SGW-62920
Revision 0

Sampling Instruction for Unplanned Release of Groundwater During Uranium Sequestration Stage B Operations in the 300-FF-5 Operable Unit

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-08RL14788

CH2MHILL
Plateau Remediation Company

P.O. Box 1600
Richland, Washington 99352

Approved for Public Release;
Further Dissemination Unlimited

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Plateau Remediation Company
P.O. Box 1600
Richland, Washington 99352

APPROVED
By Janis D. Aardal at 10:49 am, Jan 17, 2019

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1 Introduction

This sampling instruction provides the details for sampling activities associated with the unplanned release of groundwater to the ground during uranium sequestration Stage B operations in the 300-FF-5 Operable Unit (OU). Samples will be collected in accordance with DOE/RL-2014-42, *300-FF-5 Operable Unit Remedy Implementation Sampling and Analysis Plan*; DOE/RL-96-68, *Hanford Analytical Services Quality Assurance Requirements Document*; and discussions with the U.S. Department of Energy (DOE). Shallow soil samples from the release area are necessary to determine whether or not uranium contamination resulted from the unplanned release and, if so, its nature and extent.

The remedy for uranium contamination in the 300-FF-5 OU groundwater is enhanced attenuation using polyphosphate solutions to sequester uranium. Polyphosphate solution was injected during Stage B of the remedy implementation from September 4 through September 20, 2018. A sampling manifold was used to take daily planned groundwater samples at 18 of the 24 monitoring wells during the injections as well as the following week. Purgewater was pumped from the wells into two 11,400 L (3,000 gal) storage tanks before sampling. On September 20, 2018, the groundwater pumps in two wells (399-1-23 and 399-1-162) remained on after the sampling evolution, supplying approximately 20 L/min (5 gal/min) of water each (40 L/min [10 gal/min] combined) to the storage tanks that overflowed 22,000 to 23,000 L (5,800 to 6,100 gal) onto the ground before the spill was discovered on September 21, 2018, approximately 19 hours after groundwater sampling. A coordinate survey determined the wetted area footprint to be 284.5 m^2 (3,062.5 ft^2), located within the 316-2 waste site (North Process Pond) (Figure 1).

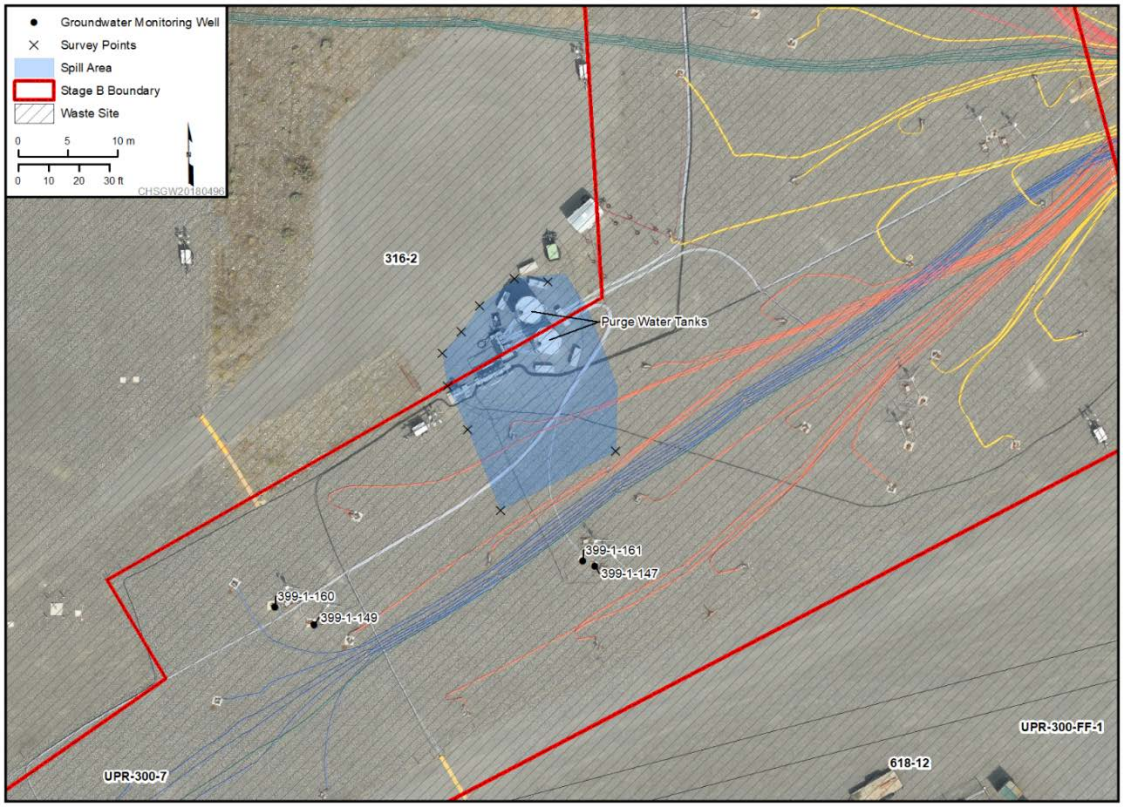

Figure 1. Aerial Photograph of the Stage B Area Showing the Surface Footprint of the Unplanned Release of Groundwater from the Purgewater Tanks

1.1 Purpose

The purpose of collecting shallow soil samples from the spill area is to determine:

- If the potential concentration of uranium discharged to the soil is above the exposure limit for shallow soil
- If the concentration of uranium discharged to the soil is above the clean-up criteria for soil such that the 316-2 waste site description needs to be amended
- If the mass of uranium discharged to the soil is above the reportable quantity limit

The primary purpose of this sampling instruction is to identify the locations, methods, and analyses for the shallow samples.

1.2 Site Description and Process Information

Waste site 316-2 (North Process Pond) was used from 1948 to 1974. Remediation activities were initiated in May 1998 and completed in June 1999. The soil was excavated to a depth of 7.5 m (25 ft) and the excavation was backfilled. The waste site was reclassified in the Waste Information Data System as closed out. Prior to remediation and closeout, the North Process Pond received cooling water and low-level process water from fuel fabrication facilities and early laboratories.

The 2013 record of decision for the 300-FF-5 OU (EPA and DOE, 2013, *Hanford Site 300 Area Record of Decision for 300-FF-2 and 300-FF-5, and Record of Decision Amendment for 300-FF-1*) specifies enhanced attenuation as the final 300-FF-5 OU remedial action for uranium. Enhanced attenuation consists of injecting polyphosphate solutions into the subsurface through wells to sequester uranium. The enhanced attenuation remedy was implemented within a 1.2 ha (3 ac) area in two stages per DOE/RL-2014-13-ADD2, *Remedial Design Report/Remedial Action Work Plan Addendum for the 300 Area Groundwater*. Stage A, consisting of infiltration and injection of polyphosphate solutions within an approximately 0.3 ha (0.75 ac) area, was completed in November 2015. An adjacent area of approximately 0.9 ha (2.25 ac) received Stage B injections from September 4 through September 20, 2018.

A centrally located sampling manifold was used to sample 18 of the 24 groundwater monitoring wells daily both during Stage B injections as well as the week following (Figure 2). Dedicated pumps in each well were used to purge the wells prior to sample collection. Purgewater was pumped into two 11,400 L (3,000 gal) purgewater storage tanks. Periodically, the purgewater was pumped into tank trucks for transport to the Modular Storage Units located on the Central Plateau. On September 20, 2018, the groundwater pumps in two wells (399-1-23 and 399-1-162) remained on after the sampling evolution, supplying approximately 20 L/min (5 gal/min) of water each (40 L/min [10 gal/min] combined) to the tanks. An estimated 22,000 to 23,000 L (5,800 to 6,100 gal) overflowed onto the ground from the tanks before the spill was discovered on September 21, 2018, approximately 19 hours after groundwater sampling and 18.5 hours after the purgewater tanks were emptied.

The estimated spill volume of 22,000 to 23,000 L (5,800 to 6,100 gal) is the difference between the cumulative amount of water generated for 18.5 hours (11:30 a.m. on September 20, 2018, to 6:00 a.m. on September 21, 2018) at 40 L/min (10 gal/min) (42,000 L [11,100 gal]) and the storage capacity of the two tanks (11,400 L [3,000 gal] each minus 1,300 L to 1,900 L [350 to 500 gal] left in each tank after purgewater was pumped to a purgewater truck at 11:30 a.m. on September 20, 2018).

Figure 2. Groundwater Sampling Manifold and Purgewater Storage Tanks for Stage B Operations

A coordinate survey determined that the wetted area footprint was 284.5 m^2 (3,062.5 ft^2). Water accumulation was noticed near the south and southeast sides of the tanks. The areal extent over which most of the water infiltrated is uncertain; based on the visual evidence, the infiltrated area is unlikely to be smaller than 6 by 6 m (20 by 20 ft).

The spill was discovered at about 5:45 a.m. on September 21, 2018, and source well pumps were shut off at about 6:00 a.m. A radiological control technician performed surveys from 8:30 a.m. to 9:30 a.m., verifying that there was no contamination detected by handheld instruments.

The maximum uranium concentrations in the Hanford Environmental Information System for groundwater samples collected from well 399-1-23 on both September 20 and 21, 2018, are 4.6 µg/L in filtered samples and 4.4 µg/L in unfiltered samples. The maximum uranium concentrations for samples collected from well 399-1-162 on both September 20 and 21, 2018, are 15.0 µg/L in filtered samples and 16.0 µg/L in unfiltered samples. Both of the wells were sampled on a minimum of 22 separate occasions for the time period of August 30 to September 27, 2018, and then sampled once weekly for an additional 4 weeks.

The groundwater produced by these two monitoring wells has assigned listed waste codes F001, F002, F003, F005, and U210 due to contact with the soil. The soil has these assigned listed waste codes due to materials disposed to the soil during active waste disposal operations. A groundwater sample was collected from each well on October 24, 2018, and analyzed for volatile organic analytes and semivolatile organic analytes to evaluate the presence of spent halogenated solvents and spent nonhalogenated solvents specified by these listed waste codes. Results showed trichloroethene was detected in well 399-1-162 at an estimated concentration of 0.44 µg/L.

In the area of the unplanned release, the backfill from the 1998 to 1999 remediation is about 5 m (16.4 ft) thick. A layer of crushed rock approximately 8 to 16 cm (3 to 6 in.) thick was installed on the ground surface to support Stage B operations.

1.3 Data Quality Objectives Summary

A data quality objectives process was used to identify the contaminant of potential concern, sampling locations, and problem statements for soil sampling in the unplanned release area. The data quality objectives information summary is included as Appendix A of this document.

1.3.1 Contaminant of Potential Concern

The contaminant of potential concern associated with the 300-FF-5 OU groundwater unplanned release is uranium from reactor fuel rod fabrication and processing.

1.3.2 Problem Statements

The three problem statements needed to address the three purposes of sampling listed in Section 1.1 are as follows:

- Determine whether uranium concentrations are above the exposure limit for shallow soil, requiring further investigation, or if no further action is necessary.
- Determine whether uranium concentrations are above the cleanup level for shallow soil, requiring an amended waste site description, or if no further action is necessary.
- Determine if the uranium mass is above the reportable quantity limit, requiring a report to the national response center, or if no further action is necessary.

If the uranium concentration in a soil sample is above the practical quantitation limit, then the sample will be analyzed for uranium isotopes to determine whether or not that uranium is naturally occurring. If it is not naturally occurring, further investigation may be required.

2 Project Management

Section 4.1 of DOE/RL-2014-42 discusses the project management approach for the 300-FF-5 OU groundwater remedy.

3 Measurement/Data Acquisition

Section 4.2 of DOE/RL-2014-42 discusses data generation and acquisition for the 300-FF-5 OU groundwater remedy.

3.1 Sampling Process Design

The 10 shallow soil sample locations are listed in Table 1 and shown in Figure 3. Sample locations may need to be adjusted in the field based on practical constraints such as site infrastructure. Four soil samples will be collected at locations of purgewater accumulation as evidenced by standing water to bias toward potential area of contaminant concentration. Five samples are spaced to generate data representative of the release footprint. One background sample is located outside of the spill extent.

Table 1. Shallow Soil Sample Locations

Sample Number	Northing* (m)	Easting* (m)	Analysis	Comments
1	116507.07	594212.34	Total Uranium Isotopic Uranium (as required)	Location of water accumulation south southeast of the tanks
2	116507.48	594215.75		Location of water accumulation southeast of the tanks
3	116514.02	594208.23		North side of the tanks
4	116512.60	594213.68		Location of water accumulation east of the tanks
5	116507.04	594202.27		Northwestern area of the spill extent
6	116510.14	594210.27		Between the tanks
7	116499.71	594208.71		Southwestern area of the spill extent
8	116502.70	594214.51		Southeastern area of the spill extent
9	116495.72	594211.50		Southern area of the spill extent
10	116512.80	594193.54		Background northwest of the spill extent

*Horizontal coordinates per the Washington Coordinate System of 1983, South Zone 1991 (WCS83S), surveyed December 17, 2018.

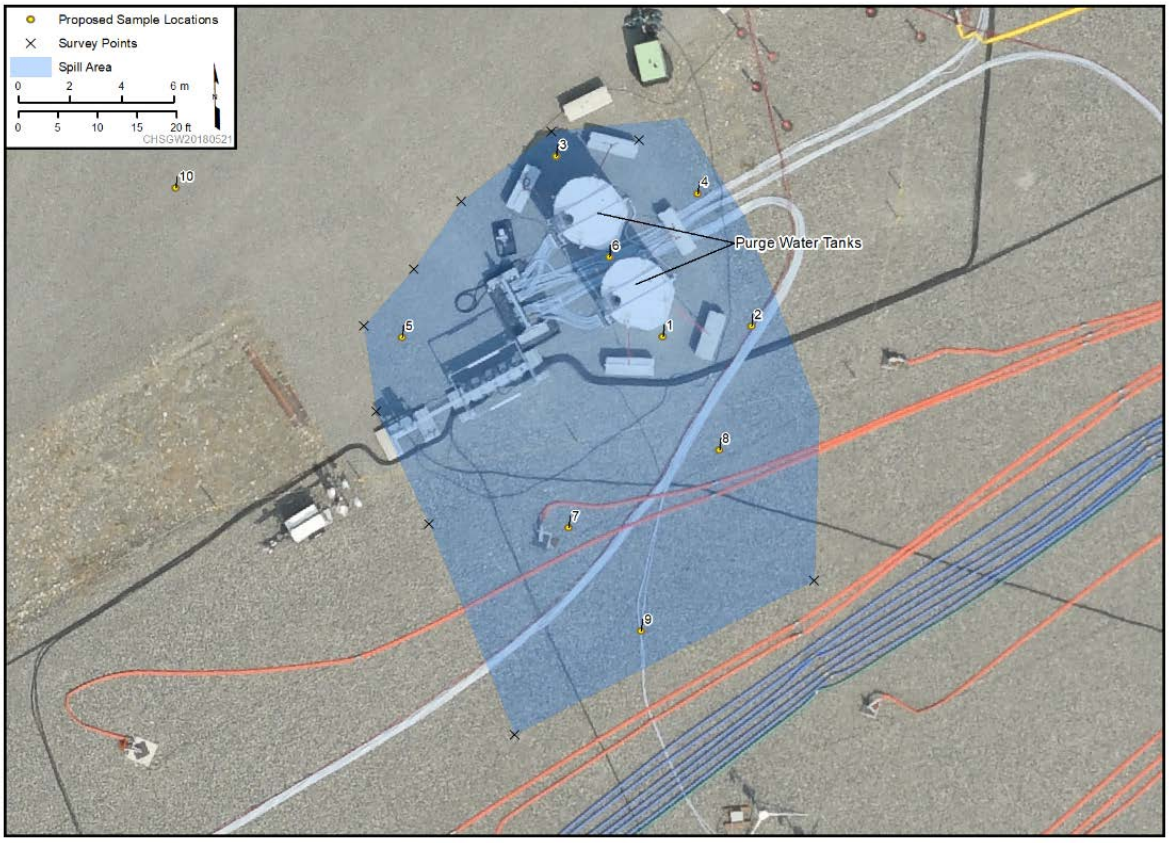

Figure 3. Soil Sample Locations for the Unplanned Release of Groundwater

3.2 Sampling Methods Requirements

Shallow soil samples will be collected 15 to 30 cm (6 to 12 in.) below the layer of crushed rock added to support Stage B operations (Section 1.2). Nine samples will be collected within the footprint of the unplanned release and one background sample will be collected from outside the footprint. One sample will be collected by hand at each location. Appropriate quality control samples will be collected in accordance with Section 4.2 of DOE/RL-2014-42.

3.3 Sample Handling, Shipping, and Custody Requirements

Section 5.4 of DOE/RL-2014-42 discusses sample handling for the 300-FF-5 OU groundwater remedy.

3.4 Analytical Methods

The soil samples will be analyzed for uranium (total) using U.S. Environmental Protection Agency Method ICP/MS 6020 (SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*). If uranium concentrations exceed the practical quantitation limit, then samples will be analyzed for uranium isotopes U-233/234, U-235, and U-238 using alpha energy analysis.

3.5 Quality Control Requirements

Appropriate field quality control samples will be collected to evaluate the potential for cross contamination and laboratory performance. Section 4.2 of DOE/RL-2014-42 discusses quality control requirements for the 300-FF-5 OU groundwater remedy.

3.6 Instrument Calibration and Maintenance

Section 4.2 of DOE/RL-2014-42 discusses instrument calibration and maintenance for the 300-FF-5 OU groundwater remedy.

3.7 Field Documentation

Section 5.2 of DOE/RL-2014-42 discusses field documentation for the 300-FF-5 OU groundwater remedy.

4 Assessments and Response Actions

Section 4.3 of DOE/RL-2014-42 discusses assessments and response actions for the 300-FF-5 OU groundwater remedy.

5 Data Verification and Validation Requirements

Section 4.4 of DOE/RL-2014-42 discusses data verification and validation requirements for the 300-FF-5 OU groundwater remedy.

6 Waste Management

Chapter 6 of DOE/RL-2014-42 discusses waste management for the 300-FF-5 OU groundwater remedy.

Waste materials are generated during drilling, sample collection, processing, and subsampling activities. Waste will be managed in accordance with DOE/RL-2000-56, *Waste Management Plan for the 300-FF-5 OU*, and must be characterized to the extent necessary to meet the requirements of DOE/RL-2011-41, *Hanford Site Strategy for Management of Investigation Derived Waste*.

Offsite analytical laboratories are responsible for the disposal of unused sample quantities and wastes generated during the analytical process. Pursuant to 40 CFR 300.440, "National Oil and Hazardous Substances Pollution Contingency Plan," "Procedures for Planning and Implementing Off-Site Response Actions," approval from the DOE remedial project manager is required before returning unused samples or waste from offsite laboratories.

7 Health and Safety

Chapter 7 of DOE/RL-2014-42 discusses health and safety for the 300-FF-5 OU groundwater remedy.

The hazardous waste operations safety and health program was established to ensure the safety and health of workers involved in hazardous waste site activities. The program was developed to comply with the requirements of 29 CFR 1910.120, "Occupational Safety and Health Standards," "Hazardous Waste Operations and Emergency Response," and 10 CFR 835, "Occupational Radiation Protection." The health and safety program defines the chemical, radiological, and physical hazards and specifies the controls and requirements for day-to-day work activities on the overall Hanford Site. Personal training, control of industrial safety and radiological hazards, personal protective equipment, site control, and general emergency response to spills, fire, accidents, injury, site visitors, and incident reporting are governed by the health and safety program.

8 References

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Appendix A

Data Quality Objectives Information Summary

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PRC-PRO-SMP-53095

Data Quality Objectives Information Summary

Published Date: 01/14/2019 **Effective Date:** 01/14/2019

Appendix A – Systematic Planning Record

Characterization Data Collection Planning Record

Project Summary

Project Name: 300-FF-5 Operable Unit Enhanced Attenuation Stage B Groundwater Unplanned Release	Date: 01/14/2019
Name of Person Completing Record: Virginia Rohay	Position: Project Scientist
Name of Responsible Manager: David St. John	

Project Background:

The remedy for uranium contamination in the 300-FF-5 Operable Unit (OU) groundwater is enhanced attenuation using polyphosphate solutions to sequester uranium. Injections of polyphosphate solution for Stage B of the remedy were implemented from September 4 through September 20, 2018. Daily groundwater sampling at 24 wells was planned during the injections and for one week following the injections. A sampling manifold was used to facilitate sampling 18 of the 24 wells each day. Pumps in the wells were used to purge the wells before sampling. Purgewater was pumped into two 11,400 L (3,000 gal) storage tanks. On September 20, 2018, the groundwater pumps in two wells (399-1-23 and 399-1-162) were left on after sampling, supplying approximately 20 L/min (5 gal/min) of water each (40 L/min [10 gal/min] combined) to the storage tanks. An estimated 22,000 to 23,000 L (5,800 to 6,100 gal) overflowed onto the ground from the tanks before the spill was discovered on September 21, 2018, approximately 19 hours after sampling. A coordinate survey determined that the wetted area footprint was 284.5 m^2 (3,062.5 ft^2), located within the 316-2 waste site (North Process Pond) (Figure 1).

Planning Type:

The planning level for this data quality objective (DQO) process entails elements of internal and external DQO planning as described in PRC-PRO-SMP-53095. This Data Quality Objectives Information Summary (A-6006-889) was prepared by CH2M HILL Plateau Remediation Company (CHPRC) and sent to U.S. Department of Energy, Richland Operations (RL) for review and consensus. The process was not facilitated.

Organization, Schedule, and Goal

State the Problem

Problem Statement: There is a need to sample and analyze soil to determine the uranium concentrations that may have resulted from the unplanned release of groundwater to the ground.
Project Lead: David St. John/CHPRC, 300-FF-5 OU Cost Account Manager.
Project Team: Virginia Rohay/CHPRC, 300-FF-5 OU Project Scientist; Elyse Frohling/CHPRC, 300-FF-5 OU Project Scientist; Chuck Miller/CHPRC, Subject Matter Expert for contaminant transport; Sunil Mehta/Intera, Subject Matter Expert for 300-FF-5 OU contaminant transport; Sarah Springer/CHPRC, Subject Matter Expert for 300-FF-5 OU hydrogeology; Dean Neshem/CHPRC, Project Engineer, Sean Sexton/CHPRC, Environmental Compliance Officer; John Sands/RL, 300-FF-5 OU Project Manager.
Resources: No budgetary or resource issues have been identified.
Project Schedule: Prepare the sampling and analysis instruction by January 17, 2019. Conduct sampling in January 2019.
Waste Site Background: attached.

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Data Quality Objectives Information Summary (Continued)

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Appendix A – Systematic Planning Record

Characterization Data Collection Planning Record

Principal Study Questions	**PSQ 1**	Is the concentration of uranium discharged to soil above the exposure limit for shallow soil.
	PSQ 2	Is the concentration of uranium discharged to soil above the clean-up criteria for soil such that the 316-2 waste site description needs to be amended.
	PSQ 3	Is the mass of uranium discharged to the soil above the reportable quantity limit.

Define alternative outcomes or actions that can occur upon answering PSQs.	**AA 1A**	Consider further investigations of uranium extent in discharge area.
	AA 1B	No further investigations required.
	AA 2A	Submit amended waste description to the Waste Information Data System (WIDS) for the unplanned release.
	AA 2B	No further action required.
	AA 3A	Report uranium mass to national response center.
	AA 3B	No further action required.

Identify the decision statements or estimation statements needed to address the PSQs.	1. Determine whether uranium concentrations are above the exposure limit for shallow soil, requiring further investigation, or if no further action is necessary.
	2. Determine whether uranium concentrations are above the cleanup level for shallow soil, requiring an amended waste site description, or if no further action is necessary.
	3. Determine if the uranium mass is above the reportable quantity limit, requiring a report to the national response center, or if no further action is necessary.

Data Needs

Define what constitutes a sampling unit:

A sampling unit consists of a minimum of one soil sample.

What is the smallest unit upon which decisions or estimates will be made?

The scale of inference is the shallow soil below the surface footprint of the area contacted by the unplanned release of groundwater.

Data Needs Summary

PSQ	Data Need	Media of Interest	Location	Sampling Method	Action Level	Frequency	Practical Constraints	Analytical Method	Potential Source of Data
PSQs 1, 2, and 3	Uranium concentration	Soil below crushed rock	Footprint of unplanned release and background outside footprint	By hand	Practical quantitation limit	once	Site infrastructure	EPA Method 200.8 or EPA Method 6020	Sampling and analysis

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Data Quality Objectives Information Summary (Continued)

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Appendix A – Systematic Planning Record

Characterization Data Collection Planning Record

Performance or Acceptance Criteria

(Determine the quality of data needed and analytical approach)

Specify the population parameter *(e.g., mean, median, or percentile)*, appropriate for making decisions or estimates:

The concentration of uranium in shallow soil samples from below the crushed rock beneath the surface footprint of the ground contacted by the unplanned release of groundwater.

Decision Problem

Provide a decision rule related to the Action Level identified above that includes a clear "if…then…else" statement:

Decision Rules 1, 2, and 3a: If the uranium concentration in a soil sample is above the practical quantitation limit, then analyze the sample for uranium isotopes to determine if the uranium is naturally occurring; otherwise, no further action is required.

Decision Rules 1, 2, and 3b: If the uranium isotopic data indicate that the uranium is not naturally occurring, then further investigation may be required; otherwise, no further action is required.

What are the consequences of making an incorrect decision and what is the tolerance for an incorrect decision?

Decision Errors 1, 2, and 3a a: The uranium concentration is determined to be below the quantitation limit, but it is not. Consequence: Potential uranium contamination would not be evaluated to determine if it is naturally occurring. Severity: Moderate.

Decision Errors 1, 2, and 3a b: The uranium concentration is determined to be above the quantitation limit, but it is not. Consequence: Additional analysis for uranium isotopes would reveal the error. Severity: Low

Decision Errors 1, 2, and 3b a: The uranium isotopic concentrations indicate that the uranium is naturally occurring, but it is not. Consequence: Uranium contamination would not be recognized. Severity: Moderate.

Decision Errors 1, 2, and 3b b: The uranium isotopic concentrations indicate that the uranium is not naturally occurring, but it is. Consequence: Further investigation would reveal the error. Severity: Low

Estimation Problem

Develop the specification of the estimator by combining the true value of the selected population parameter with the scale of estimation and other boundaries:

No estimation specification is established for this study.

What are the acceptable limits on uncertainty?

No limits of uncertainty are established for this study.

Plan for Obtaining the Data

Soil samples will be collected at nine locations within the surface footprint of the area contacted by the unplanned release of groundwater and at one background location outside of this footprint. The samples will be collected 15 to 30 cm (6 to 12 in.) below the crushed rock layer added to support Stage B operations. The samples will be analyzed for uranium and potentially for uranium isotopes as needed. The sample locations are shown on Figure 2.

1. At the location of water accumulation south southeast of the tanks.
2. At the location of water accumulation southeast of the tanks.
3. On the north side of the tanks.
4. At the location of water accumulation east of the tanks.
5. In the northwestern area of the spill extent.
6. Between the tanks.
7. In the southwestern area of the spill extent.
8. In the southeastern area of the spill extent.
9. In the southern area of the spill extent.
10. Background northwest of the spill extent.

Appendix A – Systematic Planning Record

Characterization Data Collection Planning Record

Plan for Obtaining the Data

Waste Site Background

Waste site 316-2 (North Process Pond) was used from 1948 to 1974. Remediation activities were initiated in May 1998 and completed in June 1999. The soil was excavated to a depth of 7.5 m (25 ft) and the excavation was backfilled. The waste site was reclassified in WIDS as closed out.

The record of decision issued in 2013 for the 300-FF-5 OU specifies enhanced attenuation (EA) as the final 300-FF-5 OU remedial action for uranium. Enhanced attenuation consists of injecting polyphosphate solutions into the subsurface through wells to sequester uranium. The enhanced attenuation remedy was implemented within a 1.2 ha (3 ac) area in two stages per DOE/RL-2014-13-ADD2, *Remedial Design Report/Remedial Action Work Plan Addendum for the 300 Area Groundwater.* Stage A was completed in November 2015 and consisted of infiltration and injection of polyphosphate solutions within an approximately 0.3 ha (0.75 ac) area. Stage B injections occurred from September 4 through September 20, 2018, in an adjacent area of approximately 0.9 ha (2.25 ac).

Daily groundwater sampling at 24 wells was planned during the Stage B injections and for one week following the injections. A sampling manifold was used to facilitate sampling 18 of the 24 wells each day. Pumps in the wells were used to purge the wells before sampling. Purgewater was pumped into two 11,400 L (3,000 gal) storage tanks. On September 20, 2018, the groundwater pumps in two wells (399-1-23 and 399-1-162) were left on after sampling, supplying approximately 20 L/min (5 gal/min) of water each (40 L/min [10 gal/min] combined) to the tanks. An estimated 22,000 to 23,000 L (5,800 to 6,100 gal) overflowed onto the ground from the tanks before the spill was discovered on September 21, 2018, approximately 19 hours after sampling and 18.5 hours after the purgewater tanks were emptied. A coordinate survey determined that the wetted area footprint was 284.5 m^2 (3,062.5 ft^2) (Figure 1). Water accumulation was noticed near the south and southeast sides of the tanks. The areal extent over which most of the water infiltrated is uncertain; based on the visual evidence, the infiltrated area is unlikely to be smaller than 6 by 6 m (20 by 20 ft).

The estimated spill volume of 22,000 to 23,000 L (5,800 to 6,100 gal) is the difference between the cumulative amount of water generated for 18.5 hours (11:30 a.m. on September 20, 2018, to 6:00 a.m. on September 21, 2018) at 40 L/min (10 gal/min) (42,000 L [11,100 gal]) and the storage capacity of the two tanks (11,400 L [3,000 gal] each minus 1,300 L to 1,900 L [350 to 500 gal] left in each tank after purgewater was pumped to a purgewater truck at 11:30 a.m. on September 20, 2018).

In the area of the unplanned release, the backfill from the 1998-1999 remediation is about 5 m (16.4 ft) thick. A layer of crushed rock approximately 8 to 16 cm (3 to 6 in.) thick was installed on the ground surface to support the Stage B operations.

The spill was discovered at about 5:45 a.m. on September 21, 2018. A radiological control technician performed surveys from 8:30 a.m. to 9:30 a.m., verifying that there was no contamination detected by handheld instruments.

The maximum uranium concentrations in the Hanford Environmental Information System for groundwater samples collected from well 399-1-23 on both September 20 and 21, 2018, are 4.6 µg/L in filtered samples and 4.4 µg/L in unfiltered samples. The maximum uranium concentrations for samples collected from well 399-1-162 on September 20 and 21, 2018, are 15.0 µg/L in filtered samples and 16.0 µg/L in unfiltered samples.

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Data Quality Objectives Information Summary (Continued)

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Appendix A – Systematic Planning Record

Characterization Data Collection Planning Record

Plan for Obtaining the Data

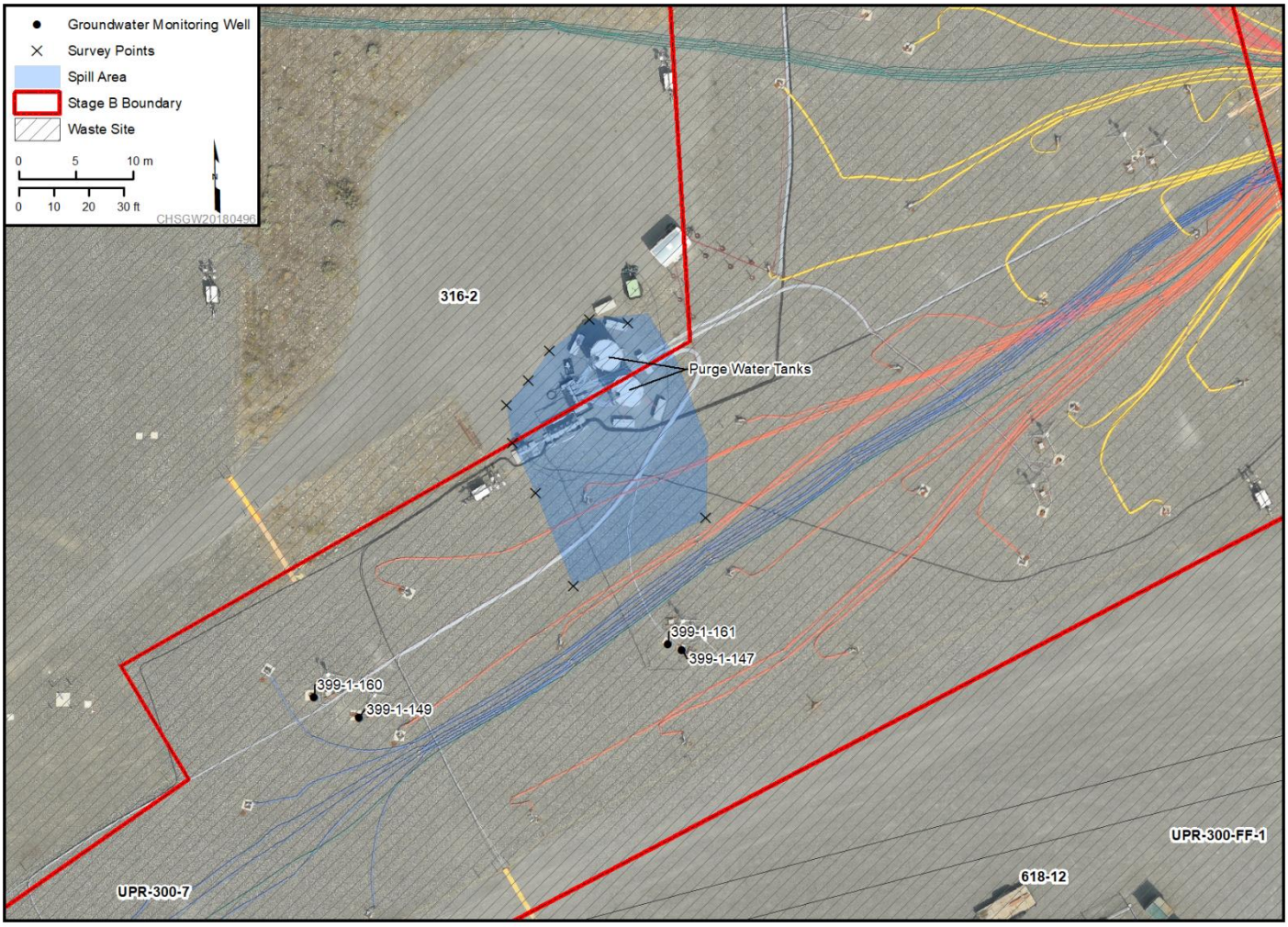

Figure 1. Aerial Photograph of the Stage B Area Showing the Surface Footprint of the Unplanned Release of Groundwater from the Purgewater Tanks.

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Data Quality Objectives Information Summary (Continued)

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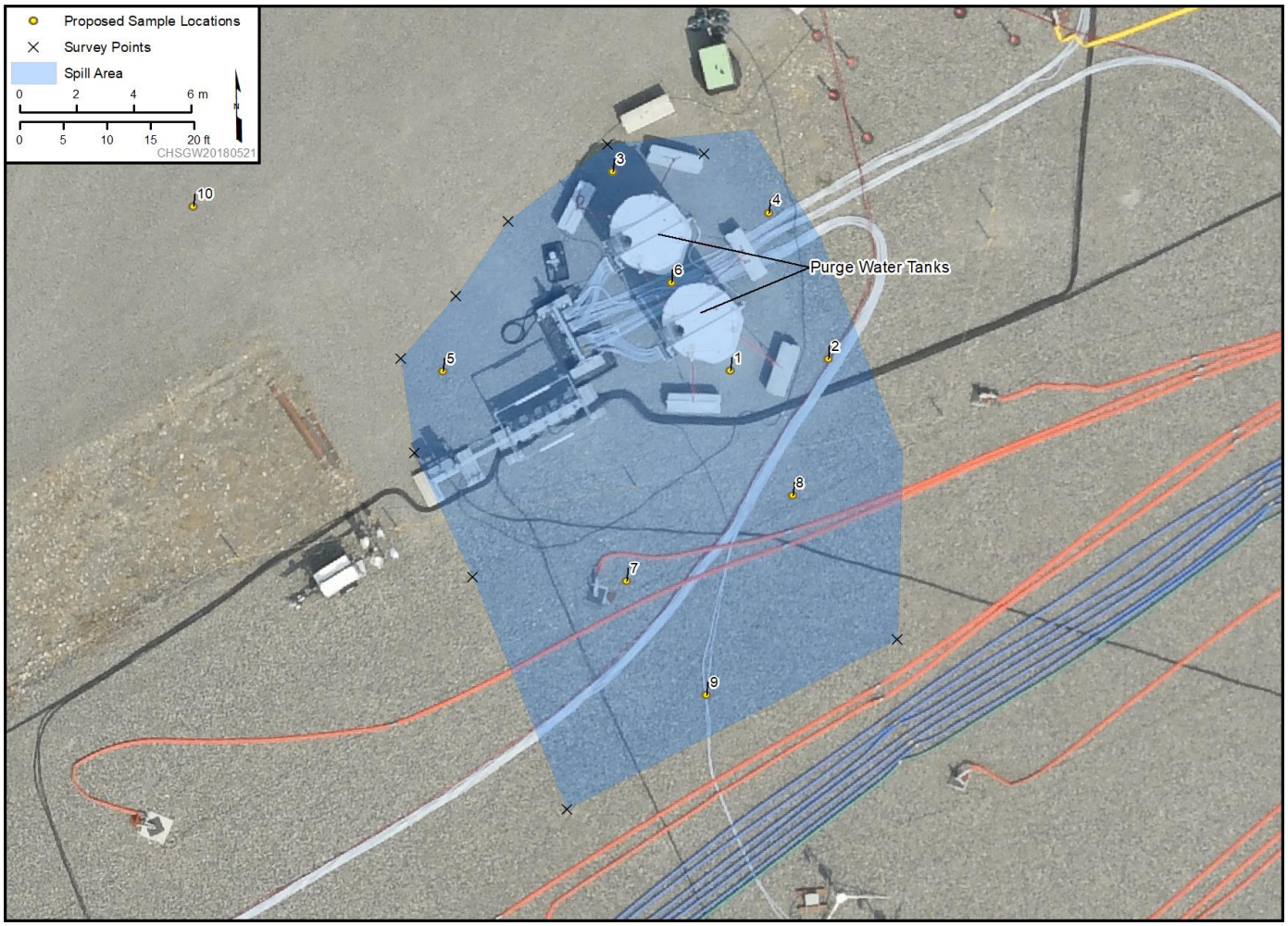

Figure 2. Soil Sample Locations for the Unplanned Release of Groundwater.