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FIELD SAMPLING AND ANALYSIS PLAN FOR SX PORE WATER EXTRACTION TEST PROJECT STAGE I – SOIL SAMPLING

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Abstract: The purpose of this plan is to provide the field sampling and analysis information associated with Stages I and II of the SX Pore-water Extraction Test Project, details of which are defined in RPP-PLAN-53808, 200 West Area Tank Farms Interim Measures Preliminary Investigation Work Plan.

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FIELD SAMPLING AND ANALYSIS PLAN FOR SX PORE-WATER EXTRACTION TEST PROJECT STAGES I AND II – SOIL SAMPLING

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Abbreviations and Acronyms

ARHCO	Atlantic Richfield Hanford Company
ATL	Advanced Technologies and Laboratories International, Inc.
bgs	below ground surface
CFR	*Code of Federal Regulations*
CHPRC	CH2M HILL Plateau Remediation Company
DOE	U.S. Department of Energy
DOECAP	U.S. Department of Energy Consolidated Audit Program
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
FEAD	Format for Electronic Analytical Data
FIR	Field Investigation Report
FSAP	Field Sampling and Analysis Plan
HASQARD	*Hanford Analytical Services Quality Assurance Requirements Documents*
HDW	Hanford Defined Waste
HEIS	Hanford Environmental Information System
HFFACO	*Hanford Federal Facility Agreement and Consent Order*
ICP/MS	inductively coupled plasma/mass spectroscopy
ILL	interstitial liquid level
LCS	laboratory control sample
ORP	U.S. Department of Energy, Office of River Protection
PNNL	Pacific Northwest National Laboratory
QA	quality assurance
QC	quality control
QSAS	Quality Systems for Analytical Services

RCRA	*Resource Conservation and Recovery Act of 1976*
REDOX	Reduction Oxidation (Plant)
RL	U.S. Department of Energy, Richland Operations Office
RPD	relative percent difference
RSLTCK	R-Saltcake waste type
SIM	Hanford Soil Inventory Model
SOW	statement of work
SST	single-shell tank
UPR	unplanned release
WAC	*Washington Administrative Code*
WIDS	Waste Information Data System
WMA	Waste Management Area
WRPS	Washington River Protection Solutions LLC

Units

°C	degrees Celsius
Ci	curies
ft	feet
g	gram
gal	gallon
L	liter
m	meters
mg/kg	milligram per kilogram
mL	milliliter
pCi/g	picocuries per gram

1.0 SAMPLING AND ANALYSIS OBJECTIVES

1.1 PURPOSE

The purpose of this plan is to provide the field sampling and analysis information associated with Stages I and II of the SX Pore-water Extraction Test Project. The details of the SX Pore-water Extraction Test Project are defined in RPP-PLAN-53808, *200 West Area Tank Farms Interim Measures Preliminary Investigation Work Plan*.

Results of previous soil investigations at 241-SX Tank Farm (SX Farm) indicate the presence of contamination within the vadose zone. Presumably, the most effective way to mitigate risk associated with this contamination is through restriction of groundwater recharge using interim surface barriers or removing contaminants in the vadose zone. RPP-7884, *Field Investigation Report for Waste Management Area S-SX* (FIR) indicated future risk is best mitigated by reducing both the subsurface moisture content and the soil contaminant inventory. The work planned in support of this test will specifically help evaluate the potential to reduce the subsurface soil moisture and contaminant inventory through pore-water and vapor extraction.

As identified in RPP-PLAN-53808, staff from the Washington State Department of Ecology (Ecology), U.S. Department of Energy (DOE)-Richland Operations Office (RL), DOE-Office of River Protection (ORP), Washington River Protection Solutions, LLC (WRPS), and Pacific Northwest National Laboratory (PNNL) met on October 30, 2012 to discuss the proof-of-principle testing south of SX Farm. Minutes from this meeting are contained in Appendix A. As discussed at the meeting, the testing south of SX Farm will be performed in three stages as illustrated in Figure 1-1.

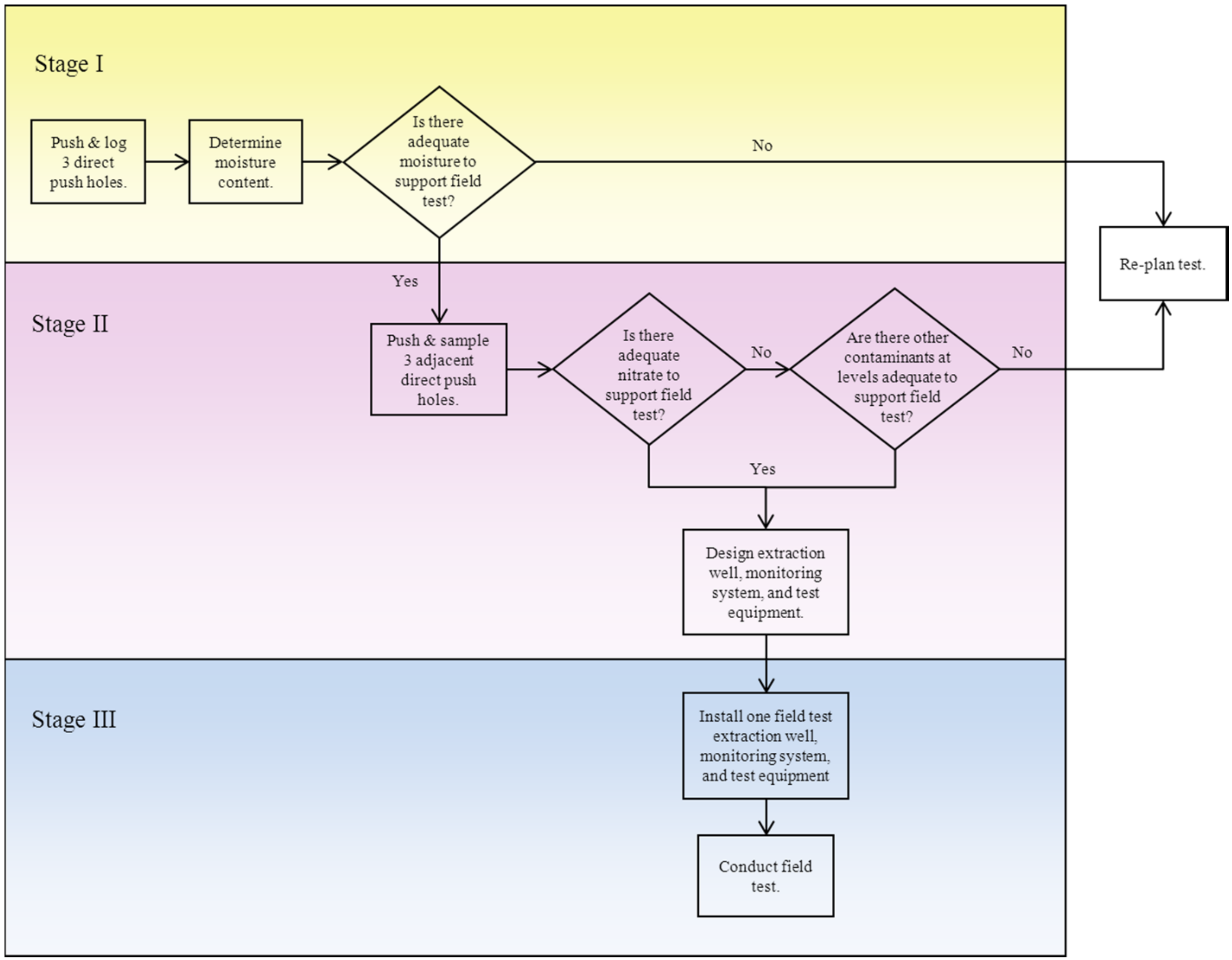
- The first stage proof-of-principle testing will be field activities to obtain additional information about three prospective test locations south of the SX Farm fence line. This first stage will involve pushing and logging these three test locations to determine if the locations have good moisture peaks (i.e., adequate moisture content) as determined by reviewing neutron log data collected from the probe hole.

- The second stage of proof-of-principle testing will be pushing probe holes adjacent to the first probe holes, collecting samples, identifying a preferred test location, and designing the test equipment and associated monitoring system.

- The third stage of the proof-of-principle testing will be to procure equipment, install the test and monitoring equipment including a direct push hole at the selected test location, and conduct the water extraction test itself.

Stages I and II, which are the focus of this plan, will characterize the study area for selection of a test site and provide technical information for performing a proof-of-principle test of soil desiccation/contaminant removal using direct push equipment.

Figure 1-1. Decision Process for Probe Hole Placement and Determining the Acceptability of a Potential Test Location.



1.2 SCOPE

As indicated, this plan focuses on Stages I and II of the proof-of-principle testing. These stages include the field activities to obtain moisture information about three prospective test locations south of the SX Farm fence line. It should be noted that the general location of the test at SX Farm was specified in *Hanford Federal Facility Agreement and Consent Order* (HFFACO) (Ecology et al. 1989) Milestone M-045-20. The general location of the test area was chosen due to the presence of relatively shallow moist geologic layers containing mobile contaminants such as ^{99}Tc and nitrates. The specific area south of SX Farm was chosen for the test to allow greater operational flexibility than working within the tank farm itself.

Ground penetrating radar and electrical ground scans have been performed to identify subsurface infrastructure and support citing of the test holes. The combination of subsurface infrastructure and surface accessibility information has been used to determine the exact location of each test hole shown in Figure 1-2.

Each of the initial three holes will be pushed and logged to determine moisture content. Moisture content will be initially determined by reviewing neutron log data collected from the direct push hole. Although the determination of the test location's viability based on moisture content will be primarily qualitative, work performed by PNNL and documented in PNNL-21882/RPT-DVZ-AFRI-011, *Pore-Water Extraction Scale-Up Study for the SX Tank Farm* indicates that a minimum moisture content of 20% by volume should be targeted. However, additional PNNL testing is ongoing, and it is possible that a lower moisture content may be acceptable at the selected test location based on site-specific soil conditions. Existing data shows that high moisture zones should be found at these locations.

During Stage II of the test, a second hole will be pushed adjacent to each of the first probe holes placed in Stage I. Each of these second direct push holes will be sampled at two intervals. Sample intervals will be selected based on the logging results and other information available about the location. The samples will be analyzed on a "quick-turnaround" basis for moisture content, nitrate, and technetium. Note that the moisture content mentioned in the preceding sentence will be determined at the laboratory (222-S) via gravimetric analysis. This moisture content information will supplement available field information.

Some additional tests (i.e., falling head test) will be performed to gain additional geologic property information to assist in selecting test locations. The specifics on this testing will not be included in this document as this plan solely focuses on the sampling and analysis effort.

This Field Sampling and Analysis Plan (FSAP) specifically provides the direction and requirements of the field sampling, laboratory analysis, and data reporting for soil sampling of the three direct push locations south of SX Farm. Information is provided in the following sections:

- Facility description (Section 2.0)
- Sampling requirements (Section 3.0)
- Sample analysis requirements (Section 4.0)

- Quality assurance and quality control (Section 5.0)
- Data reporting (Section 6.0)
- Change control (Section 7.0)
- Documents and records (Section 8.0)
- Project organization (Section 9.0)
- References (Section 10.0).

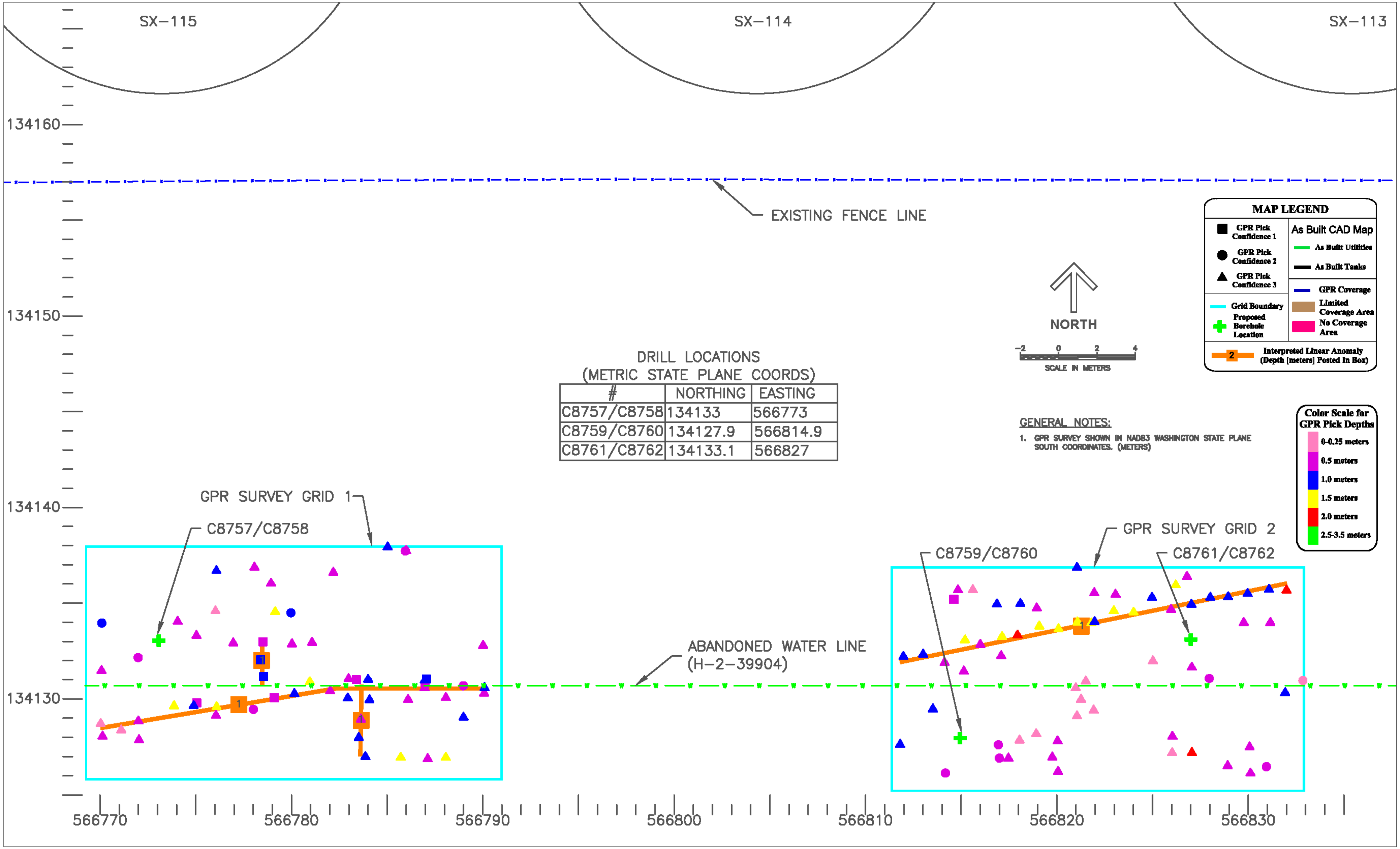
The quality assurance (QA) plan objectives are met through implementation of all sections of this FSAP.

The direct push probe will be driven to depths of 120 to 130 feet (ft) below ground surface (bgs) and soil samples will be collected at an average of two depths from each sample probe hole. Note that a multidiscipline team comprised of WRPS personnel, Energy*Solutions* Government Group Services, Inc., Western Operations, and other supporting subcontractors will implement the field activities.

Samples will be analyzed for constituents identified in Sections 3.0 and 4.0 – moisture content, nitrate, and technetium along with additional opportunistic analysis that may assist in test location selection. Note that the data collected for this project should aid in evaluating the SX Farm vadose zone (e.g., determine the nature and extent of the plume contaminants). Furthermore, it is probable that data collected through this FSAP will be used to support future characterization efforts for SX Farm. Ecology will be involved in any discussions regarding further use of this data and associated information.

It should be noted that geophysical logging along with available quick turnaround analysis ("quick turn") of two mobile contaminants (^{99}Tc and nitrate) will be used to aid in determining sample depths. After this information is obtained, meetings will be held with, or e-mails will be sent to, representatives from WRPS, DOE, DOE-ORP, DOE-RL, and Ecology, to gain a consensus on sample depths.

Figure 1-2. Probe Hole Locations.



#	NORTHING	EASTING
C8757/C8758	134133	566773
C8759/C8760	134127.9	566814.9
C8761/C8762	134133.1	566827

2.0 FACILITY DESCRIPTION

Figure 2-1 shows the layout of Waste Management Area (WMA) S-SX. The WMA for closure and corrective measures may include areas beyond the current perimeter fence(s) that have been affected by releases from single-shell tanks (SSTs) or ancillary equipment (e.g., pipeline breaks outside the fenceline).

Constructed between 1953 and 1954, SX Farm is comprised of 15 SSTs. The SX Farm tanks are arranged in rows of three tanks each, forming a cascade. Each of the SX Farm tanks has a nominal 1-million-gal storage capacity. Each SX Farm tank consists of a carbon steel liner inside a reinforced concrete shell. The steel tank liner covers the 75-ft inner diameter tank bottom and sidewalls to a height of ~32 ft as measured from the tank center. The tank bottom is dish-shaped and slopes ~3.3% from the sidewall to the tank center (i.e., 14.875-in. elevation drop over 37.5-ft radius).

Ten of the tanks in SX Farm have laterals installed below the tank bottoms as part of the leak detection system. In addition to laterals, vadose zone monitoring wells (drywells) are installed throughout the farm for leak detection. The SX Farm drywells and laterals are shown in Figure 2-2.

2.1 LEAK ASSESSMENT INFORMATION AND UNPLANNED RELEASES

RPP-7884 reported soil waste inventories estimates resulting from projected tank releases. The in-tank inventories as a function of time were derived from the Hanford defined waste model, providing tank-specific waste composition estimates at the time of the postulated waste releases. Recently, the estimates presented in the FIR were further refined using a systematic process to evaluate historic losses of waste from tank farm sources. This systematic process is described in RPP-32681, *Process to Assess Tank Farm Leaks in Support of Retrieval and Closure Planning*. This systematic process resulted in the estimates presented in RPP-ENV-39658, *Hanford SX-Farm Leak Assessments Report*. The "leaker" status designated in Figure 2-1 reflects the status as reported in RPP-7884 and HNF-EP-0182, *Waste Tank Summary Report for Month Ending September 30, 2012*, Rev. 294 and has not been updated to show the new designations presented in RPP-ENV-39658 awaiting formal tank leak assessment in accordance with procedure TFC-ENG-CHEM-D-42, "Tank Leak Assessment Process." The RPP-ENV-39658 reassessment suggests that the releases previously attributed to tanks 241-SX-104 and 241-SX-110 are unlikely to have occurred.

RPP-7884 also provides detailed descriptions of subsurface hydrogeologic and geologic conditions at SX Farm.

Historic information on tank leak monitoring and the current evaluation of waste losses to the soil is provided in RPP-ENV-39658. The evaluation of the tank waste loss events reported in that document led to the information summarized in Table 2-1. Tank waste loss events were initially reassessed for SSTs currently classified as "assumed leakers" (HNF-EP-0182). Table 2-1 summarizes the results of tank waste loss reassessments for these tanks and provides a

Figure 2-1. Waste Management Area S-SX and Surrounding Facilities.

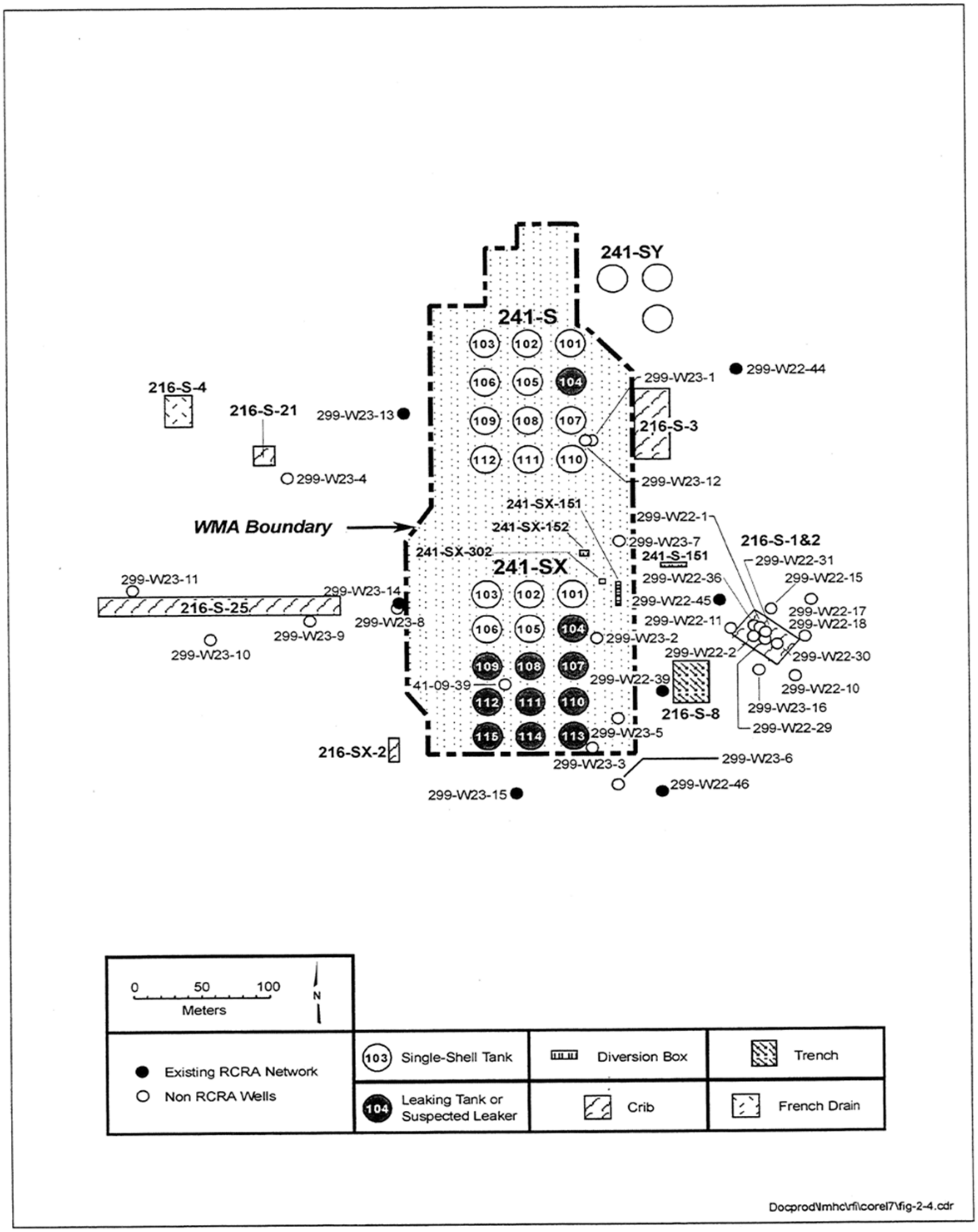
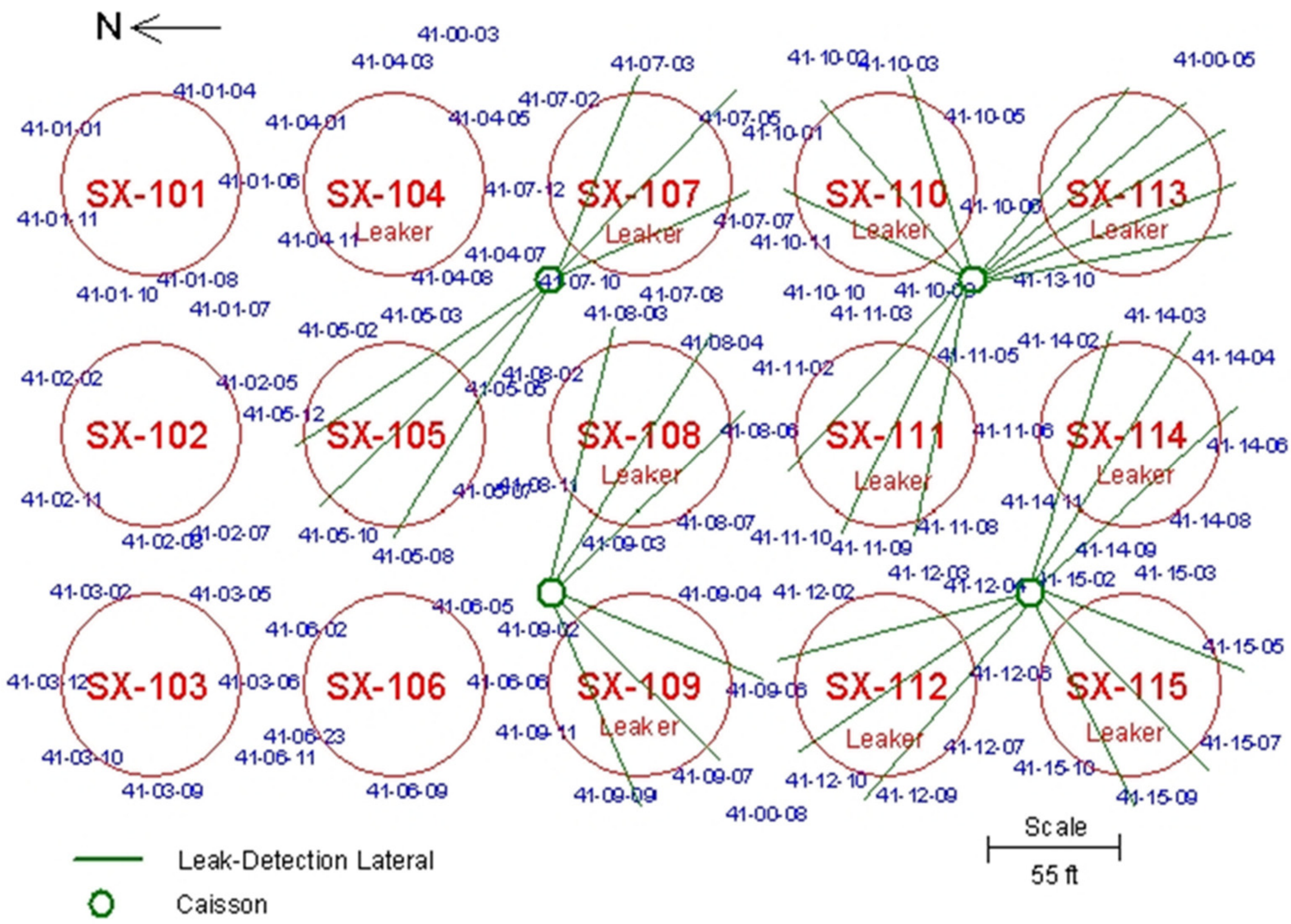


Figure 2-2. 241-SX Tank Farm Laterals and Drywells.



2-3

RPP-PLAN-54366, Rev. 0

Table 2-1. Summary of Tank Waste Loss Events in 241-SX Farm. (2 sheets)

Tank	Description	HNF-EP-0182 (Rev 294) Estimate	Revised Estimate
241-SX-104 (SX-104)	Tank SX-104 was classified as questionable integrity based on ILL decreases from 1994 to 1998. ILL decreases were also observed in 1998 and 2008. Previous assessments concluded that the 1998 and 2008 ILL decreases were not attributed to a tank leak. There are several potential explanations for the ILL decrease observed from 1984 to 1988; evaporation is the most likely explanation. Assessment team members concluded there is no evidence tank SX-104 lost containment.	6,000 gal	0 (leak unlikely)
241-SX-107 (SX-107)	Tank SX-107 was classified a suspect leaker in 1967 based on drywell and lateral activity. The revised ^{137}Cs inventory is based on vadose zone data and kriging analyses. No representative sample data was found, so the leak volume was calculated assuming an average, model based, REDOX waste concentration at the time of the leak (2.7 Ci/gal for ^{137}Cs).	<5,000 gal	6,000 gal ^{137}Cs: 14,500 Ci SIM Ratio: 0.81
241-SX-108 (SX-108)	Tank SX-108 was removed from service and identified as a confirmed leaker in 1964 based on drywell and lateral activity. The revised ^{137}Cs inventory is based on vadose zone data and kriging analyses. The waste concentration at the time of the leak (3.8 Ci/gal for ^{137}Cs) is based on December 1965 SX-108 sample data. This equates to a leak volume of 11,000 gal; the revised leak volume range is based on this estimate plus unaccounted water losses.	2.4 – 35 kgal	50 – 100 kgal ^{137}Cs: 34,900 Ci SIM Ratio: 0.83
241-SX-109 (SX-109)	Tank SX-109 was identified as a suspect leaker in 1967 based on drywell and lateral activity. The revised ^{137}Cs inventory was based on vadose zone data and kriging analyses. No representative sample data was found, so the leak volume was calculated assuming an average, model based, REDOX waste ^{137}Cs concentration.	<10,000 gal	1,000 gal ^{137}Cs: 2,270 Ci SIM Ratio: 0.95
241-SX-110 (SX-110)	Tank SX-110 was removed from service and identified as a potential leaker in July 1976 as a result of an apparent unexplained liquid level decline of ~0.75 inch. Based on the lack of drywell and lateral radiation readings, along with no evidence of corrosion of the steel liner, the assessment team concluded that a tank leak is unlikely and no leak inventory is assigned.	5,500 gal	0 (leak unlikely)
241-SX-111 (SX-111)	Tank SX-111 was declared an assumed leaker on May 1974 based on a liquid level decline and an increase in radiation detected in lateral 44-11-02. The revised ^{137}Cs inventory was based on a maximum leak volume in an occurrence report and September 1, 1974 sample analyses. The HDW model estimates for RSLTCK should be used to estimate inventory for other analytes.	500 gal	2,800 gal ^{137}Cs: 1,830 Ci Other analytes: Multiply HDW RSLTCK concentration by 0.55 and multiply by 2,800.

Table 2-1. Summary of Tank Waste Loss Events in 241-SX Farm. (2 sheets)

Tank	Description	HNF-EP-0182 (Rev 294) Estimate	Revised Estimate
241-SX-112 (SX-112)	Tank SX-112 was declared a leaking tank in January 1969 due to liquid level decreases and increased activity in tank laterals. The revised leak volume and ^{137}Cs inventory are from a 1969 ARHCO report* and appear to be consistent with drywell data. The high ratio is needed because SIM uses a leak volume of only 1,000 gal.	30,000 gal	27,000 gal ^{137}Cs: 19,200 Ci SIM Ratio: 16.1
241-SX-113 (SX-113)	Tank SX-113 was confirmed as leaking in 1962 based on the leak test and gamma activity detected in laterals underneath the tank. No change was made to earlier leak volume estimates. A small change in the ^{137}Cs inventory was made based on October 1962 sample data.	15,000 gal	15,000 gal ^{137}Cs: 4,080 Ci SIM Ratio: 0.96
241-SX-114 (SX-114)	Tank SX-114 was classified a potentially leaking tank in 1972 based on increasing drywell activity. No previous leak volume or inventory was given. A review of data confirmed the probability of a tank leak. The leak is assumed to be less than 2,000 gal based on uncertainty in manual tape liquid level measurements. The ^{137}Cs inventory estimate is based on a 1974 SX-111 sample. Inventories for other analytes are assumed to be the same as the revised SX-111 inventory multiplied by a volume ratio of 0.715.	No estimate	<2,000 gal ^{137}Cs: 1,310 Ci Other analytes: multiply SX-111 analytes by 0.715
241-SX-115 (SX-115)	Tank SX-115 was confirmed as a leaking tank in 1965 based on measured liquid level decreases and gamma activity in drywells and laterals. The revised leak volume is the upper volume in a process report (HW-83906 E RD, page 62c**) and the revised ^{137}Cs inventory is based on September 1964 tank sample results. The SIM ratio accounts for volume and sample differences from current SIM estimates.	50,000 gal	51,000 gal ^{137}Cs: 16,800 Ci SIM Ratio: 1.13

Note: Except as noted, ^{137}Cs inventories are decayed to January 1, 2001 consistent with values in Hanford Soil Inventory Model (SIM).

Reference: HNF-EP-0182, Rev. 294, *Waste Tank Summary Report for Month Ending September 30, 2012*.

ARHCO = Atlantic Richfield Hanford Company
HDW = Hanford Defined Waste
ILL = interstitial liquid level
REDOX = Reduction Oxidation
RSLTCK = R-Saltcake waste type
SIM = Hanford Soil Inventory Model

* ARH-1100-DEL, *200 Areas Operation Monthly Report January 1969*, page G-4.
** HW-83906 E RD, *Chemical Processing Department 200 West Area Tank Farm Inventory and Waste Reports July 1961 Through 1966*.

comparison to the waste loss estimates contained in HNF-EP-0182. The estimated volumes of waste lost and the waste composition (types) were evaluated to update the estimated inventory of constituents in RPP-26744, *Hanford Soil Inventory Model, Rev. 1*. In addition, tanks currently assumed as "sound" were reviewed to assess the potential for loss of waste containment. There was no indication of releases from any of the other tanks in SX Farm.

As reported in the RPP-ENV-39658 report, document DOE/RL-88-30, *Hanford Site Waste Management Units Report* contains the official listing of unplanned releases (UPRs) identified at the Hanford Site. The operational history for SX Farm was also reviewed as part of the reassessment reported in RPP-ENV-39658 to determine if additional information exists for the UPRs within SX Farm that are not associated with tank waste loss events. No significant new information was located for these UPRs. However, potential new UPRs as a result of pipeline failures were identified through review of the operational histories for SX Farm. There was insufficient available information to estimate a volume or inventory of tank waste potentially discharged to the soil from most of the identified UPRs.

To date, there have been no additional assessments or re-evaluations of the UPRs not directly associated with tanks. As such, the most recent information available for these releases is summarized within the Waste Information Data System database and is presented in Table 2-2.

Table 2-2. Unplanned Releases Associated with 241-SX Tank Farm, Compiled from the Waste Information Data System.

WIDS Site Number	Location	Date	Release Type	Waste Type
UPR-200-W-114 UPR-200-W-50	Inside 241-SX Tank Farm and spread eastward beyond the fence	1/1/1958	Wind born particulates from 241-SX Tank Farm activities	Consolidated WIDS site containing UN-216-W-24 UN-200-W-114

WIDS = Waste Information Data System
Source: WIDS database.

2.2 GEOLOGY, STRATIGRAPHY, AND HYDROLOGY

The WMA S-SX was constructed in a sequence of sediments that overlie the Columbia River Basalt Group. The sediments include the upper Miocene to Pliocene Ringold Formation, the Plio-Pleistocene unit (i.e., Cold Creek unit), Pleistocene cataclysmic flood gravels and slack water sediments of the Hanford formation, and the Holocene eolian deposits. Figure 2-3 presents a generalized cross section of the Hanford Site (GJO-97-31-TAR/GJO-HAN-17, *Hanford Tank Farms Vadose Zone: S Tank Farm Report* and GJO-97-31-TARA/GJO-HAN-17, *Hanford Tank Farms Vadose Zone: Addendum to the S Tank Farm Report*).

Four major stratigraphic units underlie the SX Farm (in ascending order) and include the following:

- Columbia River Basalt Group
- Ringold Formation (including members of Taylor Flats [Rtf] and members of Wooded Island [Rwi])
- Cold Creek unit (including subunits CCU_u and CCU_l)

- Hanford formation (including subunits H1 and H2)
- Backfill.

The general characteristics of these units are described in more detail in RPP-23748, *Geology, Hydrogeology, Geochemistry, and Mineralogy Data Package for the Single-Shell Tank Waste Management Areas at the Hanford Site*. The SSTs at WMA S-SX were emplaced within the Hanford formation sediments. All but the surface of the Hanford formation have a general tendency to dip west to southwest toward the axis of the Cold Creek unit. The vadose zone beneath WMA S-SX is as much as 65 meters (213 ft) thick and consists of the Hanford formation, the Cold Creek unit, and the upper part of the Ringold Formation. Both the water table and the unconfined aquifer reside entirely within the Ringold Formation; see Figures 2-4 and 2-5.

Sediments in the vadose zone vary from open-framework gravels of the gravel-dominated facies and interbedded sand and silt of the silt-dominated facies of the Hanford formation to calcium carbonate-rich deposits of the Cold Creek unit and cemented gravels of the Ringold Formation. These sediments are characterized by numerous lateral discontinuities, such as pinchouts, erosion truncations, and irregular flow patterns. If clastic dikes are present, they may enhance vertical flow patterns. Therefore, there are numerous possible avenues for contamination to migrate through the vadose zone (HNF-4936, *Subsurface Physical Conditions Description of the S-SX Waste Management Area*).

The following is an overview of the hydrology of the uppermost unconfined aquifer beneath WMA S-SX. More detailed information can be found in RPP-23748, RPP-7884, DOE/RL-2009-73, *Interim Status Groundwater Quality Assessment Plan for the Single-Shell Tank Waste Management Area S-SX*, and DOE/RL-2011-118, *Hanford Site Groundwater Monitoring for 2011*.

The current primary groundwater flow direction in the unconfined aquifer beneath WMA S-SX is to the east-southeast. The estimated hydraulic gradient in this region is 2.0×10^{-3}. The general groundwater flow velocity ranges from 0.013 to 0.31 meters/day (0.04 to 1.02 ft/day) (DOE/RL-2011-118).

Water level data collected from monitoring wells located near and inside WMA S-SX (299-W23-1, 299-W23-3, 299-W23-4) indicate that between the early 1950s and mid-1960s, the water table in the vicinity of WMA S-SX rose ~11 meters (~36 ft) in response to wastewater discharges to the 216-U-10 pond. The water table elevation remained fairly steady between 1965 and 1984. Water levels began to decline rapidly in 1985, when discharge to the 216-U-10 pond ceased. That decline continues today. Water levels have decreased by ~11 meters (~36 ft) in the WMA S-SX area since 1985, and have returned to levels consistent with those observed in the early 1950s.

Figure 2-3. Generalized Cross Section of the Hanford Site.

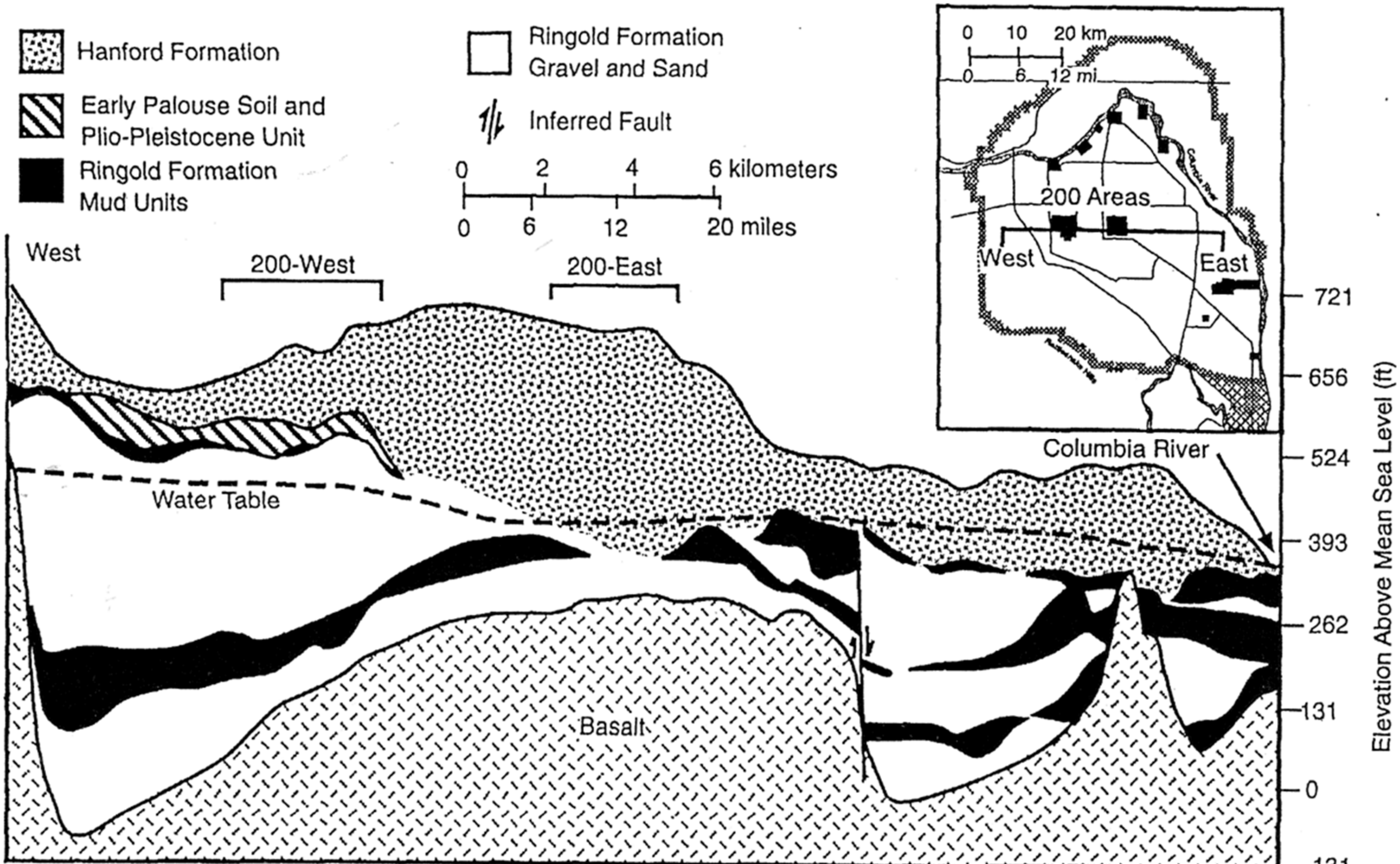
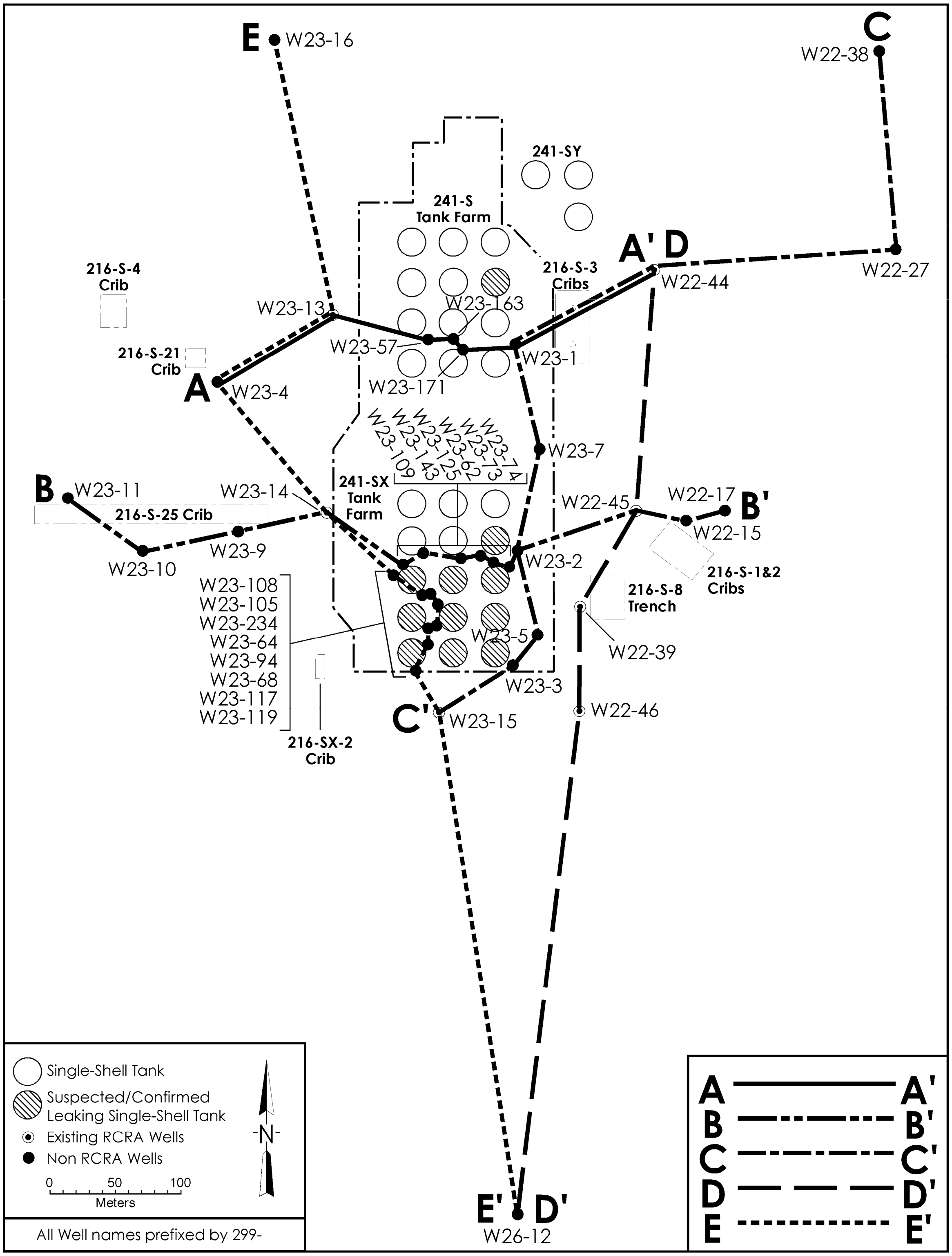


Figure 2-4. Location of Waste Management Area S-SX Cross Sections Presented in RPP-23748.

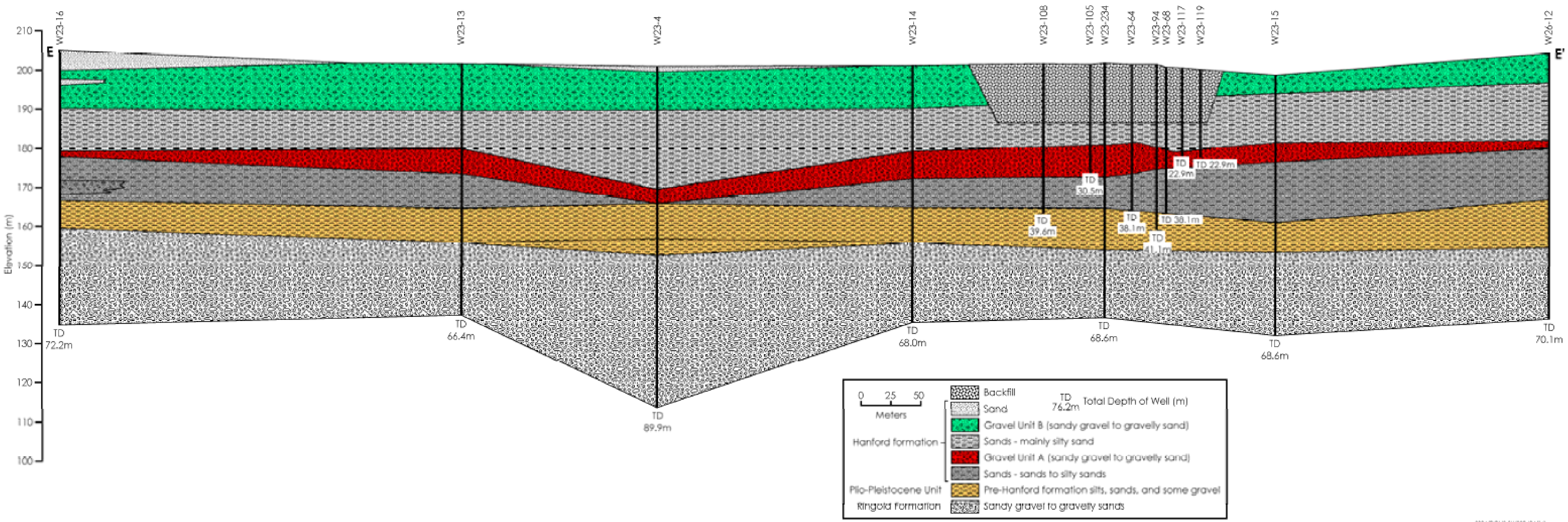


Source: RPP-23748, *Geology, Hydrogeology, Geochemistry, and Mineralogy Data Package for the Single-Shell Tank Waste Management Areas at the Hanford Site.*

The aquifer resides in partially cemented sands and gravels of the Ringold Formation member of Wooded Island (subunit E). Currently, the water table beneath WMA S-SX lies ~136 meters (~446 ft) above mean sea level, resulting in ~78 meters (~255 ft) of vadose zone (RPP-17209, *Modeling Data Package for an Initial Assessment of Closure of the S and SX Tank Farms*). The unconfined aquifer is ~67 meters (~219 ft) thick (RPP-23748), and hydraulic conductivity values reported for the aquifer in this area range from 0.15 to 17.2 meters/day (0.49 to 56.4 ft/day). Additional hydraulic property data from aquifer testing at wells near WMA S-SX are provided in RPP-23748 and DOE/RL-2011-118.

Groundwater beneath WMA S-SX was found to be contaminated with nitrate, ^{99}Tc, and hexavalent chromium attributed to two general source areas within the WMA (DOE/RL-2011-118). The nitrate plume data are attributed to one source area to the north in 241-S Tank Farm and one area to the south in SX Farm (Figure 3-6 in RPP-PLAN-53808). Tritium and carbon tetrachloride plumes are also present in groundwater beneath the WMA, but their sources are thought to be further upgradient of the WMA.

Figure 2-5. Geologic Cross-Section E-E' from Waste Management Area S-SX.



3.0 SAMPLING REQUIREMENTS

All field sampling activities shall be conducted in accordance with this FSAP and the appropriate procedures and work packages. Soil sampling services for this work will be contracted through the CH2M HILL Plateau Remediation Company (CHPRC) or performed by WRPS sampling personnel (e.g., nuclear chemical operators). The sampling personnel shall follow CHPRC or WRPS sampling protocols and procedures, which cover items such as cleaning of sampling devices, chain of custody, etc.

3.1 SOIL SAMPLING TECHNIQUE, STRATEGY, AND DESIGN

3.1.1 Sampling Technique

Sampling south of SX Farm will be conducted using a hydraulic hammer direct push rig technology using the dual-string sampling system, which consists of inner and outer strings that are deployed by small-diameter push rods. When the targeted sampling depth is achieved, the rods are pulled back and the removable tip is removed from the inner rods. A sampler is attached to the inner string and returned to the bottom of the outer casing/push tubing and positioned against the inner receiver face of the drive shoe. The inner and outer tubing strings are "locked" together by use of a proprietary method, and the entire assembly is advanced ~10% more than the targeted sample interval in order to secure the material in the sampler.

The sampler body holds three stainless-steel liners. The liners are removed from the sampler body and surveyed. The sampling personnel document recovery, sample condition, and volume recovery percent. They then package and transport the sample under chain-of-custody control to the selected laboratory for analysis. The "dummy" tip is reattached to the inner string and returned to bottom and placed in the casing shoe, and the entire assembly is advanced to the next designated sample depth. This process is repeated until all sample depths are achieved or the tubing meets refusal.

Upon completion of the final sample extraction, or upon meeting refusal, the dummy tip or sampler is removed and the probe hole is decommissioned per requirements of *Washington Administrative Code* (WAC) 173-160, "Minimum Standards for Construction and Maintenance of Wells."

3.1.2 Sampling Strategy and Design

Probe holes will be drilled to approximate depths of 120 to 130 ft bgs and soil samples will be collected at two depths from each location.

Sampling strategy at each direct push site is summarized as follows.

a. A minimum of two direct push probe holes will be completed at each location. The initial probe hole will be logged for both gross gamma and neutron moisture (i.e., geophysical logging). Following logging, deep electrodes will be installed for surface geophysical exploration and the hole will be decommissioned per WAC 173-160. The second push is for soil sampling.

b. The depth of the first push will be ~120 to 130 ft bgs or refusal (whichever comes first).

c. The depth location for sampling individual horizons will be selected by reviewing the gamma and moisture logs of the first direct push and the following information: any leak loss inventory information pertinent to the site, geologic summary of the area, operational history, historical characterization data at that site, and available "quick turn" (^{99}Tc and nitrate) data. Note that ^{99}Tc and nitrate "quick turn" data may become available from some of the probe holes identified in this plan as the work progresses. As the data becomes available, it may be used to help select sample depths for later probe hole locations. The sampling horizons will be selected in meetings with or via e-mails to WRPS, DOE-ORP, DOE-RL, CHPRC and Ecology.

Note: Depths are subject to constraints in the field and may be modified if necessary.

3.2 SAMPLE COLLECTION, HANDLING, AND SHIPPING

The dual-string sampler used to collect soil samples holds three stainless-steel liners and a shoe to collect samples during the direct push. The liners are removed from the sampler body and surveyed. The material in the shoe shall be collected in a 500-mL glass jar. Stainless-steel liner A is the liner closest to the shoe. The next or middle liner is liner B, and the topmost stainless-steel liner is liner C. Each liner needs to be marked for its bottom and top to signify the position of the sample prior to shipping and transport.

Trained sampling personnel document recovery, sample condition, and volume percent recovery. They then package and transport the sample under chain-of-custody control to the laboratory for analysis.

Analysis methods and holding times for radiological and chemical analytes are shown in Table 3-1. Sample preservation and containers are also discussed in Table 3-1 (i.e., table footnotes). Field quality control (QC) samples, specifically equipment rinsates (blanks) and field blanks, will be collected to evaluate the potential for cross-contamination and laboratory performance. Sample preservation, containers, and holding times for the field QC samples are shown in Table 3-2.

Soil samples shall be maintained and shipped at/or below 6 °C as specified in Tables 3-1 and 3-2. The samples shall be shipped to the laboratory as soon as possible, to meet applicable holding times. However, it is recognized that some samples may have elevated levels of radioactivity. These samples may be stored and transported in shielded shipping containers that may not allow the samples to be maintained at/or below 6 °C. Samples not meeting temperature or holding time requirements will be identified as they occur and discussed in the laboratory data report. The impact on subsequent use or interpretation of these data will be evaluated by the WRPS personnel.

Table 3-1. Soil Sampling Requirements for South of 241-SX Tank Farm.[a]

Analysis Type	Primary Analysis	Constituent	Holding Time
"Quick Turn"	Inductively coupled plasma/ mass spectroscopy	Technetium-99	6 months
	9056 Ion chromatography	Nitrate	48 hours after digestion
	9045	pH	24 hours (or as soon as possible)
	9050	Conductivity	28 days
Standard	9056 Ion chromatography	Fluoride, Nitrite, Nitrate, Chloride, Sulfate, Acetate, Formate, Glycolate, Oxalate, Bromide, Phosphate	28 days/48 hours[b]
	Inductively coupled plasma/ mass spectroscopy	Technetium-99, Tin-126, Uranium-233, Uranium-234, Uranium-235, Uranium-236, Uranium-238, Neptunium-237, Thorium-230, Thorium-232	6 months
	Gravimetric	Percent solids	None
		Percent water	
		Bulk density	

[a] Sampling personnel will place the shoe material in a 500-mL glass bottle. The samples will be cooled to ≤6 °C. Available material from the shoe and liners (A, B, and C) are composited by the laboratory and the composited material is used in the "quick turn" and standard analysis.

[b] 48-hour hold time (after preparation) is for nitrate, nitrite, and phosphate.

Table 3-2. Field Quality Control Sampling Requirements for South of 241-SX Tank Farm.[a]

Primary Analysis Method	Constituent	Container	Preservative	Holding Time
Inductively coupled plasma/ mass spectroscopy	Technetium-99, Tin-126, Uranium-233, Uranium-234, Uranium-235, Uranium-236, Uranium-238, Neptunium-237, Thorium-230, Thorium-232	Glass/plastic 500 mL	HNO_3 to pH<2	6 months
9056 Ion chromatography	Fluoride, Nitrite, Nitrate, Chloride, Sulfate, Acetate, Formate, Glycolate, Oxalate, Bromide, Phosphate	Glass/plastic 500 mL	Cool to ≤6 °C	28 days/48 hours[b]

[a] Percent moisture, percent solids, conductivity, pH, and bulk density will not be measured/analyzed on field quality control samples.

[b] 48-hour hold time (after preparation) is for nitrate, nitrite, and phosphate.

Radiological control technician(s) will measure the dose rates of each sample container (i.e., jar and liners). The radiological control technician(s) also will measure radiological activity on the outside of the sample container (through the container) and will document the highest contact radiological reading in millirem per hour. This information, along with other data, will be used to select proper packaging, marking, labeling, and shipping paperwork in accordance with U.S. Department of Transportation regulations [Title 49, *Code of Federal Regulations*, "Transportation" (49 CFR)], and to verify that the sample can be received by the analytical laboratory in accordance with the laboratory's acceptance criteria.

3.3 SAMPLE IDENTIFICATION

The Hanford Environmental Information System (HEIS) database will be the electronic repository for the laboratory analytical results. The HEIS sample numbers will be issued to the sampling organization for this project in accordance with onsite organizational procedures. Each sample will be identified and labeled with a unique HEIS sample number. The sample location, depth, and corresponding HEIS numbers will be documented in the sampling personnel's field logbook. Note: the shoe material that is put in a 500-mL glass jar and the three liners will each have a unique HEIS number. The composite sample will also have a unique HEIS number.

Each sample container will be labeled with the following information using a waterproof marker on firmly affixed water-resistant labels:

a. Sample identification number
b. Sample collection date and time
c. Name or initials of person collecting the sample
d. Preservation method (if applicable)
e. Sample location (direct push hole number and depth of collection).

Due to space limitation on sample labels, it is not possible to list all analytes; however, the laboratory is provided all necessary information to complete analysis. This information is provided in Section 4.0, which identifies the full list of analytes, appropriate analysis methods, and additional analysis information (e.g., detection limits).

3.4 SAMPLE CUSTODY

The sampling team shall initiate a chain-of-custody form for each sample. The chain-of-custody form shall accompany each sample. At a minimum, the following sampling information shall be included on the chain-of-custody form:

a. Project name

b. Signature of the collector

c. Date and time of collection

d. Sample type (e.g., soil)

e. Sample preservation information

f. Requested analysis or provide a reference for sample analysis

g. Signatures of persons involved in the chain of possession

h. Date and time relinquished to the laboratory

i. Unique HEIS sample identification number assigned to the sample

j. Sample location (direct push hole number and depth of collection)

k. A notation of pertinent sampling information including unusual characteristics or sampling problems

l. A brief description of the sample matrix, such as color or consistency, if possible.

Any pertinent sampling information (recovery, unusual characteristics, or sampling problems) shall be recorded in the sampling logbook. Each sample will be shipped to 222-S Laboratory (or alternate laboratory, if necessary) in an approved shipping container in accordance with approved procedures. Each sample will be sealed with a sample seal to demonstrate that the samples have reached the laboratory without alteration.

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4.0 SAMPLE ANALYSIS REQUIREMENTS

Samples are normally received from the field at door 13 of the 222-S Laboratory Multicurie Section. Samples transported in coolers will be stored under refrigeration until they are processed. On receipt, the sample custodian will verify the identification number on each sample container and ensure it matches the sample seal on the sample container and the chain of custody. Laboratory sample identification numbers will be affixed to each container that is retained past initial receipt. Residual sample material remaining after analysis will be maintained in refrigerated storage until directed otherwise by the Primary Laboratory Contact.

After the samples are received at the laboratory, the samples will be prepared and analyzed in accordance with this FSAP. Table 4-1 identifies the following information:

- Constituent (analyte)
- Required detection limit and/or target detection limit
- Primary and alternate analytical method including preparation information
- Quality control acceptance requirements for the various primary methods.

"Quick turn" constituents are bolded in Table 4-1 and secondary constituents are italicized. Secondary constituents will only be reported in the data package if they are detected. Radiological constituents are highlighted with shading.

Section 4.1 provides sample handling and preparation requirements and analytical requirements. Direction for addressing insufficient sample recovery is provided in Section 4.2. The laboratory shall use the least possible dilution to obtain the lowest practical detection limits for all requested analytes.

Table 4-1. Analytical Requirements for South of 241-SX Tank Farm. (3 sheets)

Constituent	Required Detection Limit (Target Detection Limit)[a, b]	Analytical Method (prep)	Alternate Method (prep)	QC Acceptance Requirements[c, d]		
				LCS % Recovery	Spike % Recovery	% RPD
pH	-	9045 (water)	NA	± 0.1 pH units	NA	NA
Fluoride – F^-	20 (5)	Ion Chromatography 9056 (water)	NA	80-120%	75-125%	≤30%
Nitrite – NO_2^-	- (2.5)					
Nitrate – NO_3^-	- (2.5)					
Chloride – Cl^-	- (0.3)[e]					
Sulfate – SO_4^{-2}	- (2.7)[e]					
Acetate – $C_2H_3O_2^-$	- (4.5)[e]					
Formate – CHO_2^-	- (10.0)[e]					
Glycolate – $C_2H_3O_3^-$	- (3.8)[e]					
Oxalate – $C_2O_4^{-2}$	- (2)[e]	Ion Chromatography 9056 (water)	NA	80-120%	75-125%	≤30%
Bromide[f] – Br^-	1 (-)					
Phosphate – PO_4^{-3}	- (-)					

Table 4-1. Analytical Requirements for South of 241-SX Tank Farm. (3 sheets)

Constituent	Required Detection Limit (Target Detection Limit)[a, b]	Analytical Method (prep)	Alternate Method (prep)	QC Acceptance Requirements[c, d]		
				LCS % Recovery	Spike % Recovery	% RPD
Technetium-99 – Tc^{99}	450 (1)	ICP/MS (water)	Liquid scintillation (water)	80-120%	75-125%	≤30%
Technetium-99 – Tc^{99}	450 (20)	ICP/MS (acid)	Liquid scintillation (acid)	80-120%	75-125%	≤30%
Tin-126 – Sn^{126}	- (-)		NA	80-120%	75-125%	≤30%
Uranium-233 – U^{233}	480 (1)	ICP/MS (acid)	NA	NA	NA	≤30%
Uranium-234 – U^{234}	510 (1)			NA	NA	≤30%
Uranium-235 – U^{235}	280 (1)			80-120%	75-125%	≤30%
Uranium-236 – U^{236}	- (-)			NA	NA	≤30%
Uranium-238 – U^{238}	160 (1)			80-120%	75-125%	≤30%
Neptunium-237 – Np^{237}	390 (1)		Alpha energy analysis (acid)	80-120%	75-125%	≤30%
Thorium-230 – Th^{230}	1,000 (1)		NA	NA	NA	≤30%
Thorium-232 – Th^{232}	150 (1)			80-120%	75-125%	≤30%

Table 4-1. Analytical Requirements for South of 241-SX Tank Farm. (3 sheets)

Constituent	Required Detection Limit (Target Detection Limit)[a, b]	Analytical Method (prep)	Alternate Method (prep)	QC Acceptance Requirements[c, d] LCS % Recovery	Spike % Recovery	% RPD
Percent water	- (-)	Gravimetric	NA	80-120%	NA	≤30%
Percent solids				NA		NA
Bulk density						≤30%
Conductivity	- (-)	9050	NA	NA	NA	NA

Note: All analyses are performed on composite samples. Data packages will be provided by the laboratory in Format VI. "Quick turn" analyses (excluding pH and conductivity) will be provided via e-mail to the Characterization Task Lead but will also be available in the data package for loading into Hanford Environmental Information System.
Bold constituents are "quick turn" constituents.
Italicized constituents are considered secondary constituents per RPP-23403, *Single-Shell Tank Component Closure Data Quality Objectives*.

[a] Detection limits for non-radiological constituents are in mg/kg and detection limits for radiological constituents are in pCi/g.

[b] "–" indicates that there is no required detection limit and/or target detection limit. If there is no required detection limit or target detection limit, then the laboratory will use the associated method detection limit.

[c] Laboratory quality acceptance requirements are based on RPP-43551, *Tank Farm Interim Barrier Data Quality Objectives*, RPP-RPT-38152, *Data Quality Objectives Report Phase 2 Characterization for Waste Management Area C RCRA Field Investigation/Corrective Measures Study*, and ATL-MP-1011, *ATL Quality Assurance Project Plan for 222-S Laboratory*. The laboratory quality control samples will be analyzed at a frequency of no less than 1 of 20 samples (1 per batch) with the following exceptions:

- Matrix spikes are NA for percent water, percent solids, pH, and conductivity.
- Matrix spike duplicates are NA for all analyses.
- Blanks are NA for percent water, percent solids, and pH.
- Laboratory control samples are NA for percent water, percent solids analyses, Sn-126, Th-230, and U-236.

[d] Secondary analytes will be reported when detected. All QC failures associated with secondary analytes will be discussed in the report narrative and qualified appropriately in the data package. Note that if there are QC failures associated with secondary analytes, reanalysis will not be required.

[e] Target detection limit for this constituent is not specified in D&D-30262, *Data Quality Objectives Summary Report for the 200-IS-1 Operable Unit Pipelines and Appurtenances*. It is based on detection limits achieved in the analyses of soil samples taken near tank 241-S-102 (RPP-RPT-36439, *Final Report for the Contaminated Soil Samples at Tank 241-S-102 in Support of the Type A Investigation of the Tank Waste Spill*).

[f] The detection limit for bromide is based on bromine (1 mg/kg).

ICP/MS = inductively coupled plasma/mass spectroscopy
QC = quality control
LCS = laboratory control sample
RPD = relative percent difference
NA = not applicable

4.1 DIRECTION FOR SAMPLE HANDLING AND PREPARATION

The following steps shall be performed on each sample, as soon as the sample from the last interval for each probe hole has been received (batching will be done per probe hole). The steps shall be performed within one probe hole in the order in which they were taken.

a. Remove sample material from each liner (Liners A, B and C) and the shoe, then place each in a separate plastic tray. Sample material from the liners may be removed by inserting a push rod in one end of the core tube and forcing the sediment out of the other end onto a flat smooth surface. If the sediment is packed into the core tube too tightly to be extruded in this fashion, use a hydraulic extruder, scoop, or spatula to dislodge the sediment from the tube. Document the samples photographically, immediately after extrusion. The photographs are to be recorded and transmitted in the same format. A licensed geologist with Hanford experience will describe the samples. Visual inspection and simple manual manipulations will be performed to provide a geologic description of each sample. These descriptions shall provide estimates of the percentage of sand, fine sand, very fine sand, coarse to fine silt and mud content. The sediment descriptions are recorded and used to classify the sediment texture on a modified Folk/Wentworth diagram.

b. Composite the material from Liners A, B and C and the shoe and homogenize.

c. Subsample a representative portion (10 to 15 g) of the composited material and place into a pre-weighed jar on a calibrated balance, as soon as possible after extrusion and compositing. Place the jar with sample in an oven, set to 105 °C, overnight. Cool the sample and weigh; calculate the percent moisture content by weight. Return the sample to the oven for at least 2 hours of additional heating. Reweigh the sample after cooling and calculate the cumulative weight loss. Repeat this process with additional weighing until a constant weight is achieved (less than 0.01 g change on successive weighing). The cumulative weight loss on drying is used to calculate the moisture content by weight and the percent dry solids by weight.

d. Subsample a sufficient amount of the composited material to perform the required “quick turn” analysis specified in Table 4-1 and contact with an equal portion of deionized water. Initially, assume the amount of moisture in the sediment is 5%, to calculate the amount of water needed to make up a 1:1 ratio of water to dry solids. The assumed leach factors will be mathematically corrected prior to reporting results, once the percent moisture results are complete. Approximately a 3-mL aliquot of the unfiltered 1:1 sediment: water extract supernates will be used for pH measurement.

e. Perform analysis for pH, nitrate, conductivity and ^{99}Tc on the 1:1 water digest. These are the “quick turn” constituents. The nitrate and ^{99}Tc results are to be reported to the Primary Laboratory Contact within an expedited time frame, typically within one week of sample receipt at 222-S Laboratory. If requested by the Primary Laboratory Contact, the data will be provided within 48 hours. Standard laboratory QC requirements are applied to these analyses (i.e., laboratory blank, laboratory control sample, and duplicate). pH and conductivity results will be held and reported in the standard data package.

f. Subsample sufficient amount of the composited material to perform all remaining analyses identified in Table 4-1.

The required methods of analysis for analytes are identified in Table 4-1 and are methods included in SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, Third Edition, as amended. It will be necessary for the laboratory to contact the Primary Laboratory Contact to deviate from the methods identified in Table 4-1. It is understood that the laboratory analytical procedures may have changes to the SW-846 methods to accommodate analysis of samples that are contaminated with Hanford tank waste and/or to reduce radiological exposure to the analysts. It is also understood that those changes and their effect on method performance will be and have been documented to demonstrate that procedures can provide satisfactory performance for the intended use of the data. The documentation of changes (e.g., substitutions, deviations, or modifications) to the methods shall be in writing, maintained at the laboratory, and available for inspection on request by authorized representatives of regulatory authorities and WRPS. Additional regulatory QA or DOE/RL-96-68, *Hanford Analytical Services Quality Assurance Requirements Documents* (HASQARD) requirements for documenting procedure modifications should also be followed.

4.2 INSUFFICIENT RECOVERY OF SAMPLE MATERIAL

If the quantity of sample material is insufficient to perform the analyses requested in this FSAP, the laboratory shall notify the Primary Laboratory Contact within 1 working day. The Primary Laboratory Contact will identify the analyses priority based on available sample material and discussion with project personnel (e.g., Project Manager). Any analyses prescribed by this FSAP, but not performed, shall be identified in the data report and through the change notice process (see Section 7.0).

5.0 QUALITY ASSURANCE AND QUALITY CONTROL

DOE/RL-96-68 identifies the quality requirements for environmental data collection, including sampling, field measurements, and laboratory analysis and complies with the requirements of:

a. DOE O 414.1C, *Quality Assurance*

b. Title 10, *Code of Federal Regulations*, Part 830, "Nuclear Safety Management," Subpart A--Quality Assurance Requirements, §830.120, "Scope" (10 CFR 830.120)

c. EPA/240/B-01/003, *EPA Requirements for Quality Assurance Project Plans EPA QA/R-5*.

Hanford onsite laboratories performing analyses in support of this FSAP have approved and implemented QA plans. As required by TFC-PLN-02, "Quality Assurance Program Description," these QA plans meet the minimum requirements of DOE/RL-96-68 as the baseline for laboratory quality systems. If subcontracting any portion of the analytical requirements to a commercial laboratory off the Hanford Site, the subcontractor's implementing QA program shall comply with *Quality Systems for Analytical Services* (QSAS), or be scheduled for DOE Consolidated Audit Program (DOECAP) certification. A commercial laboratory off the Hanford Site is subject to WRPS audit and QA Program approval.

All sampling and analysis activities will be performed using approved methods, procedures, and work packages that are written in accordance with approved operational and laboratory QA plans, which are consistent with the requirements of this FSAP. Sampling and analysis activities shall be performed by qualified personnel using properly maintained and calibrated equipment.

Sampling and laboratory personnel shall complete the necessary training and must receive appropriate certification to perform assigned tasks in support of the characterization project. The environmental safety and health training program provides workers with the knowledge and skills necessary to safely execute assigned duties. Field personnel typically will have completed, at a minimum, the following training before starting work:

- Occupational Safety and Health Administration 40-hour hazardous waste worker training and supervised 24-hour hazardous waste site experience

- 8-hour hazardous waste worker refresher training (as required)

- Radiological worker training.

A graded approach is used to ensure that workers receive a level of training commensurate with their responsibilities that complies with applicable DOE orders and government regulations. Specialized employee training includes pre-job briefings, on-the-job training, emergency preparedness, plan-of-the-day activities, and facility/worksite orientations.

5.1 QUALITY CONTROL REQUIREMENTS FOR FIELD SAMPLING

Prior to sampling, sampling equipment shall be cleaned using a procedure that is consistent with SW-846 sampling equipment cleaning protocol. Only new (unused) pre-cleaned, quality assured sample containers or containers cleaned onsite in accordance with the SW-846 protocol shall be used for sampling.

Field QC samples shall be collected to evaluate the potential for cross-contamination and laboratory performance. Soil sampling requires the collection of field duplicates, equipment rinsate blanks, field blanks, and/or trip blank samples, where appropriate. This FSAP requires equipment rinsates and field blanks. Field duplicates (i.e., samples taken at the same location), which are used to evaluate precision of the sampling process, will not be collected as it is not possible to obtain multiple direct pushes exactly at the same location. Trip blanks, which are blank samples that travel with sample containers to the sampling site and return unopened to the laboratory with the samples, usually consist of carbon-free, deionized water. Trip blanks measure contamination during sample transport and are typically only analyzed for volatile organic compounds. Since there are no volatile organic compounds on the sample list (see Tables 3-1 and 4-1), no trip blanks will be collected and analyzed for this FSAP.

5.1.1 Equipment Rinsate Blanks

Sampling personnel from CHPRC or WRPS will prepare the equipment rinsates. Equipment rinsates are usually prepared after the sampling equipment is cleaned; they are used to verify the adequacy of sampling equipment decontamination procedures, and shall be collected for each sampling method or type of equipment used. Equipment rinsates shall consist of deionized water washed through decontaminated sampling equipment. Equipment rinsates are to be run every 20 samples for the analytes listed in Table 3-2, which also provides the list of the required sample bottles. It is anticipated that one equipment rinsate will be collected and analyzed for this FSAP since six samples are expected to be collected (three locations with two sample depths at each location).

5.1.2 Field Blanks

Sampling personnel from CHPRC or WRPS will prepare the field blanks. Field blanks are samples prepared in the field at the sample collection site and returned to the laboratory with the samples to be analyzed. They are primarily used to test for contamination from the atmosphere. Field blanks shall consist of deionized water. Field blanks are to be run every 20 samples for the analytes listed in Table 3-2, which also provides the list of the required sample bottles. It is anticipated that one field blank will be collected and analyzed for this FSAP since six samples are expected to be collected (three locations with two sample depths at each location).

5.1.3 Prevention of Cross-Contamination

Special care should be taken to prevent cross-contamination of soil samples. Particular care will be exercised to avoid the following common ways in which cross-contamination or background contamination may compromise the samples.

a. Improperly storing or transporting sampling equipment and sample containers.

b. Contaminating the equipment or sample bottles by setting them on or near potential contamination sources, such as uncovered ground. Samples should not be collected or stored in the presence of exhaust fumes.

c. Handling bottles or equipment with dirty hands. Sample containers should be filled with care so as to prevent any portion of the collected sample coming in contact with the sampling personnel's gloves.

d. Improperly decontaminating equipment before sampling or between sampling events.

5.2 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS FOR LABORATORY ANALYSIS

The QA objective of this plan is to develop implementation guidance that will provide data of known and appropriate quality. Data quality is assessed by representativeness, comparability, accuracy, and precision. These terms are defined in Table 5-1. The applicable QC guidelines, quantitative target limits, and levels of effort for assessing data quality are dictated by the intended use of the data and the nature of the analytical method.

Table 5-1. Data Quality Definitions.

Data Quality Term	Definition
Representativeness	Representativeness is the degree to which data accurately and precisely represents a characteristic of a population, a parameter variation at a sampling point, a process condition, or an environmental condition.
Comparability	Comparability is the confidence with which one data set can be compared to another.
Accuracy	Accuracy represents the degree to which a measurement agrees with an accepted reference or true value.
Precision	Precision represents a measure of the degree of reproducibility of measurements under prescribed similar conditions.

ATL-MP-1011, *ATL Quality Assurance Project Plan for 222-S Laboratory* specifies the requirements for ensuring the quality of sample analyses performed by Advanced Technologies and Laboratories International, Inc. (ATL) at the 222-S Laboratory. Analyses performed at the 222-S Laboratory will be governed by ATS-MP-1032, *222-S Laboratory Quality Assurance Project Plan* and ATL-MP-1002, *Quality Assurance Program Description (QAPD)*. All analyses shall be performed in accordance with these requirements. Laboratories performing analyses in support of this FSAP shall have approved and implemented QA plans. These QA plans shall meet HASQARD minimum requirements as the baseline for laboratory quality systems.

The analytical/laboratory QC requirements (duplicates, spikes, etc.) are identified in Table 4-1. The laboratory shall also use calibration and calibration check standards appropriate for the analytical instrumentation being used (see HASQARD for definitions of QC samples and standards). The criteria presented in the tables are goals for demonstrating reliable method performance. The laboratory will use its internal QA system for addressing any QC failures. If the QC failures are systematic and cannot be resolved by the internal protocols, the Quality Assurance personnel shall be consulted to determine the proper action. The laboratory should suggest a course of action at that time. All data not meeting the QC requirements shall be properly noted, and the associated QC failures shall be discussed in the narrative of the data report.

5.2.1 Laboratory Quality Control

The laboratory method blanks, duplicates, laboratory control sample/blank spike, and matrix spikes are defined in Chapter 1 of SW-846 and will be run at the frequency specified in Chapter 1 of SW-846. In the event that sample material is not sufficient to perform all analyses, sample quantity will be prioritized and allocated to completion of the method analysis. If insufficient sample is available for completion of laboratory QC analyses, the laboratory will make note of the condition in the data package narrative, and the associated data results will have laboratory qualifiers added as appropriate. Where spike duplicates are required, duplicates do not need to be analyzed and where duplicates are required, spike duplicates are not required. Minimally, a duplicate and spike (or spike duplicate) is required per laboratory batch.

5.2.2 Instrument/Equipment Testing, Inspection, and Maintenance

Measurement and testing equipment used in the field or in the laboratory that directly affects the quality of analytical data will be subject to preventive maintenance measures to ensure minimization of measurement system downtime. Laboratories and onsite measurement organizations must maintain and calibrate their equipment specified by manufacturer or other applicable guidelines. Maintenance requirements (such as parts lists and documentation of routine maintenance) will be included in the individual laboratory and the onsite organization QA plan or operating procedures (as appropriate). Calibration of laboratory instruments will be performed in a manner consistent with SW-846 or HASQARD.

Consumables, supplies, and reagents will be reviewed in accordance with SW-846 requirements and will be appropriate for their use.

6.0 DATA REPORTING

This section describes the laboratory reporting requirements for south of SX Farm soil samples. Section 6.1 identifies "quick turn" reporting requirements and Section 6.2 identifies how all the analyses other than the "quick turn" will be reported. Note that "quick turn" constituents are bolded in Table 4-1 and secondary constituents are italicized. Secondary constituents will only be reported in the Format VI data package if they are detected.

It is anticipated that the 222-S Laboratory will perform all of the analyses. If necessary, the laboratory may subcontract certain analyses to another qualified laboratory. The subcontracted laboratory shall meet all QA/QC requirements in this FSAP. The 222-S Laboratory will prepare a statement of work (SOW) authorizing the subcontracted laboratory to perform the analyses. The SOW shall be reviewed and approved by the Primary Laboratory Contact, the Quality Assurance personnel, and the Data Management Lead prior to commencement of laboratory analysis.

6.1 "QUICK TURN" REPORTING

The "quick turn" ^{99}Tc and nitrate analyses will be reported as preliminary results on an expedited time frame (typically within one week of the last sample receipt batched together; however, upon request it will be reported within 48 hours). The results are transmitted via e-mail to the Primary Laboratory Contact, Characterization Task Lead, and Data Management Lead. They will also be reported in the standard data package so the information will be available to load into HEIS.

6.2 FORMAT VI REPORTING

Analysis performed at the 222-S Laboratory will be provided in Format VI data packages. Analysis performed at other laboratories will be provided in a format equivalent to a 222-S Laboratory Format VI report.

Format VI Report with QA Verification includes the following.

- Narrative – contains a description of sample receipt, sample breakdown, and has a section corresponding to each method describing any analytical/QC deviations from the work plan.

- Results Table (Data Summary Report) – printout containing sample and duplicate results, relative percent difference, standard and spike recoveries, blank results, and data qualifiers (flags).

- Sample section that contains sample breakdown diagrams, chains of custody, and geologist's descriptions and photographs.

- Section that contains all e-mail correspondence documenting issues that arose during sampling and analysis, and subsequent decisions that affected initial work instructions.

- Laboratory will perform a QA review of the final report. Typical QA reviews require a minimum 10% review.

A Format VI data package is subject to internal laboratory QA verification and review including peer review prior to release.

The final data package will be provided to the Primary Laboratory Contact (i.e., .pdf file or copy through the Integrated Document Management System). The laboratory shall issue the data package within 120 calendar days following receipt of the last samples. Preliminary results shall be available within 60 days following receipt of the last sample. As indicated in Section 5.0, laboratory changes will be communicated to the Primary Laboratory Contact and documented in the laboratory report(s) narrative.

In addition to this data package, an electronic version of the analytical results, including tentatively identified compounds, shall be uploaded to HEIS within 14 calendar days of release of the data package. The electronic data shall be in the standard electronic format for HEIS [CP-15383, *Common Requirements of the Format for Electronic Analytical Data (FEAD)*].

7.0 CHANGE CONTROL

The Characterization Task Lead is responsible for ensuring the current version of the FSAP is being used and for providing any updates to field personnel. Version control is maintained by the administrative document control process.

Since this plan covers a one-time sampling event (i.e., sampling will not be a routine frequency like quarterly well sampling), all modifications to the plan will be made through the change notice process. Formal plan revisions will not be necessary. Table 7-1 provides an example of the types of changes that may be made to the sampling design and the documentation requirements. Field activity and laboratory work scope changes may be required because of unexpected field conditions, new information, health and safety concerns, or other unplanned circumstances. These work scope changes will be documented on the change notice form provided in Appendix C. Laboratory changes will be communicated to the Primary Laboratory Contact and documented in the laboratory report(s) narrative and/or through the change notice process, as applicable.

Table 7-1. Example of Change Control for Sampling Projects.

Type of Change	Action	Documentation
Slightly move sample location based on lack of recovery	No plan revision necessary	Field logbooks or operational records
Reduce required analysis due to insufficient sample recovery	Prepare change notice, obtain required approvals, and distribute change notice	Change notice

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8.0 DOCUMENTS AND RECORDS

All information pertinent to field sampling will be recorded in bound logbooks in accordance with existing sample collection protocols. The sampling team will be responsible for recording all relevant sampling information. Entries made in the logbook will be dated and signed by the individual who made the entry. Program requirements for managing the generation, identification, transfer, protection, storage, retention, retrieval, and disposition of records will be followed.

Logbooks are required for field activities. A logbook must be identified with a unique project name and number. The individual(s) responsible for logbooks will be identified in the front of the logbook and only authorized persons may make entries in logbooks. Logbooks will be signed by the field manager, supervisor, cognizant scientist/engineer or other responsible individual. Logbooks will be permanently bound, waterproof, and ruled with sequentially numbered pages. Pages will not be removed from logbooks for any reason. Entries will be made in indelible ink. Corrections will be made by marking through the erroneous entry with a single line, entering the correct information, and initialing and dating the changes.

The Project Manager is responsible for ensuring that a project file is properly maintained. The project file will contain the records or references to their storage locations. The project file will include the following, as appropriate:

- Field logbooks or operational records
- Data forms
- Chain-of-custody forms
- Sample receipt records.

The laboratory will follow their own procedures with respect to documents and records. Audits will be periodically conducted by WRPS QA to ensure their practices are following requirements. All WRPS records are put into the Integrated Document Management System, the Hanford Site record repository.

8.1 DATA QUALITY ASSESSMENT

The data quality assessment process compares completed field sampling activities to those proposed in corresponding sampling documents and provides an evaluation of the resulting data. The purpose of the data evaluation is to determine if quantitative data is of the correct type and is of adequate quality and quantity to meet the project data quality objectives. Data quality assessment will be performed according to guidelines in EPA/600/R-96/084, *Guidance for Data Quality Assessment, Practical Methods for Data Analysis*, *EPA QA/G-9, QA00 Update*.

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9.0 PROJECT ORGANIZATION

This section addresses the basic areas of project management, and it ensures that the project has a defined goal, that the participants understand the goal and approach to be used, and that the planned outputs have been appropriately documented. The project organization is described in Table 9-1. Project management and QA may conduct random surveillance and assessments to verify compliance with the requirements outlined in this FSAP, project work packages, the project quality management plan, procedures, and regulatory requirements. Deficiencies identified by these assessments shall be reported in accordance with existing programmatic requirements. Corrective actions will be implemented as required by WRPS policy and procedures. Management will be made aware of deficiencies identified by assessments and surveillances and subsequent corrective actions.

Table 9-1. Key Personnel. (3 sheets)

Title	Responsibility	Primary Contact	Alternate Contact
Project Manager	• Coordinates the preparation of data quality objectives, data requirements plans, work plans, Sampling and Analysis Plans, Field Sampling and Analysis Plans, as required. • Coordinates with U.S. Department of Energy and Washington State Department of Ecology.	Dan Parker	Susan Eberlein
Characterization Task Lead	• Prepares Sampling and Analysis Plans and/or Field Sampling and Analysis Plans and documents required change notices, as necessary. • Coordinates with Field Team Lead to identify reporting schedule requirements. • Coordinates with team members to ensure that project requirements are understood. • Determines where quality control samples will be taken to meet plan requirements. • Reviews paperwork to ensure plan requirements are being achieved. • Plans, coordinates, and oversees field sampling activities including sample collection, packaging, provision of certified clean sampling bottles/containers, documentation of sampling activities in controlled logbooks, chain of custody, and packaging and transporting of samples to laboratory or shipping center. • Reviews field paperwork to ensure that it has been completed correctly. • Directs training, mock-ups, and practice sessions to ensure that the sampling design is understood. • Identifies resources needed for sampling; develops and revises sampling procedures and training material; and performs training, as necessary. • Ensures equipment and materials (e.g., bottles) associated with sampling are available and ensures that equipment receives preventative maintenance as required.	Cindy Tabor	Harold Sydnor
Field Team Lead	• Develops information to be included in work packages. • Provides direction to Field Work Supervisor regarding field scope, schedule, and priorities. • Provides direction regarding drilling activities to field personnel including subcontractors. • Prepares work package information for all field activities. • Plans, coordinates, and oversees field drilling activities. • Coordinates with necessary organizations to ensure field drilling activities are conducted safely and correctly. • Communicates with the Characterization Task Lead, Primary Laboratory Contact, and Data Management Lead to identify field constraints that could affect sampling design or that would necessitate a change notice. • Leads the effort of determining sample depth for each probe hole. • Ensures field activities are documented in direct push completion reports.	Harold Sydnor	Cindy Tabor

Table 9-1. Key Personnel. (3 sheets)

Title	Responsibility	Primary Contact	Alternate Contact
Field Work Supervisor	• Acts as the key field interface for daily field activities. • Conducts daily briefings and goes over the daily plan. • Ensures work activities are performed in a safe and productive manner and in accordance with all applicable administrative and technical procedures. • Ensures that work does not commence until all personnel involved with the field work understand their roles and responsibilities. • Applies the work planning process, including conducting pre-job briefings and post-job reviews. • Oversees personnel performing low/medium risk, self-directed tasks with supervision only on an as-needed basis. • Identifies, recognizes, mitigates, and controls hazards.	Rick Franzen, Sr.	Chuck Peoples, Manager
Primary Laboratory Contact and Data Management Lead	• Acts as the primary laboratory interface. • Selects laboratory to perform the analyses and requests assessments/surveillances of the laboratories. • Works with the laboratory to resolve data quality issues and to ensure plan requirements are achieved. • Assists with resolving Data Validation issues and performs technical review of third party Data Validation results. • Assists in laboratory surveillances. • Ensures Sample Data Tracking system is set up to meet sampling and analysis objectives and ensures paperwork is generated for sampling events. • Oversees all Sample Data Tracking efforts in order to prioritize data management efforts and to ensure that project requirements are achieved. • Ensures the data verification process is completed and that data is reviewed against existing knowledge and data quality assessment guidelines. • Ensures that data is loaded into Hanford Environmental Information System correctly.	Cindy Tabor	Ann Shrum
Quality Assurance	• Provides oversight to ensure data integrity. • Performs assessments and surveillance, as necessary. • Reviews documentation generated through implementation of Sampling and Analysis Plans and/or Field Sampling and Analysis Plans. • Performs Quality Assurance review of third party Data Validation results. • Reviews changes to data documents and forms. • Reviews issues identified during data processes for corrective actions. • Identifies Quality Assurance hold points or best management practices, as needed.	Larry Markel	Mike McElroy, Manager

Table 9-1. Key Personnel. (3 sheets)

Title	Responsibility	Primary Contact	Alternate Contact
Radiological Engineering Contact	• Conducts As Low As Reasonably Achievable Reviews, exposure and release modeling, and radiological control optimization. • Identifies that appropriate controls are implemented to maintain worker safety. • Interfaces with health and safety contact. • Plans and directs radiological control technicians that support field activities.	Field Team Lead contacts: Daren Christensen Phone: 373-1986	
Health and Safety Contact	• Coordinates industrial health and safety support within the project as per required health and safety plan, job hazard analyses, and other pertinent safety documents. • Provides assistance to ensure compliance with applicable health and safety standards/requirements. • Coordinates with radiological engineering to determine personal protective clothing requirements.	Field Team Lead contacts: Mike Powers Phone: 376-5597	
Waste Management Contact	• Communicates policies and procedures to ensure project compliance with storage, transportation, disposal, and waste tracking requirements.	Field Team Lead contacts: Keith Smith Phone: 372-1322	

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APPENDIX A

MEETING MINUTES FROM 241-SX TANK FARM INTERIM MEASURES PROOF-OF-PRINCIPLE TEST PLANNING OCTOBER 30, 2012 MEETING

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Meeting Notes:
SX Farm Interim Measures Proof of Principle Test Planning

Meeting Date:	October 30, 2012
Location:	Ecology Building, room 3B
Purpose:	Discuss plan for SX Farm interim measure soil contamination removal proof-of-principle test, and define next steps in completing work plan.
Attendees:	Jeff Lyon (Ecology), Michelle Hendrickson (Ecology), Joe Caggiano (Ecology), Marysia Skorska (Ecology), Jim Alzheimer (Ecology), Mike Barnes (Ecology), Chris Kemp (ORP), Doug Hildebrand (DOE), Dan Parker (WRPS), Dan Glaser (WRPS), Harold Sydnor (WRPS), Mike Connelly (WRPS), Dan Glaser (WRPS), Mark Triplett (PNNL)

Topics of Discussion:

- Dan Parker described the stages of the SX farm contaminant removal test (see Figure 1).
  - The purpose of the test is to determine if contaminants can be removed using direct push boreholes.
  - Three direct push locations south of the farm will be pushed and logged.
  - Logs will be reviewed to determine sample depths.
  - Samples will be analyzed for moisture and a few mobile contaminants to determine if the location is feasible to perform the test.
  - Minimum moisture content for testing will be based on lab and modeling work performed by PNNL, but will be a qualitative call.
  - Nitrate is considered an important indicator for the ability of the process to remove dissolved chemicals – other soluble contaminants will behave similarly to nitrate.
  - The work plan will include a schedule for design of the field monitoring and test equipment, set-up, and test performance.
  - The work plan will not include the details of the field test configuration because the initial stages must be performed first, to obtain the needed information to design the test.
  - The work plan will include a schedule for the later proof-of-principle test activities and deliverables, including the recommendation on whether further testing or implementation of the method should be planned.
- Joe Caggiano asked if extraction through the narrow direct push borehole was feasible. Dan responded that the test will help answer that question. Dan noted that it is unclear how successful contaminant removal can be given the need to maintain air/water velocities in the formation as the radius impacted by the test increases, but we want to find out.
- Marysia Skorska asked if the test would employ only vacuum or a combination of vacuum and air injection. Dan responded that a decision had not yet been made, but multiple configurations were being considered. Conceptually vacuum could be used to pull water into the well from the formation, and a small diameter bladder pump could be used to carry the water from the well to the ground surface.
- Marysia requested a high level schedule of the activities associated with the SX test and other elements of the work plan.

- The group discussed the process for review of draft work plan sections prior to formal submittal. The purpose of advance review is to address questions, ensure that the deliverable does not contain surprises, and make the review process easier.
- Susan Eberlein indicated that her goal was to provide enough advance information that, after receiving the formal submittal, Ecology would consider it possible to provide provisional approval to start field work while completing detailed review of the work plan.
- The written work description section for each of the work plan activities (SX test, U farm resistivity work and TX farm direct push work) will be extracted and provided to Ecology as a draft for review. The draft will be provided by email, and a follow up meeting will be held if there are questions or comments that need discussion.
- Each work plan section (SX, U, TX) will be provided in a separate email to the entire group, over the next 2 weeks.
- Ecology may decide to appoint a lead to coordinate review and response for the various sections.

Actions:

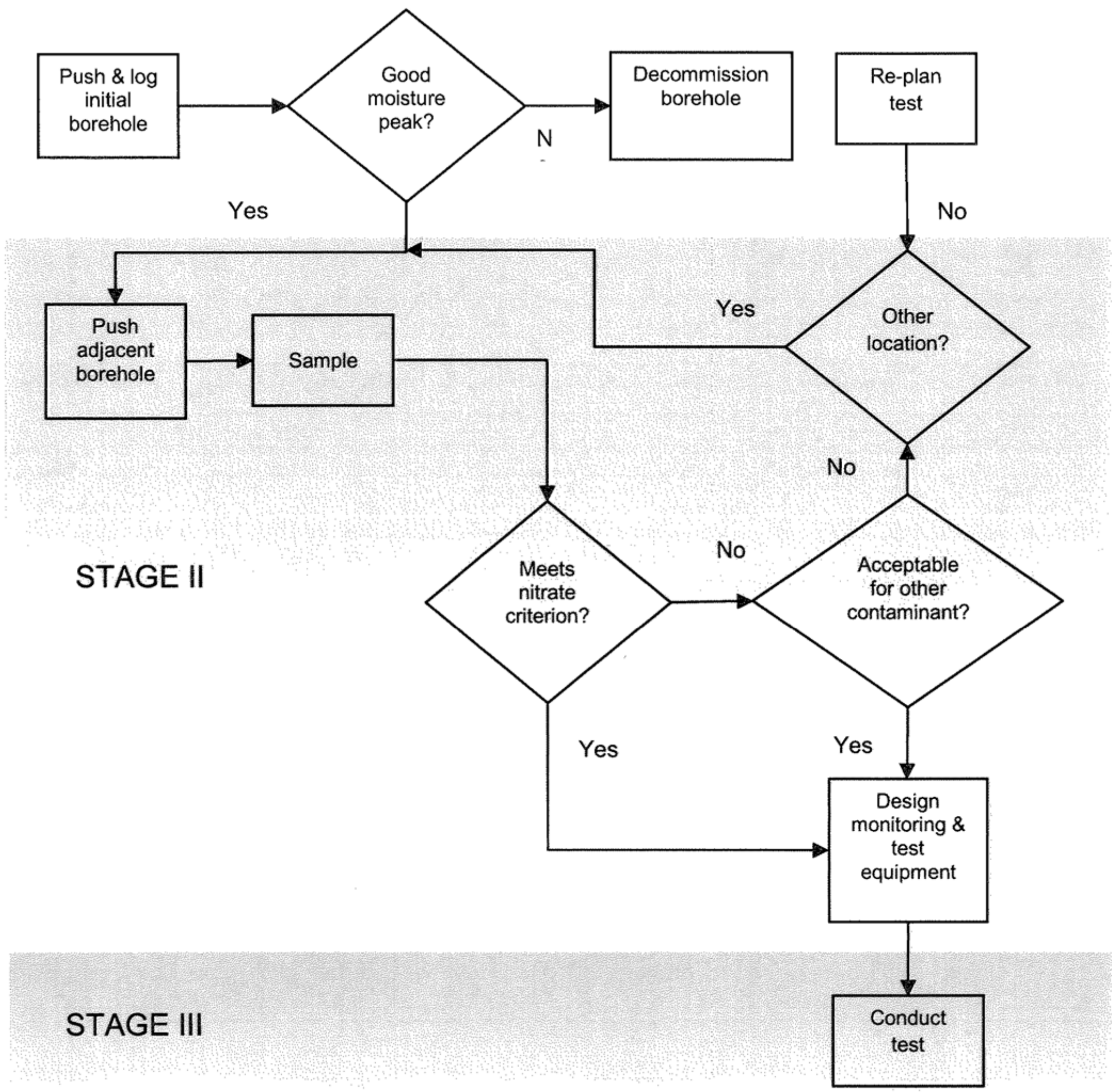
1. Provide summary schedule of activities associated with each element of the work plan (Eberlein)
2. Provide U Farm work description section (Glaser)
3. Provide TX Farm work description section and draft TX data requirements document (Connelly)
4. Provide SX farm work description section (Parker)
5. Appoint Ecology lead/point of contact for each section as appropriate (Lyon)

Concurrence:

[signature] 11-13-12 — C.J. Kemp, ORP — Date

[signature] 11-13-12 — Jeff Lyon, Ecology — Date

Figure 1. SX Farm Contaminant Removal Proof of Principle Test Phases



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APPENDIX B

VADOSE ZONE SAMPLING CHANGE NOTICE

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VADOSE ZONE SAMPLING
CHANGE NOTICE

Document: ____________ **Change Number:** ____________ **ECN to FSAP Required?** Y / N

Requestor: ______________________________ **Date:** ____________

Original Requirement:

Samples Impacted:

Proposed Change:

Reason for Change:

Date Change Effective: ____________

Schedule Impact:

Authorization:

Vadose Zone Characterization Task Lead (Print/Sign): ______________________________ **Date:** ____________

Vadose Zone Primary Laboratory Contact (Print/Sign): ______________________________ **Date:** ____________

222-S Project Coordinator (Print/Sign): ______________________________ **Date:** ____________

ATL Project Coordinator (Print/Sign): ______________________________ **Date:** ____________

Other (Optional, Print/Sign): ______________________________ **Date:** ____________

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INFORMATION CLEARANCE REVIEW AND RELEASE APPROVAL

Part I: Background Information

Title: Field Sampling and Analysis Plan for SX Pore-Water Extraction Test Project Stages I and II - Soil Sampling

Publish to OSTI? ☐ Yes ☑ No

Information Category:
☐ Abstract ☐ Journal Article ☐ Summary
☐ Internet ☐ Visual Aid ☐ Software
☐ Full Paper ☐ Report ☑ Other Field Sampling and Analysis Plan

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

Document Number: RPP-PLAN-54366 Revision 0 Date: February 2013

Author: Tabor, Cindy L

Part II: External/Public Presentation Information

Conference Name:

Sponsoring Organization(s): WRPS

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: WRPS Document Originator Checklist

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

Part IV: WRPS Internal Review

Function	*Organization*	*Date*	*Print Name/Signature/Date*
Subject Matter Expert	WRPS	04/27/2020	Tabor, Cindy L Approved - IDMS data file att.
Responsible Manager	WRPS	04/23/2020	Rutland, Paul 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 10:49 am, May 04, 2020 Print Name/Signature/Date

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

INFORMATION CLEARANCE REVIEW AND RELEASE APPROVAL

Part VI: Final Review and Approvals

Description	*Approved for Release*		*Print Name/Signature*
	Yes	*N/A*	
WRPS External Affairs	☒	☐	McKenna, Mark Approved - IDMS data file att.
WRPS Office of Chief Counsel	☒	☐	Peters, Amber D Approved - IDMS data file att.
DOE – ORP Public Affairs/Communications	☒	☐	Levardi, Yvonne M / Tyree, Geoff T Approved - IDMS data file att.
Other: ORP-OCC	☒	☐	Zelen, Benjamin J Approved - IDMS data file att.
Other: ORP-SME	☒	☐	Blackwell, Becky Approved - IDMS data file att.

Comments Required for WRPS-Indicate Purpose of Document:

The purpose of this plan is to provide the field sampling and analysis information associated with Stages I and II of the SX Pore-water Extraction Test Project.

APPROVED
By Sarah Harrison at 10:50 am, May 04, 2020

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: 05/04/2020

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

Forward Copies of Completed Form to WRPS Originator

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- <task name="Clearance Process" id="0" date-initiated="20200423T0634" performer="Sarah E Harrison" performer-id="252341659" username="h5635746">
<comments>Due Thursday May 7th 2020 - COB Please approve the Field Sampling and Analysis Plan for SX Pore-Water Extraction Test Project Stages I and II - Soil Sampling submitted by Cindy Tabor for public release. Thank you, Sarah Harrison Information Clearance</comments>
</task>
<task name="Add XML" id="1" date-done="20200423T0634" />
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- <task name="ORP Document Reviewer2" id="58" date-due="20200429T1300" date-done="20200430T1420" performer="Yvonne M Levardi" performer-id="185346745" username="h7131303" disposition="Public Release" authentication="true">
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<task name="ORP Document Reviewer1" id="57" date-due="20200429T1300" date-done="20200501T1042" performer="Geoff T Tyree" performer-id="6158846" username="h0068565" disposition="Public Release" authentication="true" />
<task name="Doc Owner Reviews ORP Comments" id="61" date-due="20200504T1042" date-done="20200504T0954" performer="Cynthia L Tabor" performer-id="173738849" username="h6436378" disposition="Send On" authentication="true" />
<task name="Milestone 2" id="62" date-done="20200504T0954" />
<task name="Verify Doc Consistency" id="4" date-due="20200505T0954" date-done="20200504T1025" performer="Sarah E Harrison" performer-id="252341659" username="h5635746" disposition="Cleared" authentication="true" />
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