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

TRADEMARK DISCLAIMER: Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States government or any agency thereof or its contractors or subcontractors. Printed in the United States of America.

Release Stamp

DATE: Jul 29,2026 HANFORD RELEASE

1. **Doc No:** RPP-RPT-66354 **Rev.** 00

2. **Title:**
Data Usability Assessment for 241-S Tank Farm and the East Polygon Vadose Zone

3. **Project Number:** ☒ N/A

4. **Design Verification Required:** ☐ Yes ☒ No

5. **USQ Number:** ☒ N/A RPP-27195

6. **PrHA Number** **Rev.** ☒ N/A

7. **Technical Baseline Document:** ☐ Yes ☒ No **Design Authority Designator**

Clearance Review Restriction Type: public

8. **Approvals**

Title	Name	Signature	Date
Clearance Review	Meinecke, Kathryn R	*Meinecke, Kathryn R*	07/29/2026
Document Control Approval	Sandoval, Sierra D	*Sandoval, Sierra D*	07/28/2026
Originator	McGuire, Mickey D	*McGuire, Mickey D*	07/28/2026
Responsible Manager	Klages, Deanna L	*Klages, Deanna L*	07/28/2026

9. **Description of Change and Justification**

Initial issue.

10. **TBDs or Holds** ☒ N/A

11. **Related Structures, Systems, and Components**

a. **Related Building/Facilities** ☐ N/A	b. **Related Systems** ☒ N/A	c. **Related Equipment ID Nos. (EIN)** ☒ N/A
241-S		

12. **Impacted Documents – Engineering** ☒ N/A

Document Number	Rev.	Title

13. **Impacted Documents (Outside SPF):**

N/A

14. **Related Documents** ☐ N/A

Document Number	Rev.	Title
RPP-PLAN-65977	00	Phase 2 RCRA Facility Investigation/Corrective Measures Study Work Plan for Waste Management Area S-SX
RPP-RPT-64722	00	Data Quality Objectives for Vadose Zone Characterization at Waste Management Area S-SX

15. **Distribution**

Name	Organization
Blackwell, Becky	TF PROGRAMS DIVISION
Castellanos, Melissa	DIGITAL STRATEGY & PLANNING
Klages, Deanna L	CLOSURE REGULATORY
McGuire, Mickey D	CLOSURE REGULATORY
Rahman, Md M	CLOSURE RISK & PERF ASSESSMENT
Schuyler, Kimberly	WELL COORDINATION & PLANNING
Singleton, Kristin M	CLOSURE REGULATORY

RPP-RPT-66354
Revision 0

Data Usability Assessment for 241-S Tank Farm and East Polygon Exposure Areas

Prepared by

M. D. McGuire
M. Castellanos
Hanford Tank Waste Operations and Closure, LLC

R. C. Brimberry
Freestone Environmental Services, Inc.

Date Published
July 2026

Prepared for the U.S. Department of Energy
Hanford Field Office

Contract No. 89303324DEM000096

Approved for Public Release;
Further Dissemination Unlimited

This page intentionally left blank.

CONTENTS

1.0 INTRODUCTION 1-1

1.1 PURPOSE 1-2

1.2 SCOPE 1-2

1.3 SAMPLING DESIGN 1-2

1.4 DATA QUALITY REQUIREMENTS 1-5

1.4.1 Analytical Methods 1-5

1.4.2 Analytical Requirements 1-7

1.4.3 Laboratory Quality Requirements 1-7

1.4.4 Laboratory Information 1-8

1.4.5 Data Qualifiers 1-8

1.4.6 Field Quality Requirements 1-8

1.4.7 Laboratory Quality Requirements 1-9

2.0 DATA VERIFICATION 2-1

2.1 DATA VERIFICATION PROCESS 2-1

2.2 DATA VERIFICATION RESULTS SUMMARY 2-1

3.0 DATA VALIDATION 3-1

3.1 DATA VALIDATION SUMMARY 3-1

3.2 DATA VALIDATION RESULTS 3-1

3.2.1 Major Deficiencies 3-1

3.2.2 Minor Deficiencies 3-2

3.2.3 Qualifiers Applied to the Data Set 3-2

4.0 DATA QUALITY INDICATOR EVALUATION 4-1

4.1 SENSITIVITY (REQUIRED DETECTION LIMITS) 4-1

4.2 HOLDING TIME 4-3

4.3 FIELD PRECISION (FIELD DUPLICATES) 4-4

4.4 EQUIPMENT BLANKS AND FIELD BLANKS 4-4

4.5 FIELD TRANSFER BLANKS 4-5

4.6 METHOD BLANKS 4-6

4.7 LABORATORY PRECISION 4-6

4.8 LABORATORY ACCURACY 4-7

4.8.1 Laboratory Control Samples. 4-7

4.8.2 Matrix Spike Recovery 4-7

4.9 SUMMARY OF DATA QUALITY INDICATOR EVALUATION 4-8

4.9.1 Precision 4-8

4.9.2 Accuracy/Bias 4-9

4.9.3 Representativeness 4-12

4.9.4 Comparability 4-12

4.9.5 Completeness 4-12

4.9.6 Sensitivity 4-13

5.0 DATA QUALITY ASSESSMENT 5-1

6.0 CONCLUSION 6-1

7.0 REFERENCES 7-1

APPENDIX A ..... A-i

APPENDIX B ..... B-i

APPENDIX C ..... C-i

FIGURES

Figure 1-1. Waste Management Area S-SX Study Area 1-3
Figure A-1. Planned and Completed Direct Push Location for 241-S and East Polygon A-1

TABLES

Table 1-1. Summary of Sample Results Evaluated in this Data Usability Assessment 1-4
Table 1-2. Soil Sampling Analytical Method Requirements for WMA S-SX (3 sheets) 1-5
Table 1-3. Soil Field Quality Control Samples 1-8
Table 1-4. Laboratory Quality Control Samples 1-9
Table 4-1. Nondetect Sample Results Exceeding Two Times the SAP RDL (2 Sheets) 4-2
Table 4-2. Sample Results Exceeding Two Times Their Required Holding Time. 4-3
Table 4-3. Field Duplicate Pairs Exceeding 30 Percent Relative Percent Difference 4-4
Table 4-4. Analytical Results with Potential Sample Handling Bias 4-5
Table 4-5. Method Blank Detections 4-6
Table 4-6. Sample Results with LCS Outside SAP and Laboratory Control Limits 4-7
Table 4-7. Sample Results with MS Outside SAP and Laboratory Control Limits. 4-8
Table 4-8. Data Qualification Resulting from Accuracy/Bias Evaluation (3 sheets) 4-10
Table 4-9. Analyses Cancelled Due to Low Sample Recovery 4-13
Table A-1. Sample Interval Information (12 sheets) A-2
Table B-1. Data Qualifiers (3 sheets) B-1
Table C-1. Summary of Data Validation Qualification for Soil Samples (3 sheets) C-1

This page intentionally left blank.

ACRONYMS

ASTM	American Society for Testing and Materials
CAS	Chemical Abstracts Service
DUA	data usability assessment
DUP	duplicate
DQI	data quality indicator
EB	equipment blank
EPA	U.S. Environmental Protection Agency
FB	field blank
ft bgs	feet below ground surface
FTB	field transfer blank
GC/ECD	gas chromatography/electron capture detector
GC/MS	gas chromatography/mass spectrometry
H2C	Hanford Tank Waste Operations & Closure, LLC
HEIS	Hanford Environmental Information System
ICP/AES	inductively coupled plasma/atomic emission
ICP/MS	inductively coupled plasma/mass spectrometry
IDL	instrument detection limit
LCD	laboratory control sample duplicate
LCS	laboratory control sample
MDA	minimum detectable activity
MDL	method detection limit
MS	matrix spike
MSD	matrix spike duplicate
NA	not applicable
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PQL	practical quantitation limit
QA	quality assurance
QC	quality control
RCRA	*Resource Conservation and Recovery Act*
RDL	required detection limit
RPD	relative percent difference

SAP	sampling and analysis plan
SIM	selected ion monitoring
SVOC	semivolatile organic compound
TIC	tentatively identified compound
µg/kg	microgram per kilogram
VOC	volatile organic compound
WMA	Waste Management Area

1.0 INTRODUCTION

This data usability assessment (DUA) provides a detailed evaluation of laboratory data generated in accordance with the sampling and analysis plan (SAP) for the Waste Management Area (WMA) S-SX as described in RPP-PLAN-65977, *Phase 2 RCRA Facility Investigation / Corrective Measures Study Work Plan for Waste Management Area S-SX*, Appendix D. The 241-S Tank Farm and East Polygon are two of the three exposure areas within the WMA S-SX study area boundary selected for supplemental characterization sampling. Field sampling, laboratory analysis, data verification, and third-party data validation have been completed for 241-S and East Polygon exposure areas. Supplemental characterization for 241-SX Tank Farm, the third exposure area within WMA S-SX, is ongoing and is not included in this report. Consolidated waste site 200-W-96-A includes the contaminated soil within the WMA S-SX study area located within the Hanford Site's Central Plateau Inner Area.

The purpose of the data presented in this DUA is to provide a comprehensive definition of the nature and extent of contamination at the 241-S Tank Farm and East Polygon exposure areas. This information will support the determination of whether there is a basis for action resulting from human health and ecological risk assessments and evaluation of groundwater protection.

A judgmental (focused) sampling design was implemented in the field; therefore, the data quality indicator (DQI) attributes of precision, accuracy/bias, representativeness, comparability, completeness, and sensitivity were evaluated based on the following guidance and method references:

- EPA/240/R-02/004, *Guidance on Environmental Data Verification and Data Validation EPA QA/G-8*
- EPA IT/IM Directive, *Quality Assurance Project Plan Guidance*
- SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*

Data verification and data validation are integral components of the DQI evaluation process. The Hanford Tank Waste Operations & Closure, LLC (H2C) used the results of the DQI evaluation process to determine whether the data quality objectives established for this characterization activity have been met.

This report documents the following components of the DUA:

- Section 1: Introduction
- Section 2: Data Verification
- Section 3: Data Validation
- Section 4: Data Quality Indicator Evaluation
- Section 5: Data Quality Assessment
- Section 6: Conclusion

1.1 PURPOSE

The purpose of this DUA is to evaluate the analytical integrity and usability of soil sample data collected for the 241-S Tank Farm and East Polygon exposure areas within the WMA S-SX study area.

The assessment follows the requirements in the SAP and provides the basis for determining whether the data are suitable for use in risk evaluation, conceptual site model refinement, and support of future corrective measures decisions.

1.2 SCOPE

This DUA addresses laboratory and field quality control, verification and validation outcomes, and DQI performance for soil samples collected from 241-S and East Polygon exposure areas under the supplemental characterization program. The assessment focuses on whether the data type, quality, and quantity meet the project objectives identified in the SAP.

1.3 SAMPLING DESIGN

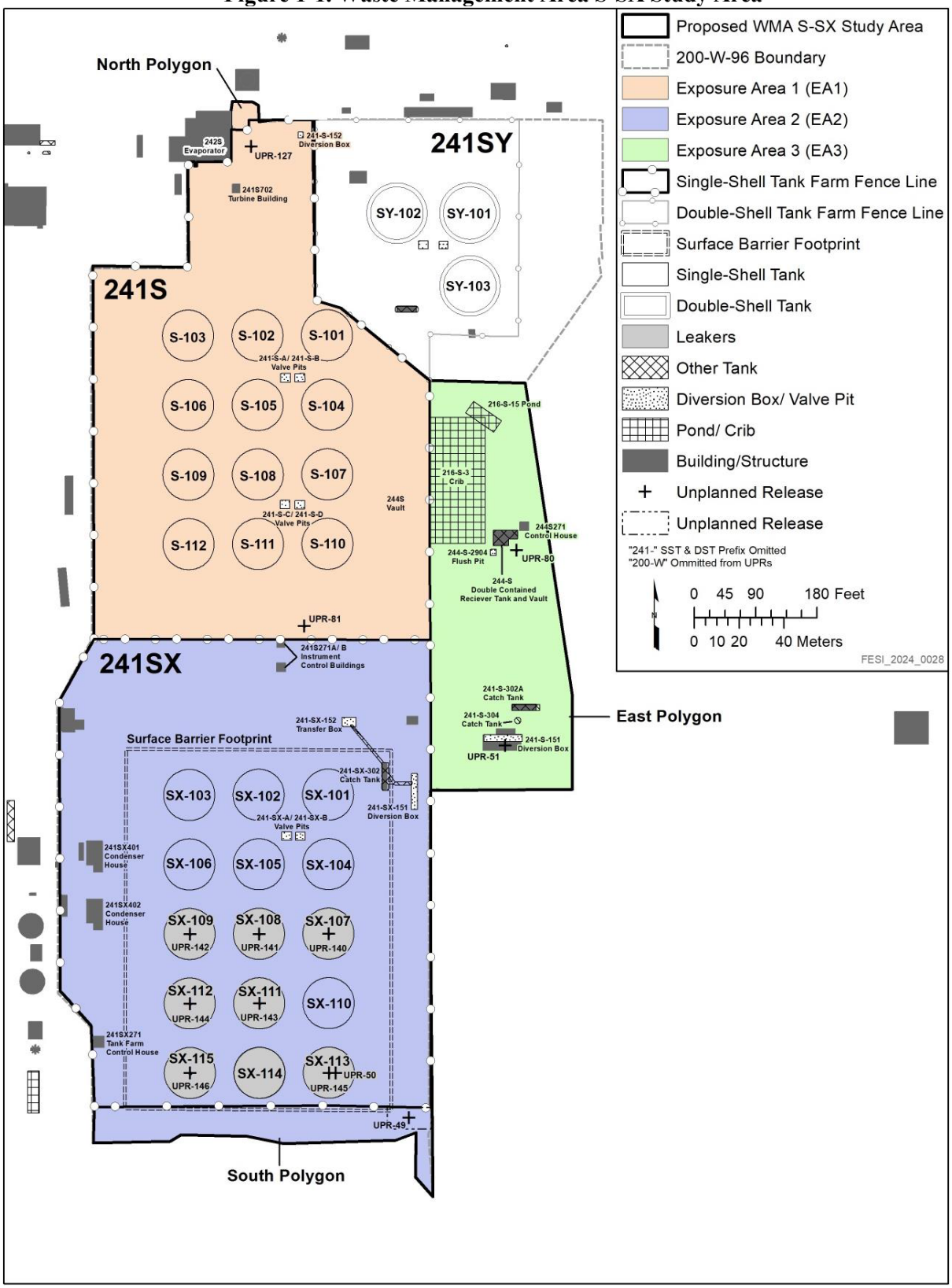
The WMA S-SX study area encompasses the 241-S Tank Farm, 241-SX Tank Farm, and adjacent areas identified in the SAP as requiring vadose zone characterization to support RCRA Facility Investigation activities. Historical operations and releases at WMA S-SX are summarized in RPP-PLAN-65977.

The WMA S-SX study area includes the soil within each exposure area as shown in Figure 1-1 and summarized as follows:

- **Exposure Area 1**: Soil within the 241-S Tank Farm fence line including the North Polygon.
- **Exposure Area 2**: Soil within the 241-SX Tank Farm fence line including the South Polygon.
- **Exposure Area 3**: Soil within the East Polygon, which is adjacent to the 241-S Tank Farm and 241-SX Tank Farm fence line and within 200-W-96.

The WMA S-SX study area does not include the soil within the neighboring 241-SY Tank Farm fence line or the portion of 200-W-96 located east of the 241-SY Tank Farm. The 241-SY Tank Farm is part of the Hanford Site double-shell tank system and is still active.

Figure 1-1. Waste Management Area S-SX Study Area



Source: Figure D-1 in RPP-PLAN-65977, *Phase 2 RCRA Facility Investigation/Corrective Measures Study Work Plan for Waste Management Area S-SX*, Appendix D.

Soil samples were collected throughout EA 1 and EA 3 to ensure proper spatial coverage using a judgmental sampling strategy. Additionally, soil samples were collected targeting locations with known or potential releases. Detailed interval-specific information, direct push depths, and sampling deviations are provided in RPP-RPT-66126, *Completion Report for 241-S Farm and East Polygon Soil Samples*. A concise comparison of the two exposure areas evaluated in this DUA is included in Table 1-1.

Table 1-1. Summary of Sample Results Evaluated in this Data Usability Assessment

Exposure Area	Total Sample Locations	Sample Depth (ft bgs)	Number of Samples for Each Location	Total Number of Samples
1	Shallow = 10 Deep = 5	Shallow = 0 to 15 Deep = Up to ~150	Shallow = 3 Deep = 8 to 9	70-75
3	Shallow = 6 Deep = 1			26-27

ft bgs = feet below ground surface

Field documentation in RPP-RPT-66126 confirms that two surface samples were not collected due to asphalt at the designated locations and that four direct push sample intervals were not collected due to no recovery from the sample liner. Multiple attempts were made to collect all soil samples; however, the dry, loose soil would drop out of the driven core tube samplers before retrieval at the surface. As a result of insufficient sample recovery, three composite analyses were not performed. There were also two deviations in the number of direct push locations for sample locations due to inability to push at the original locations. Characterization deviation forms in RPP-RPT-66126 document deviations from the SAP where samples were not collected, analyses were not performed, or the number of direct push locations changed. All characterization deviation forms were discussed with and concurred upon by H2C, the U.S. Department of Energy Hanford Field Office, and Washington State Department of Ecology.

The necessary field quality control (QC) samples including field sample duplicate, field blank (FB), field transfer blank (FTB), and equipment blank (EB) were collected at the frequency identified in the SAP.

The SAP describes detailed sample location information including depth, field activities, and data gaps addressed for each location.

Additional sample design implementation is provided in Appendix A. Figure A-1 includes the planned versus completed direct push locations. Table A-1 includes the sample interval, depth, field and composite sample numbers, and sample recovery for each sample location.

1.4 DATA QUALITY REQUIREMENTS

The SAP established analytical and laboratory quality assurance (QA) and QC requirements for soil samples collected at the 241-S Tank Farm and East Polygon exposure areas.

The laboratory sample results discussed in this DUA were downloaded from the Hanford Environmental Information System (HEIS) database on January 5, 2026. For this set of data, a total of 304 soil samples were submitted for laboratory analysis, yielding 9,781 analytical laboratory results for SAP required constituents. The soil samples were analyzed for all constituents requested in the SAP at the Hanford Site 222-S Laboratory near Richland, Washington; GEL Laboratories, LLC, in Charleston, South Carolina; or Cape Fear Analytical, LLC, in Wilmington, North Carolina, which generated 100 percent of the analytical laboratory results discussed in this assessment.

1.4.1 Analytical Methods

Samples were analyzed using the methods listed in Table 1-2 Both multi- and single-component method-based analyses were used. Multi-component method-based analyses are those typically based on U.S. Environmental Protection Agency (EPA) methods, as applicable, that yield concentration data for multiple analytes in a single analysis. The analytes may include both target and non-target analytes. Single-component method-based analyses are those based on EPA methods, as applicable, that yield concentration data for a single-target analyte in a single analysis. Sample results were reported in the HEIS database.

Table 1-2. Soil Sampling Analytical Method Requirements for WMA S-SX (3 sheets)

Primary Method (Preparation Method)[a]	Constituent/Physical Property
6010 ICP/AES (acid)	Aluminum, Antimony, Barium, Beryllium, Boron, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Potassium, Silver, Sodium, Strontium, Sulfur, Tin, Zinc
6020 ICP/MS (acid)	Arsenic, Bismuth, Cadmium, Cobalt, Lithium, Nickel, Selenium, Thallium, Thorium, Uranium, Vanadium, Zirconium
7471 Cold vapor atomic absorption (acid)	Mercury
7196 Colorimetric (water)	Hexavalent Chromium
9056 Ion chromatography (water)	Bromide, Chloride, Fluoride, Nitrate[b], Nitrite[b], Phosphate
9012 Colorimetric	Cyanide
8081 GC/ECD	4,4′-DDD, 4,4′-DDE, 4,4′-DDT, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, Chlordane, Dieldrin, Endrin, Heptachlor, Heptachlor epoxide
9045	pH
9060	Total Organic Carbon

Table 1-2. Soil Sampling Analytical Method Requirements for WMA S-SX (3 sheets)

Primary Method (Preparation Method)[a]	Constituent/Physical Property
Gamma energy analysis (direct)	Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Tin-126
Low energy gamma counting (fusion)	Iodine-129
Liquid scintillation (acid)	Technetium-99
Liquid scintillation (water)	Carbon-14, Nickel-63, Plutonium-241, Selenium-79, Tritium
Alpha energy analysis (acid)	Americium-241, Curium-243/244, Neptunium-237, Plutonium-238, Plutonium-239/240, Uranium-233/234, Uranium-235/236, Uranium-238
Beta gas proportional counting (acid)	Strontium-90
Gravimetric	Percent solids[c]
Gravimetric	Percent water[c]
Gravimetric	Bulk (sediment) density[c]
ASTM D7928, ASTM D6913	Particle size distribution[c]
Analyses at Select Locations Only	
1668 HRMS (PCB Congeners)	3,3',4,4'-Tetrachlorobiphenyl, 3,4,4',5-Tetrachlorobiphenyl, 2,3,3',4,4'-Pentachlorobiphenyl, 2,3,4,4',5-Pentachlorobiphenyl, 2,3',4,4',5-Pentachlorobiphenyl, 2',3,4,4',5-Pentachlorobiphenyl, 3,3',4,4',5-Pentachlorobiphenyl, 2,3,3',4,4',5-Hexachlorobiphenyl, 2,3,3',4,4',5'-Hexachlorobiphenyl, 2,3',4,4' ,5,5'-Hexachlorobiphenyl, 3,3',4,4',5,5'-Hexachlorobiphenyl, 2,3,3',4,4',5,5'-Heptachlorobiphenyl
8270 GC/MS-SIM (acid)	Acenaphthene, Benzo(a)pyrene, Dibenz(a,h)anthracene, Fluoranthene, Naphthalene, Pyrene, Hexachlorobenzene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Indeno(1,2,3-cd)pyrene
8270 GC/MS (SVOC)	Tributyl phosphate
8260 GC/MS (VOC)	4-Methyl-2-pentanone (MIBK, hexone)

[a] Equivalent methods may have been used by the laboratory with prior approval by the Project Manager. The most current version/revision of methods and/or test plans are preferred.

[b] Analysis for nitrate (CAS number 14797-55-8) and nitrite (CAS number 14797-65-0) will be performed by the laboratory. Nitrogen in nitrate and nitrogen in nitrite will be determined from nitrate and nitrite results.

[c] Physical properties are not evaluated in this report.

ASTM = American Society for Testing and Materials
CAS = Chemical Abstracts Service
GC/ECD = gas chromatography/electron capture detector
GC/MS = gas chromatography/mass spectrometry
ICP/AES = inductively coupled plasma/atomic emission spectrometry
ICP/MS = inductively coupled plasma/mass spectrometry
PCB = polychlorinated biphenyl
SIM = selected ion monitoring
SVOC = semivolatile organic compounds
VOC = volatile organic compound

Table 1-2. Soil Sampling Analytical Method Requirements for WMA S-SX (3 sheets)

Primary Method (Preparation Method)[a]	Constituent/Physical Property

References:
ASTM D6913, *Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis*.
ASTM D7928, *Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis*.
EPA/600/S4-86/024, *Development of Standard Methods for the Collection and Analysis of Precipitation,* "Method 300.7, Dissolved Sodium, Ammonium, Potassium, Magnesium, and Calcium in Wet Deposition by Chemically Suppressed Ion Chromatography."
RPP-PLAN-65977, *Phase 2 RCRA Facility Investigation / Corrective Measures Study Work Plan for Waste Management Area S-SX*, Appendix D.
SW-846, *Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods*.

1.4.2 Analytical Requirements

The required detection limits (RDL) for each constituent was established in the SAP based on human health, ecological, and groundwater-protection risk thresholds. They are defined in Table D5-1 of the SAP.

1.4.3 Laboratory Quality Requirements

The QA/QC requirements govern nearly all aspects of analytical laboratory operation, including instrument procurement, maintenance, calibration, and operation. Laboratory requirements for internal QC checks are performed as appropriate for the analytical method at a rate of one QC check sample per sample batch or one per 20 samples (5%), whichever is more frequent. Laboratory internal QC checks include the following:

- Laboratory Contamination. Each analytical batch contains a laboratory method blank. The method blank is used to evaluate false positive results in samples caused by contamination during handling at the laboratory.
- Analytical Accuracy. A laboratory control sample (LCS) and matrix spike (MS) are analyzed to assess general method performance based on the ability of the laboratory to successfully recover target analytes from a control matrix or environmental sample matrix, respectively. LCS is typically an independent standard prepared at a concentration within the calibration range. MS is an aliquot of a sample from the analytical batch to which a known concentration of target analytes has been added before sample preparation. The measured concentration of the LCS and MS are compared to the target concentration, and the percent recovery is calculated. This recovery percentage serves as an indicator of analytical accuracy.
- Analytical Precision. Duplicate samples are analyzed for each analytical batch including a laboratory sample duplicate, matrix spike duplicate (MSD), and laboratory control sample duplicate (LCD). The duplicate sample results are compared to the original sample results, which are evaluated as relative percent differences (RPD) and are used to assess analytical precision.

Laboratories are also subject to periodic audits of laboratory performance, systems, and overall program. No audits were performed specific to the data analyses performed as part of this project.

1.4.4 Laboratory Information

Laboratories are also subject to periodic audits of laboratory performance, systems, and overall programs. The 222-S, GEL, and Cape Fear Laboratories are accredited by the Washington State Department of Ecology. In addition, GEL Laboratories participate in the U.S. Department of Energy Consolidated Audit Program.

1.4.5 Data Qualifiers

During the generation of environmental analytical data, several qualifiers may be assigned to individual results. The HEIS database records qualifiers applied by three sources: the laboratory, a third-party data validator, or a data user/reviewer. Data review qualifiers are specifically applied as a result of this DUA. Review qualifier applications and definitions are provided in Appendix B, Table B-1.

1.4.6 Field Quality Requirements

The SAP for the WMA S-SX study area requires collection of field QC samples at the frequency described in Table 1-3.

Table 1-3. Soil Field Quality Control Samples

Quality Control Sample Type	Purpose	Frequency
Field duplicate	Estimate precision, including sampling and analytical variability.	Minimum of 1 per 20 surface samples.
Field blank	Assess contamination from containers or transportation.	Minimum of 1 per 20 field samples.
Equipment blank	Verify adequacy of sampling equipment decontamination.	Minimum of 1 per 20 field samples.
Field transfer blank	Assess contamination during field acquisition of VOC samples.	Minimum of 1 each day VOC samples are collected.

QC = quality control
VOC = volatile organic compound

Field duplicate samples are independent samples collected as close as possible to the same time and same location and intended to be identical. Field duplicates are used to determine precision for both sampling and laboratory requirements. It is not possible to collect field duplicates for direct push due to the limited soil volume recovered; however, field duplicates were collected for surface soil samples (i.e., first 31 cm [12 in]).

Field blank (FB) samples are prepared in the field at the sample collection site and returned to the laboratory with the samples to be analyzed. They are primarily used as a check for environmental contamination. FB samples consist of silica sand of known cleanliness.

Equipment blank (EB) samples are prepared after the sampling equipment is cleaned; they are used to verify the adequacy of sampling equipment decontamination procedures and were collected for each sampling method or type of equipment used. EB samples consist of silica sand of known cleanliness.

Field transfer blank (FTB) samples are analyzed for volatile organic compounds (VOCs) only and are used to document possible contamination during field acquisition of VOC samples. FTB sample bottles are filled at the sample collection site with high-purity water. One set of FTB samples were prepared each day that VOC field samples to be collected.

A baseline silica sand sample consisting of the reference material used in the FB and EB samples was analyzed as part of RPP-RPT-65442, *Data Quality Assessment for Soil Sample Collected for Phase 1 of Interim Measures at 241-B Tank Farm*. The results of the baseline silica sand sample were used to determine if there are any constituents innate to the blank reference material and may bias FB/EB results. EB and FB results of constituents found at two times the laboratory method detection limit (MDL) for chemical constituents or minimum detectable activity (MDA) for radionuclides in the baseline silica sand sample were not used in the evaluations presented in Section 4.4.

1.4.7 Laboratory Quality Requirements

In addition to the evaluation performed on field QC data that are described in Section 1.4.6, a broad review of the laboratory QC results was also conducted for this DUA. Laboratory QC results are stored electronically in the HEIS database and were evaluated using various database queries against the DQI criteria. Table 1-4 provides a summary of the laboratory QC samples. Laboratory QC requirements are specified by method in RPP-RPT-64722, *Data Quality Objectives for Vadose Zone Characterization at Waste Management Area S-SX,* Tables 6-1 and 6-2. The information in this table does not represent U.S. Environmental Protection Agency or Washington State Department of Ecology requirements; it is intended solely as guidance.

Table 1-4. Laboratory Quality Control Samples

Sample Type	Primary Characteristic Evaluated	Frequency
Laboratory duplicate, MSD, and LCD	Laboratory reproducibility, precision	One per analytical batch [a]
Laboratory control sample	Laboratory and method accuracy	One per analytical batch [a]
Matrix spike	Matrix effect/ laboratory accuracy	One per analytical batch [a]
Matrix spike duplicate	Laboratory reproducibility, laboratory and method accuracy, precision	One per analytical batch [a]
Method blank	Laboratory contamination	One per analytical batch [a]

[a] Analytical batch is a group of up to 20 samples that behave similarly with respect to the sampling or testing procedure being used and are processed as a unit unless not required or a different frequency is specified by the laboratory analysis method. Batching across projects is allowed for similar matrices (e.g., Hanford Site soil).

LCD = laboratory control sample duplicate
MSD = matrix spike duplicate

2.0 DATA VERIFICATION

Data verification is the process of evaluating completeness, correctness, conformance, and compliance of a specific data set against the method or against method, procedural, or contractual requirements. The data verification process, which is performed as part of the assessment phase of environmental data collection, is described in this section and the evaluation of the sampling design against the field implementation is summarized in Section 4.9.5.

2.1 DATA VERIFICATION PROCESS

Data review and verification was performed as described in Section D.6.2.1 of the SAP. Review and verification include evaluation of sampling chains-of-custody and sampling authorization forms to verify key information, such as unique sample numbers, analytical method, and sample depths, is correct and complete for subsequent field implementation. Following field implementation, final analytical data package verification was performed on 100 percent of the data deliverables.

Analytical data package verification is performed and documented according to internal procedures. Sample receipt documentation, such as completed chains-of-custody forms, are reviewed to determine if the number, type, location, and interval depths of all samples have been collected in accordance with the sampling and analysis requirements provided in the SAP. Analytical data for all samples, including field QC and laboratory QC samples, are reviewed to verify that analytical methods, holding times, and percent recoveries meet sampling and analysis requirements in SAP. In addition, analytical data package definitions are used to evaluate completeness and correctness. If SAP requirements are not met, such as missed holding times or recoveries outside of the SAP QC acceptance criteria, the data verification process ensures that laboratory-applied data qualifiers are used and applied correctly.

2.2 DATA VERIFICATION RESULTS SUMMARY

As a result of data verification, deviations from SAP requirements are identified and corrected in the field, in the analytical data packages, and in the HEIS database, as applicable. Verification identified several deviations from the SAP, most of which were corrected during fieldwork or analytical reporting. When corrections were not possible, the deviations were documented in the Completion Report (RPP-RPT-66126). Example verification outcomes and typical corrective actions:

- **Sample collection deviations:** A small number of planned intervals were not collected due to insufficient recovery or physical obstructions. Contingency measures or alternate locations were used where possible.
- **Missed or incorrect qualifiers:** Instances of missing or misapplied qualifiers were corrected during verification, with updated data uploaded to HEIS.

- **Documentation corrections:** Minor inconsistencies in chain-of-custody or sample identification were corrected prior to final data acceptance.

All applicable deviations and corrective actions are documented in RPP-RPT-66126 and are incorporated into the DQI evaluation discussed in Section 4. Verification confirmed that the analytical dataset is complete for the samples collected and that all necessary corrections or qualifications have been applied.

This page intentionally left blank.

3.0 DATA VALIDATION

Analytical data validation was performed by an independent third party in accordance with project requirements specified in the SAP. The validation scope included review of up to 20 percent of the dataset, with 1,336 results (approximately 13 percent of all analytical results) included in this DUA. Sampling activities are still underway for the 241-SX Tank Farm, which represents the third exposure area. This DUA currently covers two of the three exposure areas: 241-S and East Polygon. Once analytical data for the 241-SX area becomes available and has been verified, data validation will also be conducted for that exposure area to meet the overall project goal for WMA S-SX. Validation activities focused on evaluating holding times, method performance, blanks, recoveries, surrogates, instrument calibration, and other criteria necessary to determine data reliability.

Validator-applied qualifiers resulting from this process were entered into the HEIS database and are incorporated into the DQI evaluation presented in Section 4.

3.1 DATA VALIDATION SUMMARY

Data validation was performed by Analytical Quality Associates, Inc., Albuquerque, New Mexico, and documented in RPP-RPT-66358, *Data Validation Report for WMA S-SX RCRA Facility Investigation: VSR26-001*. Validation qualifiers resulting from data validation were entered into the HEIS database. Data validation results discussed in this DUA are limited to those of target analytes identified in the SAP.

3.2 DATA VALIDATION RESULTS

Validation identified both major and minor analytical deficiencies, most of which were already addressed through laboratory-applied qualifiers prior to validation. A high-level summary of findings is provided below.

3.2.1 Major Deficiencies

A small number of results were determined to be unusable due to significant departures from method or QC requirements (e.g., missed holding times, false positives, or very low spike recoveries). These results were assigned “R” qualifiers and are further addressed in Section 4. Major deficiencies were identified under the following methods:

- **EPA 8270E/8270E SIM (SVOC/PAHs):** Exceeded two times their collection to extraction holding time.
- **EPA 1668A (PCB congeners):** Very low MS recoveries.
- **Gamma energy analysis:** False positives identified by the laboratory due to high peak-width, low abundance, and no valid peak.

3.2.2 Minor Deficiencies

Several results required estimated qualifiers (e.g., J, J+, J−, UJ) due to issues such as low or high spike recoveries, method blank detections, or duplicate imprecision. These results remain usable for decision-making but are qualified. Minor deficiencies were identified under the following methods:

- **EPA 8270E/8270E SIM (SVOC/PAHs):** Blank contamination, low LCS and MS/MSD recoveries, and absence of compounds in the spiking solutions
- **EPA 1668A (PCB congeners):** Low and very low MS/MSD recoveries
- **EPA 6010/6020 (metals):** Blank contamination, negative blank results, low MS and/or MSD recoveries, and high MS and/or MSD recoveries
- **EPA 7196/9060 (hexavalent chromium/total organic carbon):** Exceeded holding times; blank contamination; low, very low, and high MS recoveries; laboratory duplicate imprecision
- **Radiochemical analyses:** Low tracer recovery, low laboratory control sample duplicate (LCD) recovery, laboratory duplicate imprecision, and interference

3.2.3 Qualifiers Applied to the Data Set

The outcomes of the validation process directly inform the DQI evaluations in Section 4. Validator-applied qualifiers, combined with laboratory-applied qualifiers, form the basis for determining whether individual analytical results are usable, estimated, biased, or unusable.

Detailed validation information—including method-specific deficiencies and qualified sample lists—is provided in Appendix C, Table C-1.
.

This page intentionally left blank.

4.0 DATA QUALITY INDICATOR EVALUATION

DQIs were evaluated in accordance with requirements in the SAP. Each evaluation focused on whether laboratory and field performance produced data suitable for their intended use. For each of the following DQI categories, analytical and QC results were compared with SAP acceptance criteria:

- **Precision:** Discusses the repeatability of field duplicate data and laboratory QC duplicates (e.g., RPD for sample duplicates, LCS duplicates, and MSD).
- **Accuracy/Bias:** Discusses evidence of field contamination and laboratory QC (e.g., Holding time, LCS percent recovery, MS percent recovery, method blank, FB, EB, and FTB).
- **Representativeness:** Discusses the degree to which data accurately and precisely represents environmental conditions at the site.
- **Comparability:** Discusses the nature of differences that may limit the comparability.
- **Completeness:** Discusses the accomplishment of all data-generating activities required by the SAP. The discussion includes a comparison of the samples collected versus those identified in the original sampling design; required field QC blanks and duplicates; and analyses performed compared to the analyses identified in the SAP.
- **Sensitivity:** Discusses any laboratory data that do not meet the SAP-required detection limits and other decision thresholds as described in the project data quality objectives.

Detailed evaluation and supporting tables are provided in the following sections. Assessment of impact associated with identified exceptions is provided in Section 4.9.

4.1 SENSITIVITY (REQUIRED DETECTION LIMITS)

Laboratory MDL for chemical constituents and MDA for radionuclides were compared to project RDL to assess sensitivity using the following approach:

1. **Comparison of MDL/MDA against SAP RDL** – Laboratory MDL/MDA for nondetect sample results were compared to the SAP RDL to assess laboratory performance against sensitivity requirements. The results showed that the MDL/MDA for 1,511 sample results of a total 4,579 sample results exceeded their corresponding SAP RDL.
2. **Comparison of MDL/MDA against two times the SAP RDL** – Nondetect analytical sample results were considered to not meet sensitivity requirements when the laboratory MDL or MDA exceeded two times the SAP RDL. This comparison determined if analytical results met SAP sensitivity requirement. The results identified 647 analytical results that exceeded two times their corresponding SAP RDL, as summarized in Table 4-1.
3. **Interpretation of secondary dilution factors** – Diluted analytical results that exceeded two times their corresponding SAP RDL were identified. Dilution of sample is sometimes necessary to achieve the calibration range or to minimize interference.

Dilution raises the reporting limit or method reporting limit by the dilution factor. Therefore, it reduces sensitivity but allows high concentration samples to be analyzed within instrument range. Of the 647 analytical results that exceeded two times their corresponding SAP RDL, the offsite laboratory applied a "D" qualifier to 185 sample results, indicating the constituent was reported at a secondary dilution factor.

In summary, 647 analytical results exceeded two times the SAP RDL. After identifying 185 analytical results that were diluted, 462 results exceeded SAP sensitivity requirements unattributed to dilution-inflated detection limits.

The offsite laboratory identified an RDL exception for 22 of the SAP constituents and reported the lowest practicable MDL or MDA.

Table 4-1. Nondetect Sample Results Exceeding Two Times the SAP RDL (2 Sheets)

Constituent	SAP RDL	Reported MDL/MDA	Number of Samples
Inorganics (mg/kg)			
Antimony	0.13	0.288 – 6.85	50
Beryllium	0.5	1.02 – 1.07	7
Silver	0.0006	0.0873 – 2.07	80
Thallium	0.0004	0.119 – 0.166	97
Pesticides (mg/kg)			
Alpha-BHC	0.00017	0.000486 – 0.00501	106
Beta-BHC	0.00017	0.000486 – 0.00501	98
VOCs/SVOCs (mg/kg)			
Hexachlorobenzene	0.0033	0.283 – 0.352	28
PCB Congeners (µg/kg)			
2,3,3',4,4',5,5'-Heptachlorobiphenyl	0.000667	0.00184 – 0.00202	9
2,3',4,4',5-Pentachlorobiphenyl	0.00133	0.00269 – 0.00279	4
Radionuclides (pCi/g)			
Cobalt-60	0.00842	0.0842 – 0.266	28
Europium-154	0.0334	0.249 – 0.628	21
Europium-155	0.0539	0.142 – 0.434	15
Neptunium-237	0.038	0.245 – 0.705	6
Plutonium-239/240	0.0248	0.0812 – 0.0998	3
Strontium-90	0.18	0.520 – 1.06	13
Uranium-233/234	0.0375	0.433 – 0.764	17

Table 4-1. Nondetect Sample Results Exceeding Two Times the SAP RDL (2 Sheets)

Constituent	SAP RDL	Reported MDL/MDA	Number of Samples
Uranium-235/236	0.0000432	0.0126 – 0.614	47
Uranium-238	0.000437	0.367 – 0.628	18

MDA = minimum detectable activity
MDL = method detection limit
PCB = polychlorinated biphenyl
SVOC = semivolatile organic compound
VOC = volatile organic compound

4.2 HOLDING TIME

Sample holding time is the maximum duration of time that can elapse between collection to analysis, or in some cases sample holding time is the maximum duration of time from collection to extraction and extraction to analysis. In this evaluation, the holding times for sample extraction and analysis were evaluated against SAP holding time requirements on a constituent basis to determine if sample results may be biased low due to degradation. Degradation may have occurred if a constituent was not extracted or analyzed before twice the SAP required holding time had elapsed. Of the 9,781 soil sample results evaluated, 45 exceeded twice their required holding time, as shown in Table 4-2.

Table 4-2. Sample Results Exceeding Two Times Their Required Holding Time.

Location ID	Sample Number(s)	Constituents	SAP Holding Time
Results Exceeding Analyzed Two Times Collection to Extraction Time			
D0594	B4KXJ8	4,4'-DDD, 4,4'-DDE, 4,4'-DDT, aldrin, alpha-BHC, beta-BHC, chlordane, endrin, gamma-BHC, heptachlor, heptachlor epoxide	14 Days
D0616	B4L657, B4L658	Acenaphthene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz[a,h]anthracene, fluoranthene, hexachlorobenzene, indeno(1,2,3-cd)pyrene, naphthalene, pyrene, tributyl phosphate	14 Days
	B4L659, B4L660, B4L661	Hexachlorobenzene, tributyl phosphate	14 Days
Results Exceeding Two Times Collection to Analysis Time			
D0614	B4L652	Cyanide	14 Days

ID = identification
SAP = sampling and analysis plan

4.3 FIELD PRECISION (FIELD DUPLICATES)

A total of 14 field duplicate samples out of 314 soil sample intervals (5%) were collected and 433 laboratory samples were analyzed for SAP required constituents for this dataset in accordance with the SAP, meeting the frequency requirement as specified in Table 1-3. The evaluation was performed using the following approach:

1. **Identify both primary and duplicate nondetect sample results** – A total of 244 duplicate sample pairs was nondetect; therefore, no additional evaluation was performed.
2. **Identify duplicate pairs where at least one sample result is greater than five times their corresponding MDL or MDA** – The remaining 196 duplicate sample pairs were compared against five times their corresponding MDL or MDA. This step identified 143 duplicate pairs where at least one analytical result was greater than five times the corresponding MDL or MDA.
3. **Evaluate RPD** – Field duplicate RPD was evaluated by comparing the result to the corresponding field sample result if at least one of the two sample constituent results was greater than five times the MDL or MDA. Evaluation of the RPD results can provide an indication of precision, including sampling and analytical variability. RPDs greater than 30 percent may be an indication of sampling or laboratory performance issues. Duplicate pair results with an RPD less than 30 percent were considered acceptable. Of the 433 soil sample results with an associated field duplicate, 15 duplicate pair results exceeded the MDL/MDA and RPD criteria, as shown in Table 4-3.

Table 4-3. Field Duplicate Pairs Exceeding 30 Percent Relative Percent Difference

Sample Location	Constituent	Sample Number (Duplicate)
D0578	Magnesium, sulfur, thorium, uranium	B4KTL2 (B4KTL3)
D0600	Strontium-90	B4KTN5 (B4KTN7)
D0606	Antimony, arsenic, barium, cadmium, potassium	B4MJ02 (B4MJ04)
	Fluoride, phosphate	B4KVW3 (B4KVW4)
D0616	Copper, plutonium-239/240, total organic carbon	B4L5D3 (B4L5D5)

4.4 EQUIPMENT BLANKS AND FIELD BLANKS

Equipment blanks and FBs are compared to associated soil sample results from the same sample location to assess potential bias introduced during sample handling. The evaluation was performed using the following approach:

1. **Comparison against background concentrations in the baseline silica sand** – To avoid falsely indicating the bias introduced during sample handling, constituents found in the baseline silica sand sample at concentrations greater than two times the laboratory MDL/MDA were excluded from this evaluation. The constituents excluded from this evaluation are aluminum, antimony, barium, calcium, chloride, cobalt, fluoride, iron, lead, magnesium, manganese, potassium, sodium, strontium, thorium, uranium, uranium-233/234, uranium-235/236, uranium-238, vanadium, zinc, and zirconium.

2. **Evaluation of analytical results against EB and FB concentrations** – Bias is indicated when EB or FB concentrations exceed two times the MDL/MDA and are greater than five percent of the associated analytical result. After excluding the constituents with background concentrations in the baseline silica sand, 2,578 analytical results with associated EB and FB results were evaluated. This evaluation found that 114 analytical results were associated with an EB or FB two times their corresponding MDL/MDA and were greater than five percent of the associated analytical result. These results indicate potential sample handling bias and may be biased high. The results of this step are included in Table 4-4.
3. **Comparison to Hanford Site background concentrations** – The 114 analytical results that indicate potential sample handling bias were compared to their corresponding Hanford Site background concentration listed in the DQO report (RPP-RPT-64722). If the concentration of the analytical result was less than the corresponding Hanford Site background concentration, there is no impact to nature and extent of contamination. The copper and nickel results in Table 4-4 were found to be less than Hanford Background concentrations. The remaining 102 analytical results with EB or FB results exceeding two times the MDL and greater than five percent of the associated analytical results indicate bias potentially affecting nature and extent of contamination.

Table 4-4. Analytical Results with Potential Sample Handling Bias

Constituent	Sample Numbers
Copper	B4KTN5, B4KTN7, B4KVB9, B4KVC0, B4KVC2, B4KVC3, B4KVC6, B4L5D3, B4L658
Fluoranthene	B4KVC5, B4KVC6
Molybdenum	B4L5D3, B4L5D5, B4L654, B4L655, B4L656, B4L657, B4L658, B4L659, B4L660
Nickel	B4KVC0, B4KVC2, B4KVC5
Sulfur	B4KLC4, B4KLF2, B4KLF6, B4KLF4, B4KL64, B4KL62, B4KL65, B4KL67, B4KTN5, B4KTN7, B4KVB9, B4KVC0, B4KVC2, B4KVC3, B4KVC4, B4KVC5, B4KVC6, B4MHY6, B4L3P6, B4L3P7, B4L3P8, B4L3P9, B4L3R0, B4L3R1, B4L3R2, B4L3R3, B4L530, B4L630, B4L631, B4L5D3, B4L5D5, B4L654, B4L655, B4L656, B4L657, B4L658, B4L659, B4L660, B4L661, B4L590, B4L675, B4L676
Tin	B4KLC4, B4KLF2, B4KLF4, B4KLF6, B4L3P6, B4L3P7, B4L3P8, B4L3R0, B4MHY6
Total organic carbon	B4KLC4, B4KLF2, B4KLF6, B4KLF4, B4KL64, B4KL62, B4KL65, B4KL67, B4KTN5, B4KTN7, B4KVB9, B4KVC0, B4KVC2, B4KVC3, B4KVC4, B4KVC5, B4MHY6, B4L3P6, B4L3P7, B4L3P8, B4L3P9, B4L3R0, B4L3R1, B4L3R2, B4L530, B4L630, B4L631, B4L5D3, B4L5D5, B4L654, B4L655, B4L656, B4L657, B4L658, B4L659, B4L660, B4L661, B4L590, B4L675, B4L676

4.5 FIELD TRANSFER BLANKS

A total of 19 FTB samples were collected for this dataset in accordance with the SAP, meeting the frequency requirement as specified in Table 1-3.

Soil samples were evaluated against FTBs to assess the potential for bias introduced during field handling and sample transfer for VOCs. 4-Methyl-2-pentanone is the only VOC identified as a target constituent; therefore, it is the only VOC evaluated in this DUA. All results were nondetect. This evaluation found no potential bias in the 4-Methyl-2-pentanone results because there were no detected FTB results.

4.6 METHOD BLANKS

Method blanks were compared to associated soil samples to assess potential bias introduced from laboratory equipment. Potential bias is indicated if the associated detected method blank concentration exceeds five percent of the associated detected soil sample result. Approximately two percent of analytical sample results (215 of 8,620 results) are associated with method blanks that did not meet the evaluation criteria. The laboratory properly identified 192 of the 215 exceptions with a "C" qualifier. The remaining 23 exceptions are summarized in Table 4-5 to identify potentially biased samples identified in this evaluation.

Table 4-5. Method Blank Detections

Method	Constituent	Number of Results
6010 ICP/AES (acid)	Antimony	2
	Lead	6
	Molybdenum	4
	Silver	2
8270 GC/MS SIM PAH	Dibenz[a,h]anthracene	1
Gamma energy analysis (direct)	Tin-126	6
Alpha energy analysis (acid)	Uranium-233/234	2

EPA = U.S. Environmental Protection Agency
GC/MS = gas chromatography/mass spectrometry
ICP/AES = inductively coupled plasma/atomic emission spectrometry
PAH = polycyclic aromatic hydrocarbon
SIM = selected ion monitoring

Note: For the four-digit EPA methods, see SW 846, *Test Methods for Evaluating Solid Waste: Physical/ Chemical Methods Compendium*.

4.7 LABORATORY PRECISION

Laboratory precision is determined by evaluating the RPD of laboratory duplicate samples. Three types of laboratory duplicates were evaluated: MS and MSD, LCS and LCD, and field sample and laboratory sample duplicate. If either or both results in a duplicate pair are detected for chemical constituents or are greater than five times the MDA for radionuclides and the RPD is greater than 30 percent, the pair does not meet precision criteria. The evaluation was performed using the following approach:

1. **Identify duplicate pairs where one or both chemical constituent results in a pair are detected or radionuclides results are greater than five times the MDA** – For chemical constituents, 286 MS/MSD pairs, 1,325 LCS/LCD pairs, and 130 laboratory sample duplicate pairs where at least one result was detected. For radionuclides, zero MS/MSD pairs, 256 LCS/LCD pairs, and 20 laboratory sample duplicate pairs where at least one result was greater than five times the MDA.
2. **Identify duplicate pairs with RPDs greater than 30 percent** – Of the results identified in the previous step, there were zero MS/MSD pairs, three LCS/LCD pairs, and 13 laboratory sample duplicate pairs with RPDs greater than 30 percent.

In summary, 100 percent (286/286) of MS/MSD pairs, 99.9 percent (1,322/1,325) of LCS/LCD pairs, and 97 percent (371/384) of laboratory duplicate pairs met SAP precision requirements.

4.8 LABORATORY ACCURACY

Two types of QC were used to assess accuracy for this dataset: the LCS and the MS/MSD. The LCS is used to assess the accuracy of the laboratory preparation and analysis processes. The MS and MSD samples are used to assess the accuracy of the published method on the sample matrix and evaluate matrix effects that may bias the data. In cases where the sample concentration is greater than four times the spiking concentration, spike recoveries were not evaluated.

4.8.1 Laboratory Control Samples

The LCS recoveries were compared to both SAP and laboratory control limits to evaluate the analytical precision of their corresponding analytical batch. When an LCS recovery is outside of control limits and the associated LCD is greater than 30 percent, detected analytical results of the corresponding analytical batch indicate poor accuracy. The evaluation was performed using the following approach:

1. **Identify detected analytical results with a corresponding LCS –** There were 7,643 soil sample results with a corresponding LCS, 3,839 of which were detected.
2. **Identify analytical results with a corresponding LCS outside of control limits –** Of the 3,839 analytical results evaluated, 2 percent (61) were associated with an LCS outside of SAP control limits, only two of which were outside of laboratory control limits.
3. **Evaluate RPD –** No LCD was analyzed for the two LCS results outside of both SAP and laboratory control limits and therefore did not meet SAP accuracy requirements. The two analytical results associated with these LCSs are summarized in Table 4-6.

Table 4-6. Sample Results with LCS Outside SAP and Laboratory Control Limits

Constituent	Batch Number(s)	Soil Sample Number(s)
Fluoranthene	2827850	B4L661
Pyrene	2827850	B4L661

4.8.2 Matrix Spike Recovery

For detected analytical sample results less than or equal to four times MS concentration, recoveries were evaluated against the SAP administrative and laboratory statistical upper and lower control limits to assess accuracy. Potentially affected samples without an MSD or MS/MSD RPD greater than 30 percent were then identified for impact assessment in Section 4.9. The evaluation was performed using the following approach:

1. **Identify analytical results less than four times the corresponding MS spike concentration –** A total of 471 analytical sample results was evaluated. After excluding nondetects, 285 detected analytical sample results remained. Excluding constituent results greater than four times the MS spike concentration–considered not meaningful for recovery evaluation – resulted in 247 detected analytical results used for assessment.

2. **Identify analytical results whose MS recovery is outside of control limits –** Of the 247 evaluated results, 52 (21%) were outside the upper and lower SAP control limits. When laboratory statistical control limits were also considered, 45 (18%) were outside both SAP and laboratory control limits.
3. **Identify analytical results associated with an unacceptable MS/MSD RPD –** After excluding 20 analytical results with an MSD RPD less than or equal to 30 percent, which indicated acceptable laboratory precision, 25 analytical results remained that exceeded both the SAP and laboratory control limits and did not have an acceptable MSD result. Therefore, five percent (25 of 471) of the analytical results–affecting five constituents and a total of 25 analytical results – were found to have MS recoveries outside both the SAP and laboratory control limits, as summarized in Table 4-7.

Table 4-7. Sample Results with MS Outside SAP and Laboratory Control Limits.

Constituent	Sample Number(s)
Chloride	B4KL75, B4KVD6, B4L633
Fluoride	B4KL75, B4MHX9, B4KVD2, B4KVD6, B4L670
Nitrate	B4KL75
Phosphate	B4KLC7, B4K0K4, B4KL75, B4KTJ7, B4MHX9, B4KTP2, B4KVD0, B4KVD2, B4KVD3, B4KVD6, B4KXN7, B4L3R8, B4L4B6, B4L633, B4L670
Total organic carbon	B4KLC4

Additionally, there was one nondetect MS result for mercury. This MS result was unable to be compared to the corresponding analytical result because the recovery does not accurately reflect the spiked concentration of the MS. The corresponding analytical result was a nondetect and therefore would have no effect on the result of this evaluation and was not qualified.

4.9 SUMMARY OF DATA QUALITY INDICATOR EVALUATION

This section summarizes, interprets, and contextualizes the results of the evaluations presented in Section 4.1 through 4.8, with respect to the DQIs assessed. Review qualifiers applied to the dataset are also discussed in this section.

4.9.1 Precision

The field precision evaluation presented in Section 4.3 found that 97 percent of field duplicate pair results met precision criteria. Due to the heterogeneous nature of soil as a sample matrix, some variability is expected within samples. No results were qualified from this evaluation because the constituents that exceeded the precision criteria have no discernable pattern from sample to sample.

The laboratory precision evaluations presented in Section 4.7 found that 100 percent of MS/MSD pair results, 99.9 percent of LCS/LCD pair results, and 97 percent of laboratory sample duplicate pair results met precision criteria. Similarly to the field duplicate evaluation, no results were qualified from this evaluation because some sample variability was expected due to the heterogeneous nature of the soil sample matrix.

4.9.2 Accuracy/Bias

The holding time evaluation presented in Section 4.2 assesses whether soil sample results may be biased low due to constituent degradation. Results are considered unusable if a sample was held longer than two times their SAP required holding time for the constituent and if it is nondetect. The 45 nondetect sample results with reported concentrations that exceeded twice their required holding time are considered unusable and have received an “R” (do not use) review qualifier.

Bias introduced during sample collection and other field activities was assessed using EBs, FBs and FTBs. As discussed in Section 4.4, 114 analytical results were associated with an EB or FB that indicated potential sample handling bias. Of the 114 results indicating potential sample handling bias, 12 results consisting of copper and nickel were below Hanford Site Background and would not influence nature and extent of contamination. These results were excluded from qualification. The remaining 102 are still considered usable but have received a “P” (potential problem) review qualifier because the results may be biased high. No bias was indicated in the evaluation of FTBs, as shown in Section 4.5.

As discussed in Section 4.6, bias introduced during analysis in the laboratory was assessed using method blanks. Bias was indicated in 215 analytical results through the evaluation of method blanks, 192 of which were properly qualified by the laboratory and will not receive further qualification. The remaining 23 results, summarized in Table 4-5, are still considered usable but have received a “P” (potential problem) review qualifier because the results may be biased high.

Evaluation of LCS percent recoveries in Section 4.8.1 demonstrated generally acceptable analytical accuracy. Of the 2,133 LCS recoveries evaluated, 99.7 percent met quality control acceptance criteria when both the SAP and laboratory control limits were considered. Where applicable, associated laboratory control duplicates were evaluated in Section 4.7, with more than 99 percent of the duplicate pairs meeting the RPD control limit. Because these results conclusively indicate acceptable analytical accuracy, no soil sample results were qualified based on this evaluation.

Evaluation of MS percent recoveries in Section 4.8.2, 45 (10%) analytical results were outside of both SAP and laboratory acceptable accuracy criteria. Among those 45 samples, MS and MSD results are available for 20 samples. The RPD results for those pairs did not exceed the acceptable criteria of 30 percent. That means, the remaining five percent (25 of 471) analytical results affecting five constituents across 16 samples exceeded both the SAP and laboratory control limits and did not have an acceptable MSD result. It should be noted that the LCS percent recoveries for those constituents are within acceptable control limits. Hence, “P” (potential problem) review qualifier was assigned for those 45 sample results.

Table 4-8 summarizes the results that were qualified resulting from the accuracy and bias evaluations presented in this section.

Table 4-8. Data Qualification Resulting from Accuracy/Bias Evaluation (3 sheets)

Constituent(s)	Qualifier*	Affected Samples	Reason
General Chemistry – EPA 9012/9045/9056/9060			
Chloride	P	B4KL75, B4KVD6, B4L633	Results indicate poor analytical accuracy through evaluation of MSs
Fluoride	P	B4KL75, B4MHX9, B4KVD2, B4KVD6, B4L670	
Nitrate	P	B4KL75	
Phosphate	P	B4KLC7, B4K0K4, B4KL75, B4KTJ7, B4MHX9, B4KTP2, B4KVD0, B4KVD2, B4KVD3, B4KVD6, B4KXN7, B4L3R8, B4L4B6, B4L633, B4L670	
Total organic carbon	P	B4KL62, B4KL64, B4KL65, B4KL67, B4KTN5, B4KTN7, B4KVC0, B4KVC2, B4KVC3, B4KVC4, B4KVC5, B4L3P6, B4L3P7, B4L3P8, B4L3P9, B4L3R0, B4L3R1, B4L3R2, B4L530, B4L590, B4L5D3, B4L5D5, B4L630, B4L631, B4L654, B4L655, B4L656, B4L657, B4L658, B4L659, B4L660, B4L661, B4L675, B4L676, B4MHY6	Results indicate potential contamination introduced during sample handling. These results are considered usable but may be biased high.
Total organic carbon	P	B4KLC4	Results indicate potential contamination introduced during sample handling and poor accuracy through evaluation of the MS. These results are considered usable but may be biased high.
Cyanide	R	B4L652	Results were analyzed outside of 2x their required hold time and are nondetects. These results are not considered usable.
Metals – EPA 6010/6020			
Antimony	P	B4L657, B4L658	Results indicate potential contamination introduced in the laboratory. These results are considered usable but may be biased high.
Lead	P	B4KVC1, B4KXK2, B4KXK4, B4L495, B4L681, B4L682	
Molybdenum	P	B4L3P6, B4L3P7, B4L3P8, B4L3P9	
Silver	P	B4L660, B4L661	
Copper	P	B4KTN5, B4KTN7, B4KVB9, B4KVC0, B4KVC2, B4KVC3, B4KVC6, B4L5D3, B4L658	Results indicate potential contamination introduced during sample handling. These results are considered usable but may be biased high.
Molybdenum	P	B4L5D3, B4L5D5, B4L654, B4L655, B4L656, B4L657, B4L658, B4L659, B4L660	
Nickel	P	B4KVC0, B4KVC2, B4KVC5	

Table 4-8. Data Qualification Resulting from Accuracy/Bias Evaluation (3 sheets)

Constituent(s)	Qualifier*	Affected Samples	Reason
Sulfur	P	B4KL62, B4KL64, B4KL65, B4KL67, B4KLC4, B4KLF2, B4KLF4, B4KLF6, B4KTN5, B4KTN7, B4KVB9, B4KVC0, B4KVC2, B4KVC3, B4KVC4, B4KVC5, B4KVC6, B4L3P6, B4L3P7, B4L3P8, B4L3P9, B4L3R0, B4L3R1, B4L3R2, B4L3R3, B4L530, B4L590, B4L5D3, B4L5D5, B4L630, B4L631, B4L654, B4L655, B4L656, B4L657, B4L658, B4L659, B4L660, B4L661, B4L675, B4L676, B4MHY6	
Tin	P	B4KLC4, B4KLF2, B4KLF4, B4KLF6, B4L3P6, B4L3P7, B4L3P8, B4L3R0, B4MHY6	
Pesticides – EPA 8081			
4,4'-DDD, 4,4'-DDE, 4,4'-DDT, aldrin, alpha-BHC, chlordane, dieldrin, endrin, gamma-BHC, heptachlor, heptachlor epoxide, beta-BHC	R	B4KXJ8	Nondetect results analyzed greater than 2x hold time. These results are not considered usable.
SVOCs – EPA 8270E/8270E SIM			
Dibenz[a,h]anthracene	P	B4KTN4	Result indicates potential contamination introduced in the laboratory. This result is considered usable but may be biased high.
Acenaphthene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz[a,h]anthracene, fluoranthene, hexachlorobenzene, indeno(1,2,3-cd)pyrene, naphthalene, pyrene, tributyl phosphate	R	B4L657, B4L658	Nondetect results analyzed greater than 2x hold time. These results are not considered usable.
Hexachlorobenzene, tributyl phosphate	R	B4L659, B4L660, B4L661	
Fluoranthene	P	B4KVC5, B4KVC6	Results indicate potential contamination introduced during sample handling. These results are considered usable but may be biased high.

Table 4-8. Data Qualification Resulting from Accuracy/Bias Evaluation (3 sheets)

Constituent(s)	Qualifier*	Affected Samples	Reason
Radiochemistry			
Tin-126	P	B4KTL3, B4KTL4, B4KTL6, B4KTK4, B4KTK6, B4KTK8	Results indicate potential contamination introduced in the laboratory. These results are considered usable but may be biased high.
Uranium-233/234	P	B4KTL7, B4KTL8	

EPA = U.S. Environmental Protection Agency
Note: For the four-digit EPA methods, see SW 846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods Compendium*.
*See Appendix B, Table B-1 for data qualifier definitions.

4.9.3 Representativeness

Sampling locations were selected using a judgmental approach based on the conceptual site model, historical site activities, and areas of potential contaminant release. Locations targeted suspected source areas and potential migration pathways to evaluate the presence and distribution of contaminants. Although sampling locations were not selected using a statistical design, the targeted approach is consistent with standard environmental investigation practices and is considered conservative for identifying potential impacts. Therefore, the dataset is considered representative for the purposes of evaluating site conditions and supporting project decisions.

4.9.4 Comparability

To generate comparable samples, sampling was performed using the same procedures used uniformly over the Hanford Site for field sampling. To generate comparable results, laboratory analyses were performed using industry-recognized standard procedures and the analytical methods summarized in Table 1-2.

4.9.5 Completeness

A total of 102 of 104 (98%) planned soil sample intervals were collected. Five of six (83%) planned field duplicates were also collected. The 37-39 ft bgs (I003) interval at D0600 was not collected due to low recovery and the surface and surface duplicate samples at D0610 were not collected because asphalt covered the sampling location. All other QC samples were collected as required.

Due to low recovery from some samples, not all required analyses were performed as required by the SAP. Analyses cancelled due to low recovery are summarized in Table 4-9.

Table 4-9. Analyses Cancelled Due to Low Sample Recovery

Location	Interval	Method	Constituent(s)
D0594	I002	8081 GC/ECD	4,4′-DDD, 4,4′-DDE, 4,4′-DDT, aldrin, alpha-BHC, beta-BHC, gamma-BHC, chlordane, dieldrin, endrin, heptachlor, heptachlor epoxide
		7196 Colorimetric	Hexavalent chromium
		9060	Total organic carbon
	I003	8081 GC/ECD	4,4′-DDD, 4,4′-DDE, 4,4′-DDT, aldrin, alpha-BHC, beta-BHC, gamma-BHC, chlordane, dieldrin, endrin, heptachlor, heptachlor epoxide
		Ion Chromatography 9056	Bromide, chloride, fluoride, nitrate, nitrite, phosphate
		9012 Colorimetric	Cyanide
		7471 Cold vapor atomic absorption	Mercury
D0598	I003	7196 Colorimetric	Hexavalent chromium
		9060	Total organic carbon
		Low energy gamma counting	Iodine-129
		Liquid scintillation (acid)	Carbon-14
		Liquid scintillation (water)	Tritium

GC/ECD = gas chromatography/electron capture detector
Notes: For the four-digit EPA methods, see SW 846, *Test Methods for Evaluating Solid Waste: Physical / Chemical Methods Compendium*.
Qualifier definitions can be found in Appendix B, Table B-1.

The SAP identified the analytical and QC requirements for the soil and field QC samples. The analytical and QC requirements pertinent to this DUA are provided in Table 1-3. The PCB congeners 2,3,3',4,4',5'-hexachlorobiphenyl and 2,3,3',4,4',5-hexachlorobiphenyl are reported as a combined congener result in the analytical data in accordance with laboratory method specification. Additionally, hexachlorobenzene was analyzed using EPA method 8270 instead of the SAP-specified EPA method 8270 SIM, also in accordance with laboratory method specification.

4.9.6 Sensitivity

The detection limit is based more upon the sensitivity of an analytical instrument's ability to measure the lowest amount of analyte in a sample. In this project, the SAP RDL for constituents is equal to their corresponding minimum risk levels based on multiple exposure scenarios - including human health, ecological protection, and groundwater protection (RPP-RPT-64722). In absence of the risk levels, the SAP RDL for some constituents were set equal to their background levels. Due to that, the detection limits for some nondetected sample results could not meet the SAP RDL. In addition to risk levels defined in the SAP, sample dilution was also considered during the review of laboratory performance against SAP sensitivity requirements. Sample dilution, although sometimes necessary for method performance, leads to an overestimation of the MDL. As discussed in Section 4.1, 647 nondetect sample results exceeded two times the SAP RDL. It should be noted that 185 out of 647 nondetect samples were diluted, hence they could not meet their corresponding SAP RDL. Therefore, diluted results greater than two times the SAP RDL and applicable risk/hazard levels have received a "P" (potential problem). The 28 nondetect hexachlorobenzene analytical results listed in Table 4-10 are above the groundwater protection risk/hazard level but do not exceed the human health and ecological protection risk/hazard levels. These results received "PZ" (potential problem, miscellaneous circumstances)

review qualifiers and will be noted in the HEIS database as usable for human health and ecological protection risk assessment but unusable for groundwater protection risk assessment. Using the nondetected results discussed in this section could result in uncertainty during the risk calculation. Such uncertainty will be addressed in the uncertainty section of the risk assessment. Table 4-10 provides details on review qualifiers applied to the dataset resulting from this evaluation.

Table 4-10. Summary of Data Qualification Resulting from Sensitivity Evaluation

Constituent(s)	Qualifier*	Affected Samples	Reason
Metals – EPA 6010/6020			
Antimony	P	B4L5D5, B4L631, B4L637, B4L654, B4L655, B4L656	Nondetect results at 2x the SAP RDL and the groundwater protection risk/ hazard level. The samples were diluted and these results are considered usable with caution.
Silver	P	B4L631, B4L637, B4L654, B4L655	Nondetect results at 2x the SAP RDL and the ecological protection risk/hazard level. The samples were diluted and these results are considered usable with caution.
Pesticides – EPA 8081			
Alpha-BHC	P	B4KL62, B4KL64, B4KL65, B4KTJ6, B4KTK1, B4L491, B4L576, B4MJ03, B4MJ05	Nondetect results at 2x the SAP RDL and the groundwater protection risk/hazard level. The samples were diluted and these results are considered usable with caution.
SVOC – EPA 8270E			
Hexachlorobenzene	PZ	B4KTN4, B4KTN6, B4KVB9, B4KVC0, B4KVC2, B4KVC3, B4KVC4, B4KVC5, B4KVC6, B4L491, B4L492, B4L493, B4L494, B4L495, B4L496, B4L497, B4L5D4, B4L5D6, B4L654, B4L655, B4L656, B4L657, B4L658, B4L659, B4L660, B4L661, B4MJ03, B4MJ05	Nondetect results that were not diluted prior to analysis exceeded 2x the SAP RDL and the groundwater protection risk/hazard level. The results were below human health and ecological protection risk/hazard levels. These results will be noted in HEIS as usable for human health and ecological protection risk assessment but not for groundwater protection.

EPA = U.S. Environmental Protection Agency
MS = matrix spike
MSD = matrix spike duplicate
RDL = required detection limit
SAP = sampling and analysis plan
VOC = volatile organic compound

Note: For the four-digit EPA methods, see SW 846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods Compendium*.

*See Appendix B, Table B-1 for data qualifier definitions.

This page intentionally left blank.

5.0 DATA QUALITY ASSESSMENT

The sampling designs at the 241-S Tank Farm and East Polygon exposure areas used judgmental sampling. The sampling design, sampling methods, and constituents were based on site process knowledge and site evaluation results; therefore, DQIs were assessed to determine data usability. Because the dataset did not originate from a statistical sampling design, a full data quality assessment evaluation was not applicable.

This page intentionally left blank.

6.0 CONCLUSION

Based on the data verification and validation activities and DQI evaluations performed in this DUA, the analytical dataset for the 241-S Tank Farm and East Polygon exposure areas is of sufficient quality for its intended regulatory uses. More than 99 percent of the data is deemed usable. A total of 43 nondetect results exceeded twice their required holding times and are therefore unusable for decision-making. An additional 28 hexachlorobenzene nondetect results exceeded groundwater-protection thresholds and received PZ qualifiers, indicating they are usable for human health and ecological risk assessments but not groundwater evaluations. Less than two percent of the data was assigned a “P” (potential problem) review qualifier due to indication of bias, poor accuracy, or not meeting SAP sensitivity requirements due to sample dilution.

No systematic laboratory or field issues were identified, and overall QC performance met project requirements. Sampling and analytical methods followed approved and documented procedures, ensuring that the data are representative, comparable, and complete for the evaluated exposure areas.

Except for the results identified as unusable, the dataset is consistent with the quality expectations of the SAP and is acceptable for use in supporting regulatory decision processes, refinement of the conceptual site model, and subsequent human health, ecological, and groundwater evaluations.

.

This page intentionally left blank.

7.0 REFERENCES

CP-15383, 2026, *Common Requirements of the Format for Electronic Analytical Data (FEAD),* Rev. 12, Central Plateau Cleanup Company, LLC, Richland, Washington. https://ehs.hanford.gov/eddpro/Content/HEIS%20FEAD.pdf.

EPA/240/R-02/004, 2002, *Guidance on Environmental Data Verification and Data Validation* EPA QA/G-8, Office of Environmental Information, U.S. Environmental Protection Agency, Washington, D.C. https://www.epa.gov/sites/default/files/2015-06/documents/g8-final.pdf

EPA IT/IM Directive, 2025, *Quality Assurance Project Plan Guidance,* U.S. Environmental Protection Agency, Washington, D.C. https://www.epa.gov/system/files/documents/2025-10/qapp-guidance_dtd_10012025_1.pdf

RPP-PLAN-65977, 2025, *Phase 2 RCRA Facility Investigation/Corrective Measures Study Work Plan for Waste Management Area S-SX*, Rev. 0, Washington River Protection Solutions, LLC, and Freestone Environmental Services, Inc., Richland, Washington. https://pdw.hanford.gov/document/AR-33877.

RPP-RPT-64722, 2025, *Data Quality Objectives for Vadose Zone Characterization at Waste Management Area S-SX*, Rev. 0, Washington River Protection Solutions, LLC, and Freestone Environmental Services, Inc., Richland, Washington. https://pdw.hanford.gov/document/AR-33640

RPP-RPT-65442, 2025, *Data Quality Assessment for Soil Samples Collected for Phase 1 of Interim Measures at 241-B Tank Farm*, Rev. 0, Hanford Tank Waste Operations and Closure, LLC, Richland, Washington. https://pdw.hanford.gov/document/AR-37796

RPP-RPT-66126, 2026, *Completion Report for 241-S Farm and East Polygon Soil Samples,* Rev. 0, Hanford Tank Waste Operations and Closure, LLC, Richland, Washington. https://pdw.hanford.gov/download/v2/AR-41177

RPP-RPT-66358, *Data Validation Report for WMA S-SX RCRA Facility Investigation: VSR26-001,* Rev. 0, Hanford Tank Waste Operations and Closure, LLC, Richland, Washington. https://pdw.hanford.gov/download/v2/AR-40542

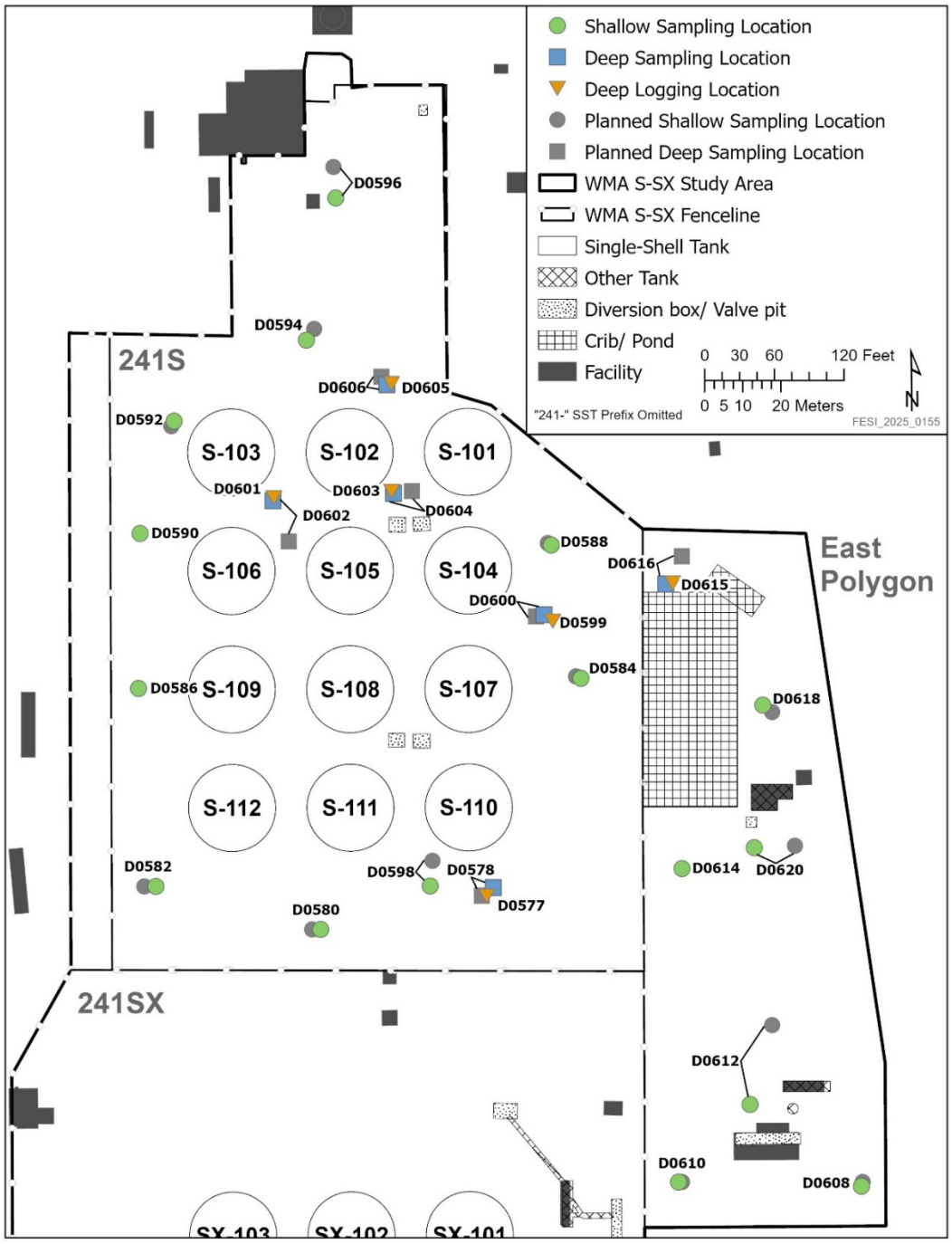
SW-846, 2020, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*, Third Edition; Final Update VII, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C. https://www.epa.gov/hw-sw846/sw-846-compendium

APPENDIX A

IMPLEMENTATION OF SAMPLE DESIGN

This page intentionally left blank.

Figure A-1. Planned and Completed Direct Push Location for 241-S and East Polygon



Reference: RPP-RPT-66126, *Completion Report for 241-S Farm and East Polygon Soil Samples.*

Note: If there was more than one push needed for logging, then the distance moved is based on the distance from the planned location to the location where the greatest interval of logging occurred. If there was more than one push needed for sampling, then the distance moved is based on the distance from the planned location to the location where the greatest number of samples were collected.

Table A-1. Sample Interval Information (12 sheets)

Sample Location (Field ID) [Total Depth]	Sample Interval[a]	Depth (ft bgs)[a]	Field Sample Number (type)[b]	222-S Composite Sample Number	GEL Composite Sample Number	Cape Fear Sample Number	Percent Recovery[c]
241-S Tank Farm							
D0578 (S-1a) [156 ft bgs]	SURFACE	0-1	B4KTL2 (M), B4K0M2 (M)	NA	NA	NA	NA
	SURFACE DUP	0-1	B4KTL3 (M), B4K0M3 (M)	NA	NA	NA	NA
	I001	3.5-6.5	B4K0M7 (S), B4K0M4 (A), B4K0M5 (B), B4K0M6 (C)	B4KTM4	B4KTL4	NA	100
	I002	11.5-14.5	B4K0N1(S), B4K0M8 (A), B4K0M9 (B), B4K0N0 (C)	B4KTM5	B4KTL5	NA	72
	I003	48-50	B4K0N5 (S), B4K0N2 (A), B4K0N3 (B), B4K0N4 (C)	B4KTM6	B4KTL6	NA	100
	I004	68-70	B4K0N9 (S), B4K0N6 (A), B4K0N7 (B), B4K0N8 (C)	B4KTM7	B4KTL7	NA	100
	I005	99-101	B4K0P3 (S), B4K0P0 (A), B4K0P1 (B), B4K0P2 (C)	B4KTM8	B4KTL8	NA	100
	I006	120-122	B4K0P7 (S), B4K0P4 (A), B4K0P5 (B), B4K0P6 (C)	B4KTM9	B4KTL9	NA	100
	I007	129-131	B4K0R1 (S), B4K0P8 (A), B4K0P9 (B), B4K0R0 (C)	B4KTN0	B4KTM0	NA	100
	I008	154-156	B4K0R5 (S), B4K0R2 (A), B4K0R3 (B), B4K0R4 (C)	B4KTN1	B4KTM1	NA	100

Table A-1. Sample Interval Information (12 sheets)

Sample Location (Field ID) [Total Depth]	Sample Interval[a]	Depth (ft bgs)[a]	Field Sample Number (type)[b]	222-S Composite Sample Number	GEL Composite Sample Number	Cape Fear Sample Number	Percent Recovery[c]
D0580 (S-2a) [14 ft bgs]	EB	NA	B4KLC5 (Q), B4KLC8 (Q)	NA	NA	NA	NA
	FB	NA	B4KLC6 (Q), B4KLC9 (Q)	NA	NA	NA	NA
	SURFACE	0-1	B4KLC4 (M), B4KLC7 (M)	NA	NA	NA	NA
	I001	4-6	B4K0Y9 (S), B4K0Y6 (A), B4K0Y7 (B)	B4KLF3	B4KLF2	NA	59
	I002	12-14	B4K103 (S), B4K100 (A)	B4KLF5	B4KLF4	NA	40
	I003	6-8	B4K107 (S), B4K104 (A)	B4KLF7	B4KLF6	NA	45
D0582 (S-3a) [14.5 ft bgs]	SURFACE	0-1	B4KLF8 (M), B4KLF9 (M)	NA	NA	NA	NA
	I001	3.5-6.5	B4K0X4 (S), B4K0X1 (A), B4K0X2 (B), B4K0X3 (C)	B4KLH1	B4KLH0	NA	86
	I002	11.5-14.5	B4K0X8 (S), B4K0X5 (A), B4K0X6 (B), B4K0X7 (C)	B4KLH3	B4KLH2	NA	100
D0584 (S-4a) [14 ft bgs]	SURFACE	0-1	B4KL94 (M), B4KL95 (M)	NA	NA	NA	NA
	I001	4-6	B4KL99 (S), B4KL96 (A), B4KL97 (B), B4KL98 (C)	B4KLC1	B4KLB8	NA	80
	I002	12-14	B4KLB3 (S), B4KLB0 (A), B4KLB1 (B), B4KLB2 (C)	B4KLC2	B4KLB9	NA	93

Table A-1. Sample Interval Information (12 sheets)

Sample Location (Field ID) [Total Depth]	Sample Interval[a]	Depth (ft bgs)[a]	Field Sample Number (type)[b]	222-S Composite Sample Number	GEL Composite Sample Number	Cape Fear Sample Number	Percent Recovery[c]
D0586 (S-5a) [14.5 ft bgs]	EB	NA	B4K0K6 (Q), B4KL59 (Q), B4K0K7(Q)	NA	NA	NA	NA
	FB	NA	B4K0K8 (Q), B4K0K9 (Q), B4KL60 (Q)	NA	NA	NA	NA
	SURFACE	0-1	B4K0K4 (M), B4KL61 (M), B4KL62 (M)	NA	NA	NA	NA
	SURFACE DUP	0-1	B4KL64 (M), B4KL63 (M), B4K0K5 (M)	NA	NA	NA	NA
	I001	3.5-6.5	B4K0L3 (S), B4K0L0 (A), B4K0L1 (B), B4K0L2 (C)	B4KL71	B4KL65	B4KL66	80
	I002	12-14	B4K0L7 (S), B4K0L4 (A), B4K0L5 (B), B4K0L6 (C)	B4KL72	B4KL67	B4KL68	86
D0588 (S-6a) [14 ft bgs]	SURFACE	0-1	B4KL74 (M), B4KL75 (M)	NA	NA	NA	NA
	I001	4-6	B4KL79 (S), B4KL76 (A), B4KL77 (B), Liner C (NA)	B4KL91	B4KL88	NA	73
	I002	12-14	B4KL83 (S), B4KL80 (A), B4KL81 (B), B4KL82 (C)	B4KL92	B4KL89	NA	100
D0590 (S-7a) [14.5 ft bgs]	SURFACE	0-1	B4KTJ6 (M), B4KTJ7 (M)	NA	NA	NA	NA
	I001	3.5-6.5	B4K0W1 (S), B4K0V8 (A), B4K0V9 (B), B4K0W0 (C)	B4KTJ8	B4KTK1	NA	73
	I002	12-14	B4K0W5 (S), B4K0W2 (A), B4K0W3 (B), B4K0W4 (C)	B4KTJ9	B4KTK2	NA	100
D0592 (S-8a) [14.5 ft bgs]	SURFACE	0-1	B4KTK4 (M), B4KTK5 (M)	NA	NA	NA	NA
	I001	3.5-6.5	B4K0T8 (S), B4K0T5 (A), B4K0T6 (B), B4K0T7 (C)	B4KTK7	B4KTK6	NA	100
	I002	11.5-14.5	B4K0V2 (S), B4K0T9 (A), B4K0V0 (B), B4K0V1 (C)	B4KTK9	B4KTK8	NA	97

Table A-1. Sample Interval Information (12 sheets)

Sample Location (Field ID) [Total Depth]	Sample Interval[a]	Depth (ft bgs)[a]	Field Sample Number (type)[b]	222-S Composite Sample Number	GEL Composite Sample Number	Cape Fear Sample Number	Percent Recovery[c]
D0594[d, e] (S-9a) [17.5 ft bgs]	SURFACE	0-1	B4MHX6 (M), B4MHX7 (M)	NA	NA	NA	NA
	I001	3.5-6.5	B4KVF2 (S), B4KVD9 (A), B4KVF0 (B), B4KVF1 (C)	B4KXJ9	B4KXJ6	NA	67
	I002	11.5-14.5[d]	B4KVF6 (S), B4KVF3 (A), B4KVF4 (B), B4KVF5 (C)	B4KXK0	B4KXJ7	NA	35
	I003	14.5-17.5[d, e]	B4KVH0 (S), B4KVF7 (A), B4KVF8 (B), B4KVF9 (C)	B4KXK0	B4KXJ8	NA	18
D0596[f] (S-10a) [17.5 ft bgs]	SURFACE	0-1	B4KVC1 (M), B4MHX9 (M)	NA	NA	NA	NA
	I001	3.5-6.5	B4KVH4 (S), B4KVH1 (A), B4KVH2 (B), B4KVH3 (C)	B4KXK5	B4KXK2	NA	100
	I002	12-14[f]	B4KVH8 (S), B4KVH5 (A), B4KVH6 (B), B4KVH7 (C)	NA	NA	NA	25[f]
	I003	14.5-17.5[f]	B4KVJ2 (S), B4KVH9 (A), B4KVJ0 (B), B4KVJ1(C)	B4KXK7	B4KXK4	NA	73
D0598[d] (S-J-1a) [17.5 ft bgs]	SURFACE	0-1	B4MHY0 (M), B4MHY1 (M), B4MHY2 (M)	NA	NA	NA	NA
	I001	3.5-6.5	B4K112 (S), B4K109 (A), B4K110 (B), B4K111 (C)	B4KXL4	B4KXK8	B4KXK9	86
	I002	11.5-14.5	B4K116 (S), B4K113 (A), B4K114 (B), (B4K115 (C)	B4KXL5	B4KXL0	B4KXL1	26
	I003	14.5-17.5[d]	B4K120 (S), B4K117 (A), B4K118 (B), (B4K119 (C)	B4KXL6	B4KXL2	B4KXL3	21

Table A-1. Sample Interval Information (12 sheets)

Sample Location (Field ID) [Total Depth]	Sample Interval[a]	Depth (ft bgs)[a]	Field Sample Number (type)[b]	222-S Composite Sample Number	GEL Composite Sample Number	Cape Fear Sample Number	Percent Recovery[c]
D0600[g, h] (S-J-3a and S-J-3c) [158 ft bgs]	FTB 1	NA	B4KTP6 (Q)	NA	NA	NA	NA
	FTB 2	NA	B4KTP7 (Q)	NA	NA	NA	NA
	FTB 3	NA	B4KTP8 (Q)	NA	NA	NA	NA
	FTB 4	NA	B4KTP9 (Q)	NA	NA	NA	NA
	FTB 5	NA	B4KTR0 (Q)	NA	NA	NA	NA
	FTB 6	NA	B4KTR1 (Q)	NA	NA	NA	NA
	FTB 7	NA	B4KTR2 (Q)	NA	NA	NA	NA
	EB	NA	B4KTN8 (Q), B4KTN9 (Q), B4KTP4 (Q)	NA	NA	NA	NA
	FB	NA	B4KTP0 (Q), B4KTP1 (Q), B4KTP5 (Q)	NA	NA	NA	NA
	SURFACE	0-1	B4KTP2 (M), B4KTN5 (M), B4KTN4 (M)	NA	NA	NA	NA
	SURFACE DUP	0-1	B4KTP3 (M), B4KTN7 (M), B4KTN6 (M)	NA	NA	NA	NA
	I001	3.5-6.5	B4KTR6 (S), B4KTR3 (A), B4KTR4 (B), B4KTR5 (C), B4KLD0 (V)	B4KVC9	B4KVB9	NA	100
	I002	11.5-14.5	B4KTT0 (S), B4KTR7 (A), B4KTR8 (B), B4KTR9 (C), B4KLD1 (V)	B4KVD0	B4KVC0	NA	100
	I003	37-41[g]	NA	NA	NA	NA	0
	I004	49-51	B4KTT8 (S), B4KTT5 (A), B4KTT6 (B), B4KTT7 (C), B4KLD3 (V)	B4KVD2	B4KVC2	NA	100
	I005	115-117	B4KTV2 (S), B4KTT9 (A), B4KTV0 (B), B4KTV1 (C), B4KLD4 (V)	B4KVD3	B4KVC3	NA	100
	I006	125-127	B4KTV6 (S), B4KTV3 (A), B4KTV4 (B), B4KTV5 (C), B4KLD5 (V)	B4KVD4	B4KVC4	NA	100

Table A-1. Sample Interval Information (12 sheets)

Sample Location (Field ID) [Total Depth]	Sample Interval[a]	Depth (ft bgs)[a]	Field Sample Number (type)[b]	222-S Composite Sample Number	GEL Composite Sample Number	Cape Fear Sample Number	Percent Recovery[c]
	I007	138-140	B4KTW0 (S), B4KTV7 (A), B4KTV8 (B), B4KTV9 (C), B4KLD6 (V)	B4KVD5	B4KVC5	NA	100
	I008	156-158	B4KTW4 (S), B4KTW1 (A), B4KTW2 (B), B4KTW3 (C), B4KLD7 (V)	B4KVD6	B4KVC6	NA	100
D0602 (S-J-4Ac) [153 ft bgs]	SURFACE	0-1	B4MHY3 (M), B4MHY4 (M), B4MHY5 (M)	NA	NA	NA	NA
	I001	3.5-6.5	B4KVJ6 (S), B4KVJ3 (A), B4KVJ4 (B), B4KVJ5 (C)	B4KXN1	B4KXL8	B4MHY4	100
	I002	11.5-14.5	B4KVK0 (S), B4KVJ7 (A), B4KVJ8 (B), B4KVJ9 (C)	B4KXN2	B4KXM0	B4KXL7	100
	I003	44-46	B4KVK4 (S), B4KVK1 (A), B4KVK2 (B), B4KVK3 (C)	B4KXN3	B4KXM1	B4KXL9	100
	I004	62-64	B4KVK8(S), B4KVK5 (A), B4KVK6 (B), B4KVK7(C)	B4KXN4	B4KXM2	NA	71
	I005	107-109	B4KVL2 (S), B4KVK9 (A), B4KVL0 (B), B4KVL1 (C)	B4KXN5	B4KXM3	NA	100
	I006	124-126	B4KVL6 (S), B4KVL3 (A), B4KVL4 (B), B4KVL5 (C)	B4KXN6	B4KXM4	NA	100
	I007	135-137	B4KVM0 (S), B4KVL7 (A), B4KVL8 (B), B4KVL9 (C)	B4KXN7	B4KXM5	NA	100
	I008	151-153	B4KVM4 (S), B4KVM1 (A), B4KVM2 (B), B4KVM3 (C)	B4KXN8	B4KXM6	NA	100

Table A-1. Sample Interval Information (12 sheets)

Sample Location (Field ID) [Total Depth]	Sample Interval[a]	Depth (ft bgs)[a]	Field Sample Number (type)[b]	222-S Composite Sample Number	GEL Composite Sample Number	Cape Fear Sample Number	Percent Recovery[c]
D0604 (S-J-5a) [158 ft bgs]	EB	NA	B4MHY8 (Q), B4MHY9 (Q)	NA	NA	NA	NA
	FB	NA	B4MJ00 (Q), B4MJ01 (Q)	NA	NA	NA	NA
	SURFACE	0-1	B4MHY6 (M), B4MHY7 (M)	NA	NA	NA	NA
	I001	3.5-6.5	B4KVP6 (S), B4KVP3 (A), B4KVP4 (B), B4KVP5(C)	B4L3R6	B4L3P6	NA	86
	I002	11.5-14.5	B4KVR0 (S), B4KVP7 (A), B4KVP8 (B), B4KVP9 (C)	B4L3R7	B4L3P7	NA	100
	I003	46-48	B4KVR4 (S), B4KVR1 (A), B4KVR2 (B), B4KVR3 (C)	B4L3R8	B4L3P8	NA	100
	I004	53-55	B4KVR8 (S), B4KVR5 (A), B4KVR6 (B), B4KVR7 (C)	B4L3R9	B4L3P9	NA	100
	I005	109-111	B4KVT2 (S), B4KVR9 (A), B4KVT0 (B), B4KVT1 (C)	B4L3T0	B4L3R0	NA	100
	I006	128-130	B4KVT6 (S), B4KVT3 (A), B4KVT4 (B), B4KVT5 (C)	B4L3T1	B4L3R1	NA	100
	I007	139-141	B4KVV0 (S), B4KVT7 (A), B4KVT8 (B), B4KVT9 (C)	B4L3T2	B4L3R2	NA	100
	I008	156-158	B4KVV4 (S), B4KVV1 (A), B4KVV2 (B), B4KVV3 (C)	B4L3T3	B4L3R3	NA	100

Table A-1. Sample Interval Information (12 sheets)

Sample Location (Field ID) [Total Depth]	Sample Interval[a]	Depth (ft bgs)[a]	Field Sample Number (type)[b]	222-S Composite Sample Number	GEL Composite Sample Number	Cape Fear Sample Number	Percent Recovery[c]
D0606 (S-J-6c) [157 ft bgs[c]]	FTB 1	NA	B4KW25 (Q)	NA	NA	NA	NA
	FTB 2	NA	B4KW26 (Q)	NA	NA	NA	NA
	FTB 3	NA	B4KW27 (Q)	NA	NA	NA	NA
	FTB 4	NA	B4KW28 (Q)	NA	NA	NA	NA
	FTB 5	NA	B4KW29 (Q)	NA	NA	NA	NA
	FTB 6	NA	B4KW30 (Q)	NA	NA	NA	NA
	SURFACE	0-1	B4KVW3 (M), B4KVD5 (M), B4KVD6 (M)	NA	NA	NA	NA
	SURFACE DUP	0-1	B4KVW4 (M), B4KVD7 (M), B4KVD8 (M)	NA	NA	NA	NA
	I001	3.5-6.5	B4KVX8 (S), B4KVX5 (A), B4KVX6 (B), B4KVX7 (C), B4KVW5 (V)	B4L4B1	B4L491	NA	100
	I002	11.5-14.5	B4KVY2 (S), B4KVX9 (A), B4KVY0 (B), B4KVY1 (C), B4KVW6 (V)	B4L4B2	B4L492	NA	95
	I003	50-52	B4KVY6 (S), B4KVY3 (A), B4KVY4 (B), B4KVY5 (C), B4KVW7 (V)	B4L4B3	B4L493	NA	100
	I004	72-74	B4KW00 (S), B4KVY7 (A), B4KVY8 (B), B4KVY9 (C), B4KVW8 (V)	B4L4B4	B4L494	NA	100
	I005	114-116	B4KW04 (S), B4KW01 (A), B4KW02 (B), B4KW03 (C), B4KVW9 (V)	B4L4B5	B4L495	NA	100

Table A-1. Sample Interval Information (12 sheets)

Sample Location (Field ID) [Total Depth]	Sample Interval[a]	Depth (ft bgs)[a]	Field Sample Number (type)[b]	222-S Composite Sample Number	GEL Composite Sample Number	Cape Fear Sample Number	Percent Recovery[c]
	I006	129-131	B4KW08 (S), B4KW05 (A), B4KW06 (B), B4KW07 (C), B4KVX0 (V)	B4L4B6	B4L496	NA	100
	I007	155-157	B4KW12 (S), B4KW09 (A), B4KW10 (B), B4KW11 (C), B4KVX1 (V)	B4L4B7	B4L497	NA	100
East Polygon							
D0608 (EP-1a) [14.5 ft bgs]	EB	NA	B4L534 (Q), B4L531 (Q)	NA	NA	NA	NA
	FB	NA	B4L535(Q), B4L532(Q)	NA	NA	NA	NA
	SURFACE	0-1	B4L533 (M), B4L530 (M)	NA	NA	NA	NA
	I001	3.5-6.5	B4L539 (S), B4L536 (A), B4L537 (B), B4L538 (C)	B4L633	B4L630	NA	NA
	I002	11.5-14.5	B4L543 (S), B4L540 (A), B4L541 (B), B4L542 (C)	B4L634	B4L631	NA	NA
D0610[i] (EP-2a) [14.5 ft bgs]	SURFACE[i]	0-1	NA	NA	NA	NA	0
	I001	3.5-6.5	B4L551 (S), B4L548 (A), B4L549 (B), B4L550 (C)	B4L639	B4L636	NA	100
	I002	11.5-14.5	B4L555 (S), B4L552 (A), B4L553 (B), B4L554 (C)	B4L640	B4L637	NA	100
D0612 (EP-3a) [14.5 ft bgs]	SURFACE	0-1	B4L563 (M), B4L562 (M)	NA	NA	NA	NA
	I001	3.5-6.5	B4L567 (S), B4L564 (A), B4L565 (B), B4L566 (C)	B4L645	B4L642	NA	100
	I002	11.5-14.5	B4L571(S), B4L568(A), B4L569 (B), B4L570 (C)	B4L646	B4L643	NA	97

Table A-1. Sample Interval Information (12 sheets)

Sample Location (Field ID) [Total Depth]	Sample Interval[a]	Depth (ft bgs)[a]	Field Sample Number (type)[b]	222-S Composite Sample Number	GEL Composite Sample Number	Cape Fear Sample Number	Percent Recovery[c]
D0614 (EP-4a) [14.5 ft bgs]	SURFACE	0-1	B4L576 (M), B4L577 (M)	NA	NA	NA	NA
	I001	3.5-6.5	B4L581 (S), B4L578 (A), B4L579 (B), B4L580 (C)	B4L651	B4L648	NA	100
	I002	11.5-14.5	B4L585 (S), B4L582 (A), B4L583 (B), B4L584 (C)	B4L652	B4L649	NA	100
D0616[h] (EP-5f and EP-5c) [158 ft bgs]	EB	NA	B4L5F4 (Q), B4L5D7 (Q), B4L5D8 (V)	NA	NA	NA	NA
	FB	NA	B4L5F5 (Q), B4L5D9 (Q), B4L5F0 (V)	NA	NA	NA	NA
	FTB 1	NA	B4L5F7 (Q)	NA	NA	NA	NA
	FTB 2	NA	B4L5F8 (Q)	NA	NA	NA	NA
	FTB 3	NA	B4L5F9 (Q)	NA	NA	NA	NA
	FTB 4	NA	B4L5H0 (Q)	NA	NA	NA	NA
	FTB 5	NA	B4L5H1 (Q)	NA	NA	NA	NA
	FTB 6	NA	B4L5H2 (Q)	NA	NA	NA	NA
	SURFACE	0-1	B4L5F2 (M), B4L5D3 (M), B4L5D4 (V)	NA	NA	NA	NA
	SURFACE DUP	0-1	B4L5F3 (M), B4L5D5 (M), B4L5D6 (V)	NA	NA	NA	NA
	I001	3.5-6.5	B4L5J6 (S), B4L5J3 (A), B4L5J4 (B), B4L5J5 (C), B4L5H3 (V)	B4L665	B4L654	NA	100
	I002	11.5-14.5	B4L5K0 (S), B4L5J7 (A), B4L5J8 (B), B4L5J9 (C), B4L5H4 (V)	B4L666	B4L655	NA	100
	I003	25-28	B4L5K4 (S), B4L5K1 (A), B4L5K2 (B), B4L5K3 (C), B4L5H5 (V)	B4L667	B4L656	NA	100
	I004	44-47	B4L5K8 (S), B4L5K5 (A), B4L5K6 (B), B4L5K7 (C), B4L5H6 (V)	B4L668	B4L657	NA	100

Table A-1. Sample Interval Information (12 sheets)

Sample Location (Field ID) [Total Depth]	Sample Interval[a]	Depth (ft bgs)[a]	Field Sample Number (type)[b]	222-S Composite Sample Number	GEL Composite Sample Number	Cape Fear Sample Number	Percent Recovery[c]
	I005	49-51	B4L5L2 (S), B4L5K9 (A), B4L5L0 (B), B4L5L1 (C), B4L5H7 (V)	B4L669	B4L658	NA	100
	I006	107-109	B4L5L6 (S), B4L5L3 (A), B4L5L4 (B), B4L5L5 (C), B4L5H8 (V)	B4L670	B4L659	NA	100
	I007	124-126	B4L5M0 (S), B4L5L7 (A), B4L5L8 (B), B4L5L9 (C), B4L5H9 (V)	B4L671	B4L660	NA	100
	I008	156-158	B4L5M4 (S), B4L5M1 (B), B4L5M2 (B), B4L5M3 (C) B4L5J0 (V)	B4L672	B4L661	NA	100
D0618 (EP-6a) [14.5 ft bgs]	EB	NA	B4L592 (Q), B4L594 (Q)	NA	NA	NA	NA
	FB	NA	B4L593 (Q), B4L595 (Q)	NA	NA	NA	NA
	SURFACE	0-1	B4L591 (M), B4L590 (M)	NA	NA	NA	NA
	I001	3.5-6.5	B4L599 (S), B4L596 (A), B4L597 (B), B4L598 (C)	B4L678	B4L675	NA	100
	I002	11.5-14.5	B4L5B3 (S), B4L5B0 (A), B4L5B1 (B), B4L5B2 (C)	B4L679	B4L676	NA	100
D0620 (EP-J-1a) [14.5 ft bgs]	SURFACE	0-1	B4L5B8 (M), B4L5B9 (M)	NA	NA	NA	NA
	I001	3.5-6.5	B4L5C3 (S), B4L5C0 (A), B4L5C1 (B), B4L5C2 (C)	B4L684	B4L681	NA	73
	I002	11.5-14.5	B4L5C7 (S), B4L5C4 (A), B4L5C5 (B), B4L5C6 (C)	B4L685	B4L682	NA	100

DUP = duplicate
EB = equipment blank
FB = field blank
FTB = field transfer blank
ft bgs = feet below ground surface
ID = identification
NA = not applicable

Reference: RPP-RPT-66126, *Completion Report for 241-S Farm and East Polygon Soil Samples.*

Note: Soil samples were analyzed at the Hanford Laboratory Management and Integration Laboratory (222-S); GEL Laboratories, LLC; or Cape Fear Analytical, LLC.

Table A-1. Sample Interval Information (12 sheets)

Sample Location (Field ID) [Total Depth]	Sample Interval[a]	Depth (ft bgs)[a]	Field Sample Number (type)[b]	222-S Composite Sample Number	GEL Composite Sample Number	Cape Fear Sample Number	Percent Recovery[c]

[a] Sample Intervals are identified by I (interval) and #. After several shallow sample locations were pushed to a depth of 14 ft bgs, it was decided in a meeting with Washington State Department of Ecology to push to 14.5 ft bgs for the remaining shallow samples. Therefore, shallow sample depth intervals would be 3 ft: 3.5 to 6.5 ft bgs and 11.5 to 14.5 ft bgs (refer to December 18, 2024, notes in RPP-RPT-66126, Appendix B).

[b] Field sample types are defined as follows: A= Liner A, B=Liner B, C=Liner C, S=Shoe, Q=quality control, V=volatile and M=manually collected.

[c] The recovery percentage for soil samples is calculated assuming that 100% recovery is when the shoe contains 107.6 grams of soil and each liner contains 162 grams of soil for an overall total of 594 grams of material.

[d] Characterization Deviation Forms WMA_S-SX-002 and WMA_S-SX-003 identify issues associated with laboratory analysis not performed on composite samples from location D0594 and D0598.

[e] Characterization Deviation Form WMA_S-SX-003 identifies issues associated with laboratory analysis not performed on composite analysis from location D0594.

[f] Characterization Deviation Form WMA_S-SX-007 identifies that there was an issue at D0596 with the composite sample from 12 to 14 ft bgs (insufficient recovery). A contingent sample was collected at 14.5 to17.5 ft bgs.

[g] Characterization Deviation Form WMA_S-SX-001 identifies that the 37 to 39 ft bgs sample was not collected at D0600 (S-J-3a). Sample collection was attempted at the planned sample depth with 0% recovery and again at 39 to 41 ft bgs with 0% recovery. The field crew moved to the backup sampling location (S-J-3c refer to Characterization Deviation Form WMA_S-SX-005) and over-drove the interval 37 to 40 ft bgs with 0% recovery. No further attempts were made at sample collection.

[h] Characterization Deviation Form WMA_S-SX-005 identifies the change in the number of sampling locations at D0600 and D0616. Note that for D0600, the field crew moved to the backup sampling location (S-J-3c) and over-drove the interval 37 to 40 ft bgs with 0% recovery. No further attempts were made at sample collection. Additionally, two pushes were required for D0616 (Characterization Deviation Form WMA_S-SX-005). At the initial sampling push of EP-5f, the outer drive tubing broke at ~16 ft bgs and inner drive tubing broke at ~ 40 ft bgs. The last sample collected was 49 to 51 ft bgs. A second sampling push was conducted at EP-5c, where three samples were collected between 107 and 158 ft bgs.

[i] Characterization Deviation Form WMA_S-SX-004 identifies that surface and surface duplicate samples were not collected at D0610. The sample could not be collected due to the presence of asphalt at the surface of the sample location.

APPENDIX B

REVIEW QUALIFIER DEFINITIONS

This page intentionally left blank.

Table B-1. Data Qualifiers (3 sheets)

Qualifier	Definition
Laboratory-Applied Qualifier	
*	Inorganics: Duplicate analysis not within control limits.
+	Inorganics: Correlation coefficient for Method of Standard Additions is < 09. 95.
>	Wetchem: Result greater than quantifiable range or greater than upper limit of the analysis range.
A	Organics: Valid for TICs only; the TIC is a suspected aldol-condensation product.
B	Inorganics and Wetchem: The analyte was detected at a value less than the contract RDL or PQL, but greater than or equal to the IDL/MDL (as appropriate). The “B” and “U” qualifiers are mutually exclusive.
	Organics: The analyte was detected in both the associated QC blank and in the sample, and the blank concentration exceeded the customer’s contractual requirements.
	Radionuclides: The associated QC sample blank has a result greater than the MDA, and after corrections, the result is greater than or equal to the MDA for this sample, and the blank concentration exceeded the customer’s contractual requirements.
C	Inorganics and Wetchem: The analyte was detected in both the sample and the associated QC method blank, and the blank concentration exceeded the customer’s contractual requirements.
	Organics (pesticide only): The identification of a pesticide confirmed by GC/MS.
D	All: Analyte was reported at a secondary dilution factor (i.e., the primary preparation required dilution to either bring the analyte within the calibration range or to minimize interference).
E	Inorganics: Reported value is estimated because of interference or because it exceeds the calibration range. See comment on cover page, case narrative, or specific data sheet.
	Organics: Concentration exceeds the calibration range of the GC/MS.
H	Laboratory holding time exceeded before the sample was analyzed.
J	Organics: estimated value – (1) constituent detected at a level less than the RDL or PQL and greater than or equal to the MDL, (2) estimated concentration for TICs.
M	Inorganics: Duplicate precision criteria not met.
N	All (except GC/MS): Spike and/or spike duplicate sample recovery is outside control limits.
	Organics (GC/MS only): presumptive evidence of compound based on mass spectral library search.
O	LCS recoveries and/or concentration(s) were detected outside control limits.
P	Organics (PCBs only): Aroclor target analyte with greater than 25% difference between column analyses.
Q	Organics (Dioxins and PCB-congeners only): Estimated maximum concentration. Used if one of the qualitative identification criteria is not met (e.g., chlorine isotopic ratios outside theoretical range).
S	Inorganics: Reported value determined by the Method of Standard Additions.

Table B-1. Data Qualifiers (3 sheets)

Qualifier	Definition
Laboratory-Applied Qualifier	
T	Organics (GC/MS only): Spike and/or spike duplicate sample recovery is outside control limits.
U	All: Nondetect – analyzed for but not detected above limiting criteria. Limiting criteria may be any of the following: value reported < 0; value reported < counting error; value reported < total analytical error; value reported ≤ contract MDL/IDL/MDA/PQL. When another qualifier accompanies a "U", the result is always considered nondetect.
X	All: The result-specific translation of this qualifier code is provided in the laboratory data report or case narrative. Additional result-specific translation information may also be found in the RESULT_COMMENT field for this record.
Y	Same as X if more than one qualifier is required.
Z	Same as X and Y if more than two qualifiers are required.
Data Validation-Applied Qualifier	
J	Indicates the constituent was analyzed for and detected. The associated value is estimated due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
J+	Indicates the constituent was analyzed for and detected. The associated value is estimated with a suspected positive bias due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
J-	Indicates the constituent was analyzed for and detected. The associated value is estimated with a suspected negative bias due to a quality control deficiency identified during data validation. The data should be considered usable for decision-making purposes.
N	The analysis indicates the presence of an analyte that has been tentatively identified.
NJ	The analysis indicates the presence of an analyte that has been tentatively identified, and the associated numerical value represents its approximate concentration.
NJ+	The analysis indicates the presence of an analyte that has been tentatively identified. The associated value is estimated with a suspected positive bias due to a quality control deficiency identified during data validation.
NJ-	The analysis indicates the presence of an analyte that has been tentatively identified. The associated value is estimated with a suspected negative bias due to a quality control deficiency identified during data validation.
U	The constituent was analyzed for but was not detected. The data should be considered usable for decision-making purposes.
UJ	The constituent was analyzed for and was not detected. Due to a quality control deficiency identified during data validation the value reported may not accurately reflect the reporting limit. The data should be considered usable for decision-making purposes.
UR	Indicates the constituent was analyzed for and not detected; however, due to an identified quality control deficiency the data should be considered unusable for decision-making purposes.
R	Indicates the constituent was analyzed for and detected; however, due to an identified quality control deficiency the data should be considered unusable for decision-making purposes.

Table B-1. Data Qualifiers (3 sheets)

Qualifier	Definition
Data Reviewer-Applied Qualifier	
F	The result is undergoing further review.
G	Records have been reviewed and determined to be correct, or the record has been corrected with laboratory confirmation or other supporting information.
H	Laboratory holding time exceeded before the sample was analyzed.
P	Potential problem. Collection/analysis circumstances make value questionable.
Q	Associated quality control sample is out of limits.
R	Do not use. Further review indicates that the result is not valid.
Y	Result suspect. Review – insufficient evidence to show result valid or invalid.
Z	Miscellaneous circumstances exist. Additional information may be found in the RESULT_COMMENT field for this record and/or in the SAMP_COMMENT field of the parent sample record.

GC/MS = gas chromatography/mass spectrometry
IDL = instrument detection limit
LCS = laboratory control sample
MDA = minimum detectable activity
MDL = method detection limit
PCB = polychlorinated biphenyl
PQL = practical quantitation limit
QC = quality control
RDL = required detection limit
TIC = tentatively identified compound

Data Qualifiers are defined as described in:

- EPA/240/R-02/004, *Guidance on Environmental Data Verification and Data Validation, EPA QA/G-8*
- CP-15383, *Common Requirements of the Format for Electronic Analytical Data (FEAD)*
- RPP-RPT-66358, *Data Validation Report for WMA S-SX RCRA Facility Investigation: VSR26-001*

APPENDIX C

DATA VALIDATION RESULTS

This page intentionally left blank.

Table C-1. Summary of Data Validation Qualification for Soil Samples (3 sheets)

Constituent(s)	Qualifier*	Affected Samples	Reason
VOCs/SVOCs – EPA 8270E/8270E SIM			
Hexachlorobenzene, Tributyl phosphate	UJ	B4KVC5, B4KVC6	Low matrix spike recovery
Fluoranthene (SIM) Pyrene (SIM)	J-	B4KVC5 B4KVC6	Low matrix spike and/or matrix spike duplicate recoveries, low laboratory control sample recovery
Naphthalene (SIM), Acenaphthene (SIM)	UJ	B4KVC5, B4KVC6	Low matrix spike and/or matrix spike duplicate recoveries, low laboratory control sample recovery
Chrysene (SIM), Benzo(b)fluoranthene (SIM), Benzo(k)fluoranthene (SIM), Benzo(a)pyrene (SIM), Dibenzo(a,h)anthracene (SIM)	J-	B4KVC5	Low matrix spike and/or matrix spike duplicate recoveries, low laboratory control sample recovery
Indeno(1,2,3-cd)pyrene (SIM)	J-	B4KVC5	Low matrix spike and/or matrix spike duplicate recoveries
Benzo(a)anthracene (SIM)	J-	B4KVC5	Low laboratory control sample recovery
Chrysene (SIM), Benzo(b)fluoranthene (SIM), Benzo(k)fluoranthene (SIM), Benzo(a)pyrene (SIM), Dibenzo(a,h)anthracene (SIM)	UJ	B4KVC6	Low matrix spike and/or matrix spike duplicate recoveries, low laboratory control sample recovery
Indeno(1,2,3-cd)pyrene (SIM)	UJ	B4KVC6	Low matrix spike and/or matrix spike duplicate recoveries
Benzo(a)anthracene (SIM)	UJ	B4KVC6	Low laboratory control sample recovery
Naphthalene (SIM), Acenaphthene (SIM), Fluoranthene (SIM), Pyrene (SIM), Benzo(b)fluoranthene (SIM), Benzo(k)fluoranthene (SIM), Indeno(1,2,3-cd)pyrene (SIM), Dibenzo(a,h)anthracene (SIM)	UJ	B4L496, B4L497	Low laboratory control sample and/or laboratory control sample duplicate recoveries
Hexachlorobenzene, Tributyl phosphate	UR	B4L657, B4L658	Extraction beyond 2X the holding time
Naphthalene (SIM), Acenaphthene (SIM) Fluoranthene (SIM), Pyrene (SIM), Benzo(a)anthracene (SIM), Chrysene (SIM), Benzo(b)fluoranthene (SIM), Benzo(k)fluoranthene (SIM), Benzo(a)pyrene (SIM), Indeno(1,2,3-cd)pyrene (SIM), Dibenzo(a,h)anthracene (SIM)	UR	B4L657, B4L658	Extraction beyond 2X the holding time

Table C-1. Summary of Data Validation Qualification for Soil Samples (3 sheets)

Constituent(s)	Qualifier*	Affected Samples	Reason
PCB Congeners – EPA 1668B			
2,3',4,4',5-Pentachlorobiphenyl	J-	B4MHY4	Very low matrix spike recovery
2,3',4,4',5-Pentachlorobiphenyl	UR	B4KXL7, B4KXL9	Very low matrix spike recovery
2,3,3',4,4'-Pentachlorobiphenyl	J-	B4MHY4	Low matrix spike recovery
2,3,3',4,4'-Pentachlorobiphenyl	UJ	B4KXL7, B4KXL9	Low matrix spike recovery
Metals – EPA 6010/6020			
Antimony	J+	B4KVC5, B4KVC6, B4MHY0, B4KXK8, B4KXL0, B4KXL2, B4KXM2	Method blank contamination
Antimony	J-	B4L657, B4L658	Negative blank result
Tin	J+	B4KVC5, B4L592, B4L593, B4L657, B4L658	Method blank contamination
Sulfur	J+	B4MHY0, B4KXK8, B4KXL0, B4KXL2,	Method blank contamination
Lead	UJ	B4L497	Negative blank result
Lead	J+	B4MHY3, B4KXL8, B4KXM0, B4KXM1, B4KXM2	Method blank contamination
Strontium, Zinc	J+	B4L592, B4L593	Method blank contamination
Arsenic, Cobalt, Lithium, Nickel, Thorium, Vanadium, Zirconium	J	B4KVC5, B4KVC6	High matrix spike and matrix spike duplicate recoveries
Cobalt, Nickel	J	B4L657, B4L658	Low matrix spike and/or matrix spike duplicate recoveries
Barium, Zirconium	J	B4L657, B4L658	High matrix spike and/or matrix spike duplicate recoveries
General Chemistry			
Total organic carbon	J	B4MHY0, B4KXK8, B4KXL0	Analysis beyond the holding time but within 2X the holding time, matrix spike recoveries outside the acceptance limits, laboratory duplicate imprecision
Hexavalent chromium	UJ	B4MHY0, B4KXK8, B4KXL0	Extraction beyond the holding time but within 2X the holding time
Total organic carbon	J+	B4L496	High matrix spike recovery
Total organic carbon	J-	B4L497	Low matrix spike and matrix spike duplicate recoveries
Hexavalent chromium	J+	B4L657, B4L658	Method blank contamination

Table C-1. Summary of Data Validation Qualification for Soil Samples (3 sheets)

Constituent(s)	Qualifier*	Affected Samples	Reason
Radiochemical			
Tin-126	R	B4L496	Peak identified as a false positive due to high peak width and interference
Cesium-137	R	B4L497	Peak identified as a false positive due to no valid peak
Europium-152	R	B4KXM2	Peak identified as a false positive due to low abundance
Tin-126	J+	B4KVC5, B4KVC6, B4KXL0, B4KXM0, B4L592, B4L658	Peak identified as a false positive due to interference
Europium-155	J+	B4L593	Peak identified as a false positive due to interference
Uranium-238	J	B4KVC5, B4KVC6	Laboratory duplicate imprecision
Neptunium-237	UJ	B4MHY0	Low tracer recovery
Uranium-235/236	J	B4L496, B4L497	Laboratory control sample duplicate imprecision
Uranium-235/236	UJ	B4L590, B4L675	Laboratory control sample duplicate imprecision
Nickel-63	UJ	B4L590, B4L592, B4L593, B4L675	Low laboratory control sample duplicate recovery
Carbon-14	UJ	B4L657, B4L658	Laboratory control sample duplicate imprecision

EPA = U.S. Environmental Protection Agency
MS = matrix spike
MSD = matrix spike duplicate
PCB = polychlorinated biphenyl
SIM = selected ion monitoring
SVOC = semivolatile organic compound
VOC = volatile organic compound
*See Appendix B, Table B-1 for data qualifier definitions.

INFORMATION CLEARANCE REVIEW AND RELEASE APPROVAL

Part I: Background Information

Title: Data Usability Assessment for 241-S Tank Farm and East Polygon Exposure Areas

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

Publish to OSTI? ☐ Yes ☑ No

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

Document Number: RPP-RPT-66354 Revision 0 Date: July 2026

Author: McGuire, Mickey D

Part II: External/Public Presentation Information

Conference Name:

Sponsoring Organization(s): H2C

Date of Conference: Conference Location:

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

Part III: H2C Document Originator Checklist

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

Part IV: H2C Internal Review

Function	*Organization*	*Date*	*Print Name/Signature/Date*
Subject Matter Expert	H2C	08/10/2026	McGuire, Mickey D Approved - IDMS data file att
Responsible Manager	H2C	07/28/2026	Klages, Deanna L Approved - IDMS data file att
Other:			

Part V: IRM Clearance Services Review

Description	*Yes*	*No*	*Print Name/Signature*
Document Contains Classified Information?	☐	☑	If Answer is "Yes," ADC Approval Required Print Name/Signature/Date
Document Contains Information Restricted by DOE Operational Security Guidelines?	☐	☑	Reviewer Signature: Print Name/Signature/Date
Document is Subject to Release Restrictions? *If the answer is "Yes," please mark category at right and describe limitation or responsible organization below:*	☐	☑	Document contains: ☐ Applied Technology ☐ Protected CRADA ☐ Personal/Private ☐ Export Controlled ☐ Proprietary ☐ Procurement – Sensitive ☐ Patentable Info. ☐ OUO ☐ Predecisional Info. ☐ UCNI ☐ Restricted by Operational Security Guidelines ☐ Other (Specify)
Additional Comments from Information Clearance Specialist Review?	☐	☑	Information Clearance Specialist Approval APPROVED By Sarah Harrison at 12:01 pm, Aug 11, 2026 Print Name/Signature/Date

When IRM Clearance Review is Complete – Return to H2C Originator for Final Signature Routing (Part VI)

INFORMATION CLEARANCE REVIEW AND RELEASE APPROVAL

Part VI: Final Review and Approvals

Description	Approved for Release		Print Name/Signature	
	Yes	N/A		
H2C External Affairs	☑	☐	Kraemer, Kristin M	Approved - IDMS data file att
H2C Office of Chief Counsel	☑	☐	Zhou, Yin	Approved - IDMS data file att
DOE – ORP Public Affairs/Communications	☑	☐	Dawson, Edward M	Approved - IDMS data file att
Other: DOE SME	☑	☐	Millikin, Emily J	Approved - IDMS data file att
Other:	☐	☐		

Comments Required for H2C-Indicate Purpose of Document:

This data usability assessment provides a detailed evaluation of laboratory data generated in accordance with the sampling and analysis plan for the Waste Management Area (WMA) S-SX as described in RPP-PLAN-65977, Phase 2 RCRA Facility Investigation / Corrective Measures Study Work Plan for Waste Management Area S-SX, Appendix D.

APPROVED
By Sarah Harrison at 12:02 pm, Aug 11, 2026

Approved for Public Release;
Further Dissemination Unlimited

Information Release Station

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

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

Date Information Product Stamped/Marked for Release: 08/11/2026

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

Forward Copies of Completed Form to H2C Originator

This XML file does not appear to have any style information associated with it. The document tree is shown below.


```
<workflow name="(SEH) Normal - RPP-RPT-66354 Rev0 " id="410956972">
  <task name="Clearance Process" id="0" date-initiated="20260728T1543" performer="SARAH E HARRISON"
  performer-id="252341659" username="h5635746">
    <comments>Due Tuesday August 10th 2026 - COB Please approve the Data Usability Assessment for
    241-S Tank Farm and East Polygon Exposure Areas, Revision 0, submitted by Mickey McGuire for
    public release.</comments>
  </task>
  <task name="Add XML" id="1" date-done="20260728T1544"> </task>
  <task name="Manager Approval" id="41" date-due="20260731T1543" date-done="20260728T1602"
  performer="DEANNA L KLAGES" performer-id="5225435" username="h0088972" disposition="Approve"
  authentication="true"> </task>
  <task name="Document Reviewer1" id="54" date-due="20260731T1602" date-done="20260729T0708"
  performer="KRISTIN M KRAEMER" performer-id="336057712" username="h4185412" disposition="Public
  Release" authentication="true"> </task>
  <task name="Document Reviewer2" id="53" date-due="20260731T1602" date-done="20260731T0520"
  performer="YIN ZHOU" performer-id="394148081" username="h9243429" disposition="Public Release"
  authentication="true"> </task>
  <task name="Document Reviewer3" id="52" date-due="20260731T1602" date-done="20260805T0651"
  performer="EMILY J MILLIKIN" performer-id="325435156" username="h0098889" disposition="Public
  Release" authentication="true">
    <comments>I had no comments on this document. Emily </comments>
  </task>
  <task name="Doc Owner Clearance Review" id="13" date-due="20260806T0652" date-done="20260806T1104"
  performer="MICKEY D MCGUIRE" performer-id="341164891" username="h5910009" disposition="Send On"
  authentication="true"> </task>
  <task name="Milestone 1" id="24" date-done="20260806T1104"> </task>
  <task name="ORP Document Reviewer1" id="57" date-due="20260810T1104" date-done="20260806T1216"
  performer="EDWARD M DAWSON" performer-id="346251522" username="h9898381" disposition="Public
  Release" authentication="true"> </task>
  <task name="Doc Owner Reviews ORP Comments" id="61" date-due="20260807T1216" date-
  done="20260810T1145" performer="MICKEY D MCGUIRE" performer-id="341164891" username="h5910009"
  disposition="Send On" authentication="true"> </task>
  <task name="Milestone 2" id="62" date-done="20260810T1145"> </task>
  <task name="Verify Doc Consistency" id="4" date-due="20260811T1145" date-done="20260811T1131"
  performer="SARAH E HARRISON" performer-id="252341659" username="h5635746" disposition="Cleared"
  authentication="true"> </task>
</workflow>
```