E-04 | 7.47E-04 | 8.29E-04 | 7.99E-04 | 9.53E-04 | 7.89E-04 | 6.79E-04 | 6.16E-04 | 4.92E-04 | 6.86E-04 | 7.70E-04 | 8.03E-04 | 9.07E-03 |
| 126Sn | Ci | 1.69E-02 | 1.59E-02 | 1.62E-02 | 1.61E-02 | 1.86E-02 | 1.47E-02 | 1.49E-02 | 1.36E-02 | 1.50E-02 | 1.35E-02 | 1.55E-02 | 1.77E-02 | 1.89E-01 |
| 129I | Ci | 1.62E-03 | 1.53E-03 | 1.61E-03 | 1.55E-03 | 1.78E-03 | 1.03E-03 | 1.73E-03 | 1.42E-03 | 1.72E-03 | 1.52E-03 | 1.48E-03 | 1.71E-03 | 1.87E-02 |
| 134Cs | Ci | 9.89E-07 | 9.30E-07 | 9.52E-07 | 9.42E-07 | 1.09E-06 | 8.59E-07 | 8.75E-07 | 8.01E-07 | 8.81E-07 | 7.97E-07 | 9.06E-07 | 1.04E-06 | 1.11E-05 |
| 137Cs | Ci | 1.12E+03 | 7.14E+02 | 7.26E+02 | 1.01E+03 | 5.99E+02 | 1.23E+03 | 1.33E+03 | 4.38E+02 | 6.66E+02 | 9.45E+02 | 6.97E+02 | 7.97E+02 | 1.03E+04 |
| 137mBa | Ci | 1.06E+03 | 6.75E+02 | 6.85E+02 | 9.50E+02 | 5.66E+02 | 1.16E+03 | 1.26E+03 | 4.15E+02 | 6.28E+02 | 8.89E+02 | 6.58E+02 | 7.51E+02 | 9.70E+03 |
| 14C | Ci | 5.47E-02 | 5.14E-02 | 5.28E-02 | 5.21E-02 | 6.03E-02 | 4.74E-02 | 4.82E-02 | 4.41E-02 | 5.02E-02 | 4.39E-02 | 4.99E-02 | 5.74E-02 | 6.12E-01 |
| 151Sm | Ci | 1.58E+02 | 1.31E+02 | 1.45E+02 | 1.40E+02 | 1.67E+02 | 1.38E+02 | 1.19E+02 | 1.08E+02 | 8.67E+01 | 1.20E+02 | 1.34E+02 | 1.40E+02 | 1.59E+03 |
| 152Eu | Ci | 1.24E-02 | 1.02E-02 | 1.13E-02 | 1.09E-02 | 1.31E-02 | 1.08E-02 | 9.33E-03 | 8.47E-03 | 6.81E-03 | 9.45E-03 | 1.05E-02 | 1.10E-02 | 1.24E-01 |
| 154Eu | Ci | 5.07E-01 | 4.19E-01 | 4.62E-01 | 4.48E-01 | 5.34E-01 | 8.45E-02 | 9.68E-02 | 3.45E-01 | 2.77E-01 | 1.16E-01 | 4.31E-01 | 4.50E-01 | 4.17E+00 |
| 155Eu | Ci | 6.16E-02 | 5.09E-02 | 5.62E-02 | 5.44E-02 | 6.48E-02 | 5.35E-02 | 4.63E-02 | 4.20E-02 | 3.37E-02 | 4.67E-02 | 5.24E-02 | 5.48E-02 | 6.17E-01 |
| 226Ra | Ci | 5.40E-07 | 4.71E-07 | 4.92E-07 | 5.08E-07 | 5.83E-07 | 4.65E-07 | 4.49E-07 | 4.32E-07 | 4.13E-07 | 4.39E-07 | 4.66E-07 | 5.40E-07 | 5.80E-06 |
| 227Ac | Ci | 6.48E-04 | 5.65E-04 | 6.10E-04 | 5.90E-04 | 7.70E-04 | 6.07E-04 | 5.20E-04 | 4.73E-04 | 4.73E-04 | 5.02E-04 | 5.67E-04 | 6.17E-04 | 6.94E-03 |
| 228Ra | Ci | 8.66E-06 | 7.31E-06 | 2.85E-04 | 7.77E-06 | 3.86E-06 | 7.54E-06 | 6.67E-06 | 6.06E-06 | 1.26E-03 | 6.63E-06 | 7.46E-06 | 7.90E-06 | 1.61E-03 |
| 229Th | Ci | 2.27E-06 | 1.91E-06 | 6.27E-05 | 2.03E-06 | 2.41E-06 | 1.98E-06 | 1.75E-06 | 1.59E-06 | 2.75E-04 | 1.74E-06 | 1.95E-06 | 2.07E-06 | 3.57E-04 |
| 231Pa | Ci | 1.41E-03 | 1.33E-03 | 1.36E-03 | 1.35E-03 | 1.56E-03 | 1.23E-03 | 1.25E-03 | 1.13E-03 | 1.26E-03 | 1.14E-03 | 1.30E-03 | 1.48E-03 | 1.58E-02 |
| 232Th | Ci | 8.66E-06 | 7.31E-06 | 2.85E-04 | 7.77E-06 | 3.86E-06 | 7.54E-06 | 6.67E-06 | 6.06E-06 | 1.26E-03 | 6.63E-06 | 7.46E-06 | 7.90E-06 | 1.61E-03 |
| 232U | Ci | 3.47E-05 | 5.54E-04 | 6.60E-04 | 9.20E-04 | 4.84E-04 | 1.86E-04 | 9.01E-04 | 4.58E-04 | 3.81E-04 | 1.05E-03 | 5.72E-04 | 5.96E-04 | 6.80E-03 |
| 233U | Ci | 2.57E-03 | 4.14E-02 | 4.93E-02 | 6.85E-02 | 3.61E-02 | 1.39E-02 | 6.72E-02 | 3.41E-02 | 2.84E-02 | 7.85E-02 | 4.27E-02 | 4.45E-02 | 5.07E-01 |
| 234U | Ci | 1.98E-02 | 2.70E-03 | 3.47E-03 | 2.38E-02 | 1.72E-02 | 1.43E-02 | 1.61E-02 | 4.72E-02 | 1.95E-03 | 2.79E-02 | 2.79E-03 | 1.85E-02 | 1.96E-01 |
| 235U | Ci | 8.81E-04 | 1.00E-04 | 1.29E-04 | 1.03E-03 | 7.52E-04 | 6.32E-04 | 6.84E-04 | 2.10E-03 | 7.27E-05 | 1.21E-03 | 1.04E-04 | 7.97E-04 | 8.48E-03 |
| 236U | Ci | 2.30E-04 | 6.85E-05 | 8.77E-05 | 3.35E-04 | 2.31E-04 | 1.77E-04 | 2.45E-04 | 5.73E-04 | 4.93E-05 | 3.92E-04 | 7.07E-05 | 2.85E-04 | 2.74E-03 |
| 237Np | Ci | 6.14E-03 | 5.38E-03 | 5.72E-03 | 5.62E-03 | 1.12E-03 | 5.33E-03 | 4.97E-03 | 4.53E-03 | 4.29E-03 | 4.78E-03 | 5.39E-03 | 5.89E-03 | 5.92E-02 |
| 238Pu | Ci | 1.64E-03 | 1.14E-02 | 8.15E-03 | 1.25E-02 | 7.52E-03 | 1.75E-03 | 2.67E-03 | 5.33E-03 | 8.62E-03 | 6.86E-03 | 1.47E-02 | 9.87E-03 | 9.10E-02 |
| 238U | Ci | 2.02E-02 | 2.21E-03 | 2.88E-03 | 2.33E-02 | 1.71E-02 | 1.44E-02 | 1.54E-02 | 4.77E-02 | 1.61E-03 | 2.74E-02 | 2.28E-03 | 1.83E-02 | 1.93E-01 |
| 239Pu | Ci | 2.14E-01 | 3.42E-01 | 3.50E-01 | 5.13E-01 | 4.36E-01 | 1.51E-01 | 1.49E-01 | 3.52E-01 | 2.76E-01 | 3.72E-01 | 4.39E-01 | 2.96E-01 | 3.89E+00 |
| 240Pu | Ci | 2.47E-02 | 8.15E-02 | 8.29E-02 | 1.00E-01 | 7.03E-02 | 2.03E-02 | 2.46E-02 | 5.33E-02 | 6.57E-02 | 6.22E-02 | 1.05E-01 | 7.06E-02 | 7.61E-01 |
| 241Am | Ci | 1.88E-01 | 7.84E-01 | 1.84E-01 | 9.27E-01 | 6.42E-01 | 2.41E-01 | 2.03E-01 | 4.63E-01 | 5.05E-01 | 4.42E-01 | 1.00E+00 | 6.67E-01 | 6.25E+00 |
| 241Pu | Ci | 2.57E-02 | 2.80E-01 | 2.33E-01 | 2.96E-01 | 1.67E-01 | 3.44E-02 | 5.94E-02 | 1.14E-01 | 2.17E-01 | 1.54E-01 | 3.60E-01 | 2.43E-01 | 2.18E+00 |
| 242Cm | Ci | 4.49E-05 | 2.38E-04 | 5.58E-05 | 2.72E-04 | 2.09E-04 | 6.02E-05 | 5.67E-05 | 1.26E-04 | 1.55E-04 | 1.22E-04 | 3.06E-04 | 2.04E-04 | 1.85E-03 |
| 242Pu | Ci | 5.26E-07 | 6.24E-06 | 4.69E-06 | 6.55E-06 | 3.65E-06 | 7.40E-07 | 1.30E-06 | 2.48E-06 | 4.75E-06 | 3.38E-06 | 8.05E-06 | 5.39E-06 | 4.77E-05 |
| 243Am | Ci | 3.25E-05 | 3.16E-04 | 7.26E-05 | 3.38E-04 | 2.04E-04 | 5.34E-05 | 6.13E-05 | 1.36E-04 | 2.03E-04 | 1.39E-04 | 4.04E-04 | 2.68E-04 | 2.23E-03 |
| 243Cm | Ci | 4.67E-07 | 5.61E-06 | 1.32E-06 | 5.90E-06 | 4.16E-06 | 8.17E-07 | 1.08E-06 | 2.27E-06 | 3.66E-06 | 2.35E-06 | 7.19E-06 | 4.79E-06 | 3.96E-05 |
| 244Cm | Ci | 8.27E-06 | 1.03E-04 | 2.41E-05 | 1.08E-04 | 7.58E-05 | 1.47E-05 | 1.98E-05 | 4.12E-05 | 6.71E-05 | 4.28E-05 | 1.32E-04 | 8.80E-05 | 7.25E-04 |
| 3H | Ci | 1.44E-01 | 1.34E-01 | 1.54E-01 | 1.36E-01 | 1.58E-01 | 1.24E-01 | 1.26E-01 | 1.16E-01 | 2.06E-01 | 1.15E-01 | 1.30E-01 | 1.49E-01 | 1.69E+00 |
| 59Ni | Ci | 4.22E-01 | 3.49E-01 | 3.87E-01 | 3.75E-01 | 4.45E-01 | 3.67E-01 | 3.19E-01 | 2.92E-01 | 2.47E-01 | 3.23E-01 | 3.59E-01 | 3.76E-01 | 4.26E+00 |
| 60Co | Ci | 9.27E-02 | 7.72E-02 | 8.50E-02 | 8.22E-03 | 5.73E-03 | 9.22E-03 | 1.14E-02 | 6.39E-02 | 5.50E-02 | 9.69E-03 | 7.89E-02 | 8.33E-02 | 5.80E-01 |
| 63Ni | Ci | 3.51E+01 | 2.90E+01 | 3.21E+01 | 3.11E+01 | 3.69E+01 | 3.04E+01 | 2.65E+01 | 2.42E+01 | 2.05E+01 | 2.67E+01 | 2.98E+01 | 3.12E+01 | 3.54E+02 |
| 79Se | Ci | 8.42E-03 | 7.88E-03 | 8.02E-03 | 7.99E-03 | 9.23E-03 | 7.26E-03 | 7.40E-03 | 6.75E-03 | 7.45E-03 | 6.73E-03 | 7.66E-03 | 8.79E-03 | 9.36E-02 |
| 90Sr | Ci | 7.16E+02 | 1.05E+02 | 1.16E+02 | 1.58E+03 | 5.21E+02 | 5.81E+02 | 4.95E+02 | 1.04E+03 | 6.96E+01 | 8.09E+02 | 1.09E+02 | 1.23E+02 | 6.27E+03 |
| 90Y | Ci | 7.16E+02 | 1.05E+02 | 1.16E+02 | 1.58E+03 | 5.21E+02 | 5.81E+02 | 4.95E+02 | 1.04E+03 | 6.96E+01 | 8.09E+02 | 1.09E+02 | 1.23E+02 | 6.27E+03 |
| 93mNb | Ci | 1.94E-01 | 1.75E-01 | 1.83E-01 | 1.80E-01 | 2.24E-01 | 1.77E-01 | 1.63E-01 | 1.47E-01 | 1.49E-01 | 1.52E-01 | 1.73E-01 | 1.92E-01 | 2.11E+00 |
| 93Zr | Ci | 2.21E-01 | 2.08E-01 | 2.12E-01 | 2.10E-01 | 2.43E-01 | 1.91E-01 | 1.95E-01 | 1.78E-01 | 1.96E-01 | 1.77E-01 | 2.02E-01 | 2.31E-01 | 2.46E+00 |
| 99Tc | Ci | 1.19E+00 | 1.12E+00 | 1.14E+00 | 1.13E+00 | 2.81E-01 | 1.03E+00 | 1.04E+00 | 9.55E-01 | 1.05E+00 | 9.53E-01 | 1.09E+00 | 1.24E+00 | 1.22E+01 |
| SUM | sum | 3.81E+03 | 1.76E+03 | 1.82E+03 | 5.30E+03 | 2.41E+03 | 3.72E+03 | 3.73E+03 | 3.07E+03 | 1.54E+03 | 3.60E+03 | 1.74E+03 | 1.97E+03 | 3.45E+04 |

| Ancillary Equipment Residual Inventory Estimates: Assuming BBI average tank farm waste concentrations | | | | | | | |
|---|---|---|---|---|---|---|---|
| Assumes 90% retrieval for catch tanks and vaults, see Section 5.1. | | | | | | | |
| Assumes pipelines are 5% full, See Section 5.3. | | | | | | | |
| **BY-Farm** | **Weighted** | | **Inventory (kg)** | | | | |
| **Chemicals** | **Avg. Tank** | **Units** | **241-BY-ITS** | **Total Tank** | **Div Box/P** | **Pipelines** | **Total BY-Anc.** |
| | **Conc. (kg/kL)** | Vol in kL | 4.28E-01 | 4.28E-01 | 0.00E+00 | 3.75E+00 | 4.17E+00 |
| | | Vol in kgal | 1.13E-01 | 1.13E-01 | 0.00E+00 | 9.90E-01 | 1.10E+00 |
| Al | 4.80E+01 | kg | 2.05E+01 | 2.05E+01 | 0.00E+00 | 1.80E+02 | 2.01E+02 |
| Bi+3 | 2.21E-01 | kg | 9.46E-02 | 9.46E-02 | 0.00E+00 | 8.29E-01 | 9.23E-01 |
| Ca+2 | 4.46E+00 | kg | 1.91E+00 | 1.91E+00 | 0.00E+00 | 1.67E+01 | 1.86E+01 |
| Cl- | 2.91E+00 | kg | 1.24E+00 | 1.24E+00 | 0.00E+00 | 1.09E+01 | 1.22E+01 |
| TIC as CO3 | 1.07E+02 | kg | 4.56E+01 | 4.56E+01 | 0.00E+00 | 4.00E+02 | 4.45E+02 |
| Cr | 4.25E+00 | kg | 1.82E+00 | 1.82E+00 | 0.00E+00 | 1.59E+01 | 1.78E+01 |
| F- | 1.45E+01 | kg | 6.22E+00 | 6.22E+00 | 0.00E+00 | 5.45E+01 | 6.07E+01 |
| Fe+3 | 5.56E+00 | kg | 2.38E+00 | 2.38E+00 | 0.00E+00 | 2.08E+01 | 2.32E+01 |
| Hg+2 | 8.58E-03 | kg | 3.67E-03 | 3.67E-03 | 0.00E+00 | 3.21E-02 | 3.58E-02 |
| K+ | 4.28E+00 | kg | 1.83E+00 | 1.83E+00 | 0.00E+00 | 1.60E+01 | 1.79E+01 |
| La+3 | 9.40E-03 | kg | 4.02E-03 | 4.02E-03 | 0.00E+00 | 3.52E-02 | 3.92E-02 |
| Mn | 1.42E-01 | kg | 6.05E-02 | 6.05E-02 | 0.00E+00 | 5.30E-01 | 5.91E-01 |
| Na+ | 3.66E+02 | kg | 1.57E+02 | 1.57E+02 | 0.00E+00 | 1.37E+03 | 1.53E+03 |
| Ni+2 | 1.62E+00 | kg | 6.94E-01 | 6.94E-01 | 0.00E+00 | 6.08E+00 | 6.78E+00 |
| NO2- | 4.20E+01 | kg | 1.80E+01 | 1.80E+01 | 0.00E+00 | 1.57E+02 | 1.75E+02 |
| NO3- | 3.58E+02 | kg | 1.53E+02 | 1.53E+02 | 0.00E+00 | 1.34E+03 | 1.49E+03 |
| Oxalate | 2.56E+01 | kg | 1.10E+01 | 1.10E+01 | 0.00E+00 | 9.61E+01 | 1.07E+02 |
| Pb+2 | 3.21E-01 | kg | 1.37E-01 | 1.37E-01 | 0.00E+00 | 1.20E+00 | 1.34E+00 |
| PO4-3 | 4.20E+01 | kg | 1.80E+01 | 1.80E+01 | 0.00E+00 | 1.57E+02 | 1.75E+02 |
| Si+4 | 7.41E+00 | kg | 3.17E+00 | 3.17E+00 | 0.00E+00 | 2.78E+01 | 3.09E+01 |
| SO4-2 | 3.31E+01 | kg | 1.42E+01 | 1.42E+01 | 0.00E+00 | 1.24E+02 | 1.38E+02 |
| Sr+2 | 1.79E+00 | kg | 7.65E-01 | 7.65E-01 | 0.00E+00 | 6.70E+00 | 7.47E+00 |
| TOC | 9.22E+00 | kg | 3.94E+00 | 3.94E+00 | 0.00E+00 | 3.45E+01 | 3.85E+01 |
| U(TOTAL) | 4.54E+00 | kg | 1.94E+00 | 1.94E+00 | 0.00E+00 | 1.70E+01 | 1.89E+01 |
| Zr+4 | 2.48E-02 | kg | 1.06E-02 | 1.06E-02 | 0.00E+00 | 9.29E-02 | 1.04E-01 |
| Sum | | kg | 4.63E+02 | 4.63E+02 | 0.00E+00 | 4.06E+03 | 4.52E+03 |

| | Weighted | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| BY-Farm | Avg. Tank | | | | | | | | |
| Radionuclides | Avg. Tank | Units | 241-BY-ITS | | Total Tank | Div Box/Pi | Pipelines | Total BY-Anc. | |
| 106Ru | 6.26E-14 | Ci | 2.68E-14 | | 2.68E-14 | 0.00E+00 | 2.35E-13 | 2.61E-13 | |
| 113mCd | 9.09E-03 | Ci | 3.89E-03 | | 3.89E-03 | 0.00E+00 | 3.40E-02 | 3.79E-02 | |
| 125Sb | 7.55E-05 | Ci | 3.23E-05 | | 3.23E-05 | 0.00E+00 | 2.83E-04 | 3.15E-04 | |
| 126Sn | 1.55E-03 | Ci | 6.64E-04 | | 6.64E-04 | 0.00E+00 | 5.81E-03 | 6.48E-03 | |
| 129I | 1.52E-04 | Ci | 6.51E-05 | | 6.51E-05 | 0.00E+00 | 5.70E-04 | 6.35E-04 | |
| 134Cs | 9.10E-08 | Ci | 3.89E-08 | | 3.89E-08 | 0.00E+00 | 3.41E-07 | 3.80E-07 | |
| 137Cs | 8.44E+01 | Ci | 3.61E+01 | | 3.61E+01 | 0.00E+00 | 3.16E+02 | 3.53E+02 | |
| 137mBa | 7.97E+01 | Ci | 3.41E+01 | | 3.41E+01 | 0.00E+00 | 2.99E+02 | 3.33E+02 | |
| 14C | 5.03E-03 | Ci | 2.15E-03 | | 2.15E-03 | 0.00E+00 | 1.89E-02 | 2.10E-02 | |
| 151Sm | 1.32E+01 | Ci | 5.66E+00 | | 5.66E+00 | 0.00E+00 | 4.95E+01 | 5.52E+01 | |
| 152Eu | 1.04E-03 | Ci | 4.43E-04 | | 4.43E-04 | 0.00E+00 | 3.88E-03 | 4.33E-03 | |
| 154Eu | 3.47E-02 | Ci | 1.48E-02 | | 1.48E-02 | 0.00E+00 | 1.30E-01 | 1.45E-01 | |
| 155Eu | 5.14E-03 | Ci | 2.20E-03 | | 2.20E-03 | 0.00E+00 | 1.93E-02 | 2.15E-02 | |
| 226Ra | 4.78E-08 | Ci | 2.04E-08 | | 2.04E-08 | 0.00E+00 | 1.79E-07 | 2.00E-07 | |
| 227Ac | 5.78E-05 | Ci | 2.47E-05 | | 2.47E-05 | 0.00E+00 | 2.16E-04 | 2.41E-04 | |
| 228Ra | 1.26E-05 | Ci | 5.38E-06 | | 5.38E-06 | 0.00E+00 | 4.71E-05 | 5.25E-05 | |
| 229Th | 2.79E-06 | Ci | 1.19E-06 | | 1.19E-06 | 0.00E+00 | 1.05E-05 | 1.17E-05 | |
| 231Pa | 1.30E-04 | Ci | 5.55E-05 | | 5.55E-05 | 0.00E+00 | 4.87E-04 | 5.42E-04 | |
| 232Th | 1.26E-05 | Ci | 5.38E-06 | | 5.38E-06 | 0.00E+00 | 4.71E-05 | 5.25E-05 | |
| 232U | 5.48E-05 | Ci | 2.34E-05 | | 2.34E-05 | 0.00E+00 | 2.05E-04 | 2.29E-04 | |
| 233U | 4.09E-03 | Ci | 1.75E-03 | | 1.75E-03 | 0.00E+00 | 1.53E-02 | 1.71E-02 | |
| 234U | 1.54E-03 | Ci | 6.57E-04 | | 6.57E-04 | 0.00E+00 | 5.76E-03 | 6.42E-03 | |
| 235U | 6.66E-05 | Ci | 2.85E-05 | | 2.85E-05 | 0.00E+00 | 2.49E-04 | 2.78E-04 | |
| 236U | 2.16E-05 | Ci | 9.22E-06 | | 9.22E-06 | 0.00E+00 | 8.08E-05 | 9.00E-05 | |
| 237Np | 4.74E-04 | Ci | 2.03E-04 | | 2.03E-04 | 0.00E+00 | 1.78E-03 | 1.98E-03 | |
| 238Pu | 7.41E-04 | Ci | 3.17E-04 | | 3.17E-04 | 0.00E+00 | 2.78E-03 | 3.09E-03 | |
| 238U | 1.51E-03 | Ci | 6.47E-04 | | 6.47E-04 | 0.00E+00 | 5.67E-03 | 6.31E-03 | |
| 239Pu | 3.24E-02 | Ci | 1.39E-02 | | 1.39E-02 | 0.00E+00 | 1.21E-01 | 1.35E-01 | |
| 240Pu | 6.28E-03 | Ci | 2.69E-03 | | 2.69E-03 | 0.00E+00 | 2.35E-02 | 2.62E-02 | |
| 241Am | 5.07E-02 | Ci | 2.17E-02 | | 2.17E-02 | 0.00E+00 | 1.90E-01 | 2.12E-01 | |
| 241Pu | 1.78E-02 | Ci | 7.60E-03 | | 7.60E-03 | 0.00E+00 | 6.66E-02 | 7.42E-02 | |
| 242Cm | 1.51E-05 | Ci | 6.44E-06 | | 6.44E-06 | 0.00E+00 | 5.64E-05 | 6.29E-05 | |
| 242Pu | 3.88E-07 | Ci | 1.66E-07 | | 1.66E-07 | 0.00E+00 | 1.45E-06 | 1.62E-06 | |
| 243Am | 1.79E-05 | Ci | 7.66E-06 | | 7.66E-06 | 0.00E+00 | 6.71E-05 | 7.47E-05 | |
| 243Cm | 3.20E-07 | Ci | 1.37E-07 | | 1.37E-07 | 0.00E+00 | 1.20E-06 | 1.34E-06 | |
| 244Cm | 5.85E-06 | Ci | 2.50E-06 | | 2.50E-06 | 0.00E+00 | 2.19E-05 | 2.44E-05 | |
| 3H | 1.39E-02 | Ci | 5.94E-03 | | 5.94E-03 | 0.00E+00 | 5.20E-02 | 5.79E-02 | |
| 59Ni | 3.54E-02 | Ci | 1.52E-02 | | 1.52E-02 | 0.00E+00 | 1.33E-01 | 1.48E-01 | |
| 60Co | 4.51E-03 | Ci | 1.93E-03 | | 1.93E-03 | 0.00E+00 | 1.69E-02 | 1.88E-02 | |
| 63Ni | 2.94E+00 | Ci | 1.26E+00 | | 1.26E+00 | 0.00E+00 | 1.10E+01 | 1.23E+01 | |
| 79Se | 7.69E-04 | Ci | 3.29E-04 | | 3.29E-04 | 0.00E+00 | 2.88E-03 | 3.21E-03 | |
| 90Sr | 5.24E+01 | Ci | 2.24E+01 | | 2.24E+01 | 0.00E+00 | 1.96E+02 | 2.19E+02 | |
| 90Y | 5.24E+01 | Ci | 2.24E+01 | | 2.24E+01 | 0.00E+00 | 1.96E+02 | 2.19E+02 | |
| 93mNb | 1.75E-02 | Ci | 7.47E-03 | | 7.47E-03 | 0.00E+00 | 6.55E-02 | 7.29E-02 | |
| 93Zr | 2.03E-02 | Ci | 8.66E-03 | | 8.66E-03 | 0.00E+00 | 7.59E-02 | 8.46E-02 | |
| 99Tc | 9.75E-02 | Ci | 4.17E-02 | | 4.17E-02 | 0.00E+00 | 3.65E-01 | 4.07E-01 | |
| Sum | | Ci | 1.22E+02 | | 1.22E+02 | 0.00E+00 | 1.07E+03 | 1.19E+03 | |

# APPENDIX B

# CONSTITUENTS OF INTEREST AND DATA QUALITY OBJECTIVES

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# APPENDIX B

## CONSTITUENTS OF INTEREST AND DATA QUALITY OBJECTIVES

Constituents for analysis in RPP-23403, *Single-Shell Tank Component Closure Data Quality Objectives* (Tables B-1 through B-4) were identified in : SST-2025-01, *Single-Shell Tank Dangerous Waste Permit Application Part A Form, Closure Unit Group 4* (A); Title 40, *Code of Federal Regulations* (CFR) Part 268, "Land Disposal Restrictions," Subpart D—Treatment Standards, §268.48, Universal Treatment Standards, (Underlying Hazardous Constituents [U]); Title 10, CFR, Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," Subpart D—Technical Requirements for Land Disposal Facilities, § 61.55, Waste Classification (10 CFR 61.55) (radionuclides); and PNNL-12040, *Regulatory Data Quality Objectives Supporting Tank Waste Remediation System Privatization Project* (W). In addition to analysis for these regulatory standards, major constituents in the sludge (M), constituents for risk assessments (R), and constituents added during Data Quality Objectives (DQO) process meetings (D) are included in RPP-23403.

**Table B-1. Inorganic Constituents in RPP-23403.* (2 sheets)**

| Constituent | Reason Included | Constituent | Reason Included |
|---|---|---|---|
| Aluminum [Al]* | R, W | Phosphorus [P] | M, W |
| Antimony [Sb] | R, U, W | Potassium [K]* | M, W |
| Arsenic [As] | A, U, W | Praseodymium [Pr] | M |
| Barium [Ba] | A, U, W | Rhodium [Rh] | M, W |
| Beryllium [Be] | U, W | Rubidium [Rb] | M |
| Bismuth [Bi]* | M, W | Ruthenium [Ru] | M |
| Boron [B] | M, W | Samarium [Sm] | M |
| Cadmium [Cd] | A, U, W | Selenium [Se] | A, U, W |
| Calcium [Ca]* | M, W | Silicon [Si] | M, W |
| Cerium [Ce] | M | Silver [Ag] | A, U, W |
| Chromium, total [Cr]* | A, U, W | Sodium [Na]* | M, W |
| Cobalt [Co] | R, W | Strontium [Sr]* | R |
| Copper [Cu] | R, W | Sulfur [S] | M |
| Europium [Eu] | M | Tantalum [Ta] | M, W |
| Iron [Fe]* | R, W | Tellurium [Te] | M, W |
| Lanthanum [La]* | M | Thallium [Tl] | U, W |
| Lead [Pb]* | A, U, W | Thorium [Th] | M |
| Lithium [Li] | M, W | Tin [Sn] | M, W |
| Magnesium [Mg] | M, W | Titanium [Ti] | M, W |

**Table B-1. Inorganic Constituents in RPP-23403.* (2 sheets)**

| Constituent | Reason Included | Constituent | Reason Included |
|---|---|---|---|
| Manganese [Mn]* | R, W | Tungsten [W] | M, W |
| Molybdenum [Mo] | M, W | Uranium, total [U]* | R, W |
| Neodymium [Nd] | M | Vanadium [V] | U, W |
| Nickel [Ni]* | U, W | Yttrium [Y] | M, W |
| Niobium [Nb] | M | Zinc [Zn]* | U, W |
| Palladium [Pd] | M | Zirconium [Zr]* | W |
| Chromium (VI) [$Cr^{6+}$] | R | Phosphate [$PO_4^{3-}$]* | W |
| Mercury [Hg]* | A, U, W | Sulfate [$SO_4^{2-}$]* | W |
| Acetate [$C_2H_3O_2^-$] | R | Cyanide [$CN^-$] | A, U, W |
| Bromide [$Br^-$] | W | Ferrocyanide [$Fe(CN)_6^{4-}$] | A, U, W |
| Chloride [$Cl^-$]* | W | Ammonium [$NH_4^+$] | D, W |
| Fluoride [$F^-$] | U, W | pH | D, W |
| Formate [$CHO_2^-$] | R | Weight Percent Water | Dry weight basis |
| Glycolate [$C_2H_3O_3^-$] | R | Bulk Density | Inventory |
| Nitrate [$NO_3^-$]* | R, W | Total Inorganic Carbon* | D, R |
| Nitrite [$NO_2^-$]* | R, W | Total Organic Carbon* | D, R |
| Oxalate [$C_2O_4^{2-}$]* | R | | |

*Standard Best-Basis Inventory constituent.

Notes:
A = Part A constituent (*Single-Shell Tank Dangerous Waste Permit Application Part A Form* [Ecology 2025])
D = Constituents added during Data Quality Objectives process meetings
M = Expected to be major components of the residual sludge and important to material balance calculation
R = Risk assessment constituent
U = Underlying Hazardous Constituent (40 CFR 268, "Land Disposal Restrictions," Subpart D—Treatment Standards, § 268.48, Universal Treatment Standards, *Code of Federal Regulations*, as amended)
W = Constituent in PNNL-12040, *Regulatory Data Quality Objectives Supporting Tank Waste Remediation System Privatization Project*, Table 4.7

Reference: RPP-23403, *Single-Shell Tank Component Closure Data Quality Objectives.*

The DQO Process (EPA/600/R-96/055, *Guidance for the Data Quality Objectives Process EPA QA/G-4*) is a strategic planning approach based on the Scientific Method to prepare for a data collection activity. It provides a systematic procedure to define the criteria that a data collection design should satisfy, including when to collect samples, where to collect samples, the tolerable level of decision error for the study, and how many samples to collect, balancing risk and cost in an acceptable manner. Thus, the DQO Process establishes the analytical requirements for samples.

**Table B-2. Volatile Organic Constituents in RPP-23403. (2 sheets)**

| Constituent | Reason Included |
|---|---|
| 1,1 Dichloroethane | U, W |
| 1,1,1-Trichloroethane | A, U, W |
| 1,1,2,2-Tetrachloroethane | A, U, W |
| 1,1,2,2-Tetrachloroethene | A, U, W |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | A, U, W |
| 1,1,2-Trichloroethane | A, U, W |
| 1,1,2-Trichloroethylene (TCE) | A, U, W |
| 1,1-Dichloroethene | A, U, W |
| 1,2, Dibromoethane (ethylene dibromide) | U, W |
| 1,2-Dichloroethane (ethylene dichloride) | A, U, W |
| 1,2-Dichloroethylene | U |
| 1,2-Dichloropropane | U |
| 1,3-Butadiene | W |
| 1,4-Dioxane | U, W |
| 1-Butanol (n-butyl alcohol) | A, U, W |
| 2-Butanone (MEK) | A, U, W |
| 2-Hexanone | W |
| 2-Methyl-2-propanol | W |
| 2-Methyl-2-propenenitrile | U, W |
| 2-Nitropropane | A |
| 2-Propanone (acetone) | A, U, W |
| 2-Propyl alcohol (isopropyl alcohol) | W |
| 3-Chloropropene (allyl chloride) | U, W |
| 4-Methyl-2-pentanone (MIBK) | A, U, W |
| Acetonitrile | U, W |
| Acrolein (propenal) | U, W |
| Acrylonitrile | U, W |
| Benzene | A, U, W |
| Bromodichloromethane | U |
| Bromoform | U |
| Bromomethane | U, W |
| Carbon disulfide | A, U, W |
| Carbon tetrachloride | A, U, W |

**Table B-2. Volatile Organic Constituents in RPP-23403. (2 sheets)**

| Constituent | Reason Included |
|---|---|
| Chlorobenzene | A, U, W |
| Chloroethane | U, W |
| Chloroethene (vinyl chloride) | A, U, W |
| Chloroform | A, U, W |
| Chloromethane | U, W |
| cis-1,3-Dichloropropene | U, W |
| Cyclohexene | W |
| Dibromochloromethane | U |
| Dichlorodifluoromethane | U, W |
| Dichloromethane (methylene chloride) | A, U, W |
| Diethyl ether | A, U |
| Ethyl Acetate | A, U, W |
| Ethylbenzene | A, U, W |
| Isobutanol | A |
| Methanol | A, U, W |
| m-Xylene | A, W |
| n-Heptane | W |
| n-Hexane | W |
| Oxirane | U, W |
| o-Xylene | A, W |
| Propionitrile (ethyl cyanide) | U, W |
| p-Xylene | A, W |
| Styrene | W |
| Tetrahydrofuran | W |
| Toluene | A, U, W |
| trans-1,3-dichloropropene | U, W |
| Trichlorofluoromethane | A, U, W |
| Xylenes (Mixed isomers of o-, m-, and p-) | A, U |

Notes:
A = Part A constituent (*Single-Shell Tank Dangerous Waste Permit Application Part A Form* [Ecology 2025])
U = Underlying Hazardous Constituent (40 CFR 268, "Land Disposal Restrictions," Subpart D—Treatment Standards, § 268.48, Universal Treatment Standards, *Code of Federal Regulations*, as amended)
W = Constituent in PNNL-12040, *Regulatory Data Quality Objectives Supporting Tank Waste Remediation System Privatization Project*, Table 4.4.

Reference: RPP-23403, *Single-Shell Tank Component Closure Data Quality Objectives.*

**Table B-3. Semivolatile Organic Constituents in RPP-23403. (2 sheets)**

| Constituent | Reason Included |
|---|---|
| 1,1'-Biphenyl | W |
| 1,1-Dimethylhydrazine | W |
| 1,2,4-Trichlorobenzene | U, W |
| 1,3-Dichlorobenzene | U, W |
| 1,4-Dichlorobenzene | U, W |
| 1,4-Dinitrobenzene | U, W |
| 2,4,5-Trichlorophenol | A, U |
| 2,4,6-Trichlorophenol | U |
| 2,4-Dichlorophenol | U |
| 2,4-Dimethylphenol | U |
| 2,4-Dinitrophenol | U |
| 2,4-Dinitrotoluene | A, U |
| 2,6-Bis (tert-butyl)-4-methylphenol | W |
| 2,6-Dinitrotoluene | U |
| 2-Chloronaphthalene | U |
| 2-Chlorophenol | U |
| 2-Ethoxyethanol | A |
| 2-Methylphenol (o-cresol) | A, U |
| 2-Nitroaniline | U |
| 4,6-Dinitro-o-cresol | U |
| 4-Chloro-3-methylphenol | U |
| 4-Chloroaniline | U |
| 4-Methylphenol (p-cresol) | A, U |
| 4-Nitroaniline | U |
| Acenaphthene | U |
| Acetophenone | U, W |
| Aldrin | U, W |
| alpha-BHC | U, W |
| Anthracene | U |
| Benz(a)anthracene | U |
| Benzo(b)fluoranthene | U |
| Benzo(k)fluoranthene | U |
| Benzo[a]pyrene | U, W |
| beta-BHC | U, W |
| bis(2-Chloroethoxy)methane | U |
| bis(2-Chloroethyl)ether | U |
| bis(2-Ethylhexyl)phthalate (DEHP) | U |
| Butylbenzylphthalate | U |
| Chrysene | U |
| Cresol (mixed isomers) | A |

**Table B-3. Semivolatile Organic Constituents in RPP-23403. (2 sheets)**

| Constituent | Reason Included |
|---|---|
| Cyclohexanone | A, W |
| Dibenz[a,h]anthracene | U, W |
| Dieldrin | U, W |
| Diethylphthalate | U |
| Dimethylphthalate | U |
| Di-n-butylphthalate | U |
| Di-n-octylphthalate | U |
| Dinoseb | U, W |
| Endrin | U, W |
| Fluoranthene | U |
| Fluorene | U |
| gamma-BHC (Lindane) | U, W |
| Heptachlor | U, W |
| Hexachlorobenzene | U, W |
| Hexachlorobutadiene | A, U, W |
| Hexachloroethane | A, U |
| Indeno(1,2,3-c,d)pyrene | U |
| Isodrin | U, W |
| m-Cresol (3-Methylphenol) | A, U |
| Methylhydrazine | W |
| N,N-Diphenylamine | U, W |
| Naphthalene | U |
| Nitrobenzene | A, U, W |
| N-Nitrosodimethylamine | U, W |
| n-Nitrosodi-n-butylamine | U |
| N-nitroso-di-n-propylamine | U |
| n-Nitrosomethylethylamine | U |
| n-Nitrosomorpholine | U |
| o-Dichlorobenzene | A, U, W |
| o-Nitrophenol | U |
| Pentachloronitrobenzene (PCNB) | U, W |
| Pentachlorophenol | U, W |
| Phenol | U, W |
| p-Nitrochlorobenzene | W |
| Polychlorinated biphenyls (PCBs) | U, W |
| Aroclor 1016 | U |
| Aroclor 1221 | U |
| Aroclor 1232 | U |
| Aroclor 1242 | U |
| Aroclor 1248 | U |

## Table B-3. Semivolatile Organic Constituents in RPP-23403. (2 sheets)

| Constituent | Reason Included |
|---|---|
| Aroclor 1254 | U |
| Aroclor 1260 | U |
| Pyrene | U |
| Pyridine | A, U, W |
| Toxaphene | U, W |
| Tributyl phosphate | R, W |

Notes:
A = Part A constituent (*Single-Shell Tank Dangerous Waste Permit Application Part A Form* [Ecology 2025])
R = Risk assessment constituent
U = Underlying Hazardous Constituent (40 CFR 268, "Land Disposal Restrictions," Subpart D—Treatment Standards, § 268.48, Universal Treatment Standards, *Code of Federal Regulations*, as amended)
W = Constituent in PNNL-12040, *Regulatory Data Quality Objectives Supporting Tank Waste Remediation System Privatization Project*, Table 4.4

## Table B-4. Radiological Constituents in RPP-23403.*

| Constituent | Reason Included | Constituent | Reason Included |
|---|---|---|---|
| $^{241}$Am | 10 CFR 61.55 | $^{241}$Pu | 10 CFR 61.55 |
| $^{14}$C | 10 CFR 61.55 | $^{242}$Pu | Risk assessment |
| $^{242}$Cm | 10 CFR 61.55 | $^{125}$Sb | Possibly significant in some tanks |
| $^{243/244}$Cm | 10 CFR 61.55 | $^{79}$Se | Risk assessment |
| $^{60}$Co | 10 CFR 61.55 | $^{126}$Sn | Risk assessment |
| $^{137}$Cs | 10 CFR 61.55 | $^{90}$Sr | 10 CFR 61.55 |
| $^{152}$Eu | Potential major activity contributor | $^{99}$Tc | 10 CFR 61.55 |
| $^{154}$Eu | Potential major activity contributor | $^{228}$Th | Possibly significant in some tanks |
| $^{155}$Eu | Potential major activity contributor | $^{230}$Th | Possibly significant in some tanks |
| $^{3}$H | 10 CFR 61.55 | $^{232}$Th | Possibly significant in some tanks |
| $^{129}$I | 10 CFR 61.55 | $^{233}$U | Potential major activity contributor |
| $^{63}$Ni | 10 CFR 61.55 | $^{234}$U | Potential major activity contributor |
| $^{237}$Np | 10 CFR 61.55 | $^{235}$U | Potential major activity contributor |
| $^{231}$Pa | Risk assessment | $^{236}$U | Potential major activity contributor |
| $^{238}$Pu | 10 CFR 61.55 | $^{238}$U | Potential major activity contributor |
| $^{239/240}$Pu | 10 CFR 61.55 | | |

*All standard Best-Basis Inventory constituents. Best-Basis Inventory provides separate inventories for $^{243}$Cm, $^{244}$Cm, $^{239}$Pu and $^{240}$Pu based on estimated isotope ratios and analytical values for $^{243/244}$Cm and $^{239/240}$Pu.

References:
10 CFR 61, "Licensing Requirements for Land Disposal of Radioactive Waste," Subpart D—Technical Requirements for Land Disposal Facilities, § 61.55, Waste classification, *Code of Federal Regulations*, as amended.
RPP-23403, *Single-Shell Tank Component Closure Data Quality Objectives*.

DQOs are qualitative and quantitative statements derived from the outputs of the first six steps of the DQO Process that:

1. Clarify the study objective;

2. Define the most appropriate type of data to collect;

3. Determine the most appropriate conditions from which to collect the data; and

4. Specify tolerable limits on decision errors which will be used as the basis for establishing the quantity and quality of data needed to support the decision.

The DQO Process assures that the type, quantity, and quality of environmental data used in decision making will be appropriate for the intended application, resulting in environmental decisions that are technically and scientifically sound and legally defensible. In addition, the DQO Process guards against committing resources to data collection efforts that do not support a defensible decision.

Appendix I Section 2.1.6 of the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989) Action Plan states, "Before tank waste field retrieval activities are initiated, *[U.S. Department of Energy]* DOE will develop a tank or component specific retrieval data quality objectives (DQO) document for the residual tank waste characterization in coordination with [*the State of Washington Department of Ecology*]. As part of the DQO process, DOE will also develop a sampling and analysis plan for post-retrieval and closure sampling." Similarly, DOE O 435.1, *Radioactive Waste Management* places a requirement on using the DQO Process. Based on the DQOs, sampling and analysis activities were performed in accordance with the following EPA documents:

- EPA/600/R-96/055, *Guidance for the Data Quality Objectives Process EPA QA/G-4*

- EPA/240/B-01/003, *EPA Requirements for Quality Assurance Project Plans EPA QA/R-5*, March 2001 as revised.

The DQOs applied to 241-B, 241-BX and 241-BY Tank Farms single-shell tank samples as specified in applicable tank characterization plans and reports are shown in Table B-5. After waste is retrieved, the remaining tank waste residuals will be sampled and analyzed in accordance with RPP-23403.

**Table B-5. Data Quality Objectives Applied to 241-B, 241-BX and 241-BY Farm Tank Samples.**

| Document Topic and Number | Document Title | Document Scope | Tanks where applied |
|---|---|---|---|
| Safety Screening WHC-SD-WM-SP-004 | Tank Safety Screening Data Quality Objective | Data needs to determine safe storage of tank waste. | All except 241-B-105 and 241-BX-102 |
| Waste Compatibility HNF-SD-WM-DQO-001 | Data Quality Objectives for Tank Farms Waste Compatibility Program | Data needed for waste transfers in the tank farms. | 241-BX-106, 241-BY-103, 241-BY-105, 241-BY-106, 241-BY-109 |
| Ferrocyanide | — | — | 241-BY-103, 241-BY-104, 241-BY-105, 241-BY-106, 241-BY-108, 241-BY-110 |
| Polychlorinated biphenyls (PCBs) RPP-7614 | Data Quality Objectives to Support PCB Management in the Double-Shell Tank System | Data needed to manage PCBs in double-shell tank system and waste feed to the waste treatment plant. | 241-B-101, 241-B-104, 241-B-106, 241-B-107, 241-B-108, 241-B-109, 241-BX-103, 241-BX-105, 241-BX-109, 241-BX-110, 241-BX-111, 241-BX-112, 241-BY-102 – 241-BY-112. (Tank Waste Information Network System PCB data) |
| Organic Solvent HNF-SD-WM-DQO-026 | Data Quality Objective to Support Resolution of the Organic Solvent Safety Issue | Data needs to resolve the safety issue of organic solvent pools in the tanks. | 241-B-102, 241-B-103, 241-B-104, 241-B-105, 241-B-107, 241-B-202, All 241-BX Farm tanks except 241-BX-101, 241-BX-108 and 241-BX-109, All 241-BY Farm tanks |
| Flammable Gas WHC-SD-WM-DQO-004 | Flammable Gas Tank Safety Program: Data Requirements for Core Sample Analysis Developed Through the Data Quality Objectives Process | Data needs to resolve flammable gas safety issue. | 241-BY-101 and 241-BY-109 |
| Historical Data Acquisition Model Verification HNF-SD-WM-DQO-018 | Historical Model Evaluation Data Requirements | Data needs supporting the historical model for tank grouping. | 241-B-104, 241-B-106, 241-B-108, 241-BX-110, 241-BY-103, 241-BY-104, 241-BY-105, 241-BY-106, 241-BY-107, 241-BY-108, 241-BY-110 |
| Organic Complexant WHC-SD-WM-DQO-006 | Data Quality Objective to Support Resolution of the Organic Complexant Safety Issue | Data needs to resolve the organic complexant issue. | All tanks except 241-B-105 and 241-BX-102 |

**Table B-5. Data Quality Objectives Applied to 241-B, 241-BX and 241-BY Farm Tank Samples.**

| Document Topic and Number | Document Title | Document Scope | Tanks where applied |
|---|---|---|---|
| Hazardous Vapor (tanks with vapor samples) WHC-SD-WM-DQO-002 | Data Quality Objectives for Hazardous Vapor Safety Screening | Data needs to assess head space vapor safety. | 241-B-101, 241-B-102, 241-B-103, 241-B-104, 241-B-105, 241-B-107, 241-B-201, 241-B-202, all 241-BX Farm tanks except 241-BX-101, 241-BX-108 and 241-BX-109, all 241-BY Farm tanks. |
| Pretreatment WHC-SD-WM-DQO-022 | Data Needs and Attendant Data Quality Objectives for Tank Waste Pretreatment and Disposal | Data needs to support enhanced sludge washing, solids/liquid separation, cesium removal, strontium removal, transuranic waste removal, and technetium removal. | 241-B-103, 241-B-104, 241-B-106, 241-B-110, 241-BX-103, 241-BX-107, 241-BX-110, 241-BY-104, 241-BY-105, 241-BY-106, 241-BY-108, 241-BY-110 |

## REFERENCES

10 CFR 61, "Licensing Requirements for Land Disposal of Radioactive Waste," Subpart D—Technical Requirements for Land Disposal Facilities, § 61.55, Waste classification, *Code of Federal Regulations*, as amended.

40 CFR 268, "Land Disposal Restrictions," Subpart D—Treatment Standards, § 268.48, Universal Treatment Standards, Code of Federal Regulations, as amended.

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EPA/240/B-01/003, 2001, *EPA Requirements for Quality Assurance Project Plans EPA QA/R-5*, U.S. Environmental Protection Agency, Office of Environmental Information, Washington, D.C.

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HNF-SD-WM-DQO-001, 2016, *Data Quality Objectives for Tank Farms Waste Compatibility Program*, Rev. 23, Washington River Protection Solutions, LLC, Richland, Washington.

HNF-SD-WM-DQO-018, 1997, *Historical Model Evaluation Data Requirements*, Rev. 2, Lockheed Martin Hanford Corporation, Richland, Washington.

HNF-SD-WM-DQO-026, 1997, *Data Quality Objective to Support Resolution of the Organic Solvent Safety Issue*, Rev. 0, DE&S Hanford, Inc./Lockheed Martin Hanford Corporation/ARES Corporation, Richland, Washington.

PNNL-12040, 1998, *Regulatory Data Quality Objectives Supporting Tank Waste Remediation System Privatization Project*, Rev. 0, Pacific Northwest National Laboratory, Richland, Washington.

RPP-23403, 2025, *Single-Shell Tank Component Closure Data Quality Objectives*, Rev. 8, Hanford Tank Waste Operations and Closure LLC, Richland, Washington.

RPP-7614, 2002, *Data Quality Objectives to Support PCB Management in the Double-Shell Tank System*, Rev. 3, CH2M HILL Hanford Group, Inc., Richland, Washington.

SST-2025-01, 2025, *Single-Shell Tank System Dangerous Waste Permit Application Part A Form, Closure Unit Group 4*, State of Washington Department of Ecology, Olympia, Washington.

WHC-SD-WM-DQO-002, 1995, *Data Quality Objectives for Hazardous Vapor Safety Screening*, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-WM-DQO-004, 1995, *Flammable Gas Tank Safety Program: Data Requirements for Core Sample Analysis Developed Through the Data Quality Objectives Process*, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-WM-DQO-006, 1995, *Data Quality Objective to Support Resolution of the Organic Complexant Safety Issue*, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-WM-DQO-022, 1995, *Data Needs and Attendant Data Quality Objectives for Tank Waste Pretreatment and Disposal*, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

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